



October 9, 2020

Tommy Lee  
Cedar Meadow Lake Watershed District  
P.O. Box 320  
Leicester, MA 01524-0320

**Re: Lake Assessment and Management Recommendations – 2020  
Cedar Meadow Lake  
Leicester, Massachusetts  
ESS Project No. C609-003**

Dear Mr. Lee,

ESS Group, Inc. (ESS) is pleased to present the Cedar Meadow Lake Watershed District (the District) with this report summarizing the assessment of Cedar Meadow Lake completed by ESS this year and our corresponding management recommendations. ESS completed a full-lake aquatic plant assessment and collected water quality data at Cedar Meadow Lake on August 6, 2020.

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.

### **TIMELINE OF MONITORING AND MANAGEMENT ACTIONS AT CEDAR MEADOW LAKE**

The following is a brief summary of the key monitoring and management actions undertaken at Cedar Meadow Lake since 2015.

- March 2015 – Leicester Conservation Commission issued an Order of Conditions for management of aquatic invasive plant species through herbicide treatments, hand harvesting, and diver harvesting. Treatment of algae blooms through the use of copper-based algaecides was also approved.
- June 2015 – Aquatic Control Technology (ACT, now Solitude Lake Management) treated 22.7 acres of the lake with Reward (diquat) and Clipper (flumioxazin) to control fanwort (*Cabomba caroliniana*) and variable-leaf milfoil (*Myriophyllum heterophyllum*).
- July 2015 – ESS conducted post-treatment aquatic plant mapping at the lake, during which few living fanwort or variable-leaf milfoil plants were observed. ESS observed a cyanobacteria bloom occurring in the lake and recommended monitoring water clarity to determine whether algae testing and treatment would be appropriate.



- September 2015 – ESS collected a water sample from the lake for qualitative analysis of algae community. The sample was found to contain fairly dense concentrations of multiple cyanobacteria taxa including *Microcystis* sp., *Aphanocapsa* sp., *Woronichinia naegeliana*, and *Dolichospermum* sp.
- May 2016 – ESS conducted early growing season plant mapping at Cedar Meadow Lake, which documented a relatively small area of variable-leaf milfoil in the northern end of the lake and both variable-leaf milfoil and fanwort in the basin north of Rawson Street.
- July 2016 – In response to the District's observations of a possible algae bloom, ESS collected a water sample from the lake for qualitative analysis of algae community. Based on the qualitative analysis of the sample, a more detailed quantitative analysis was not warranted. Water clarity as measured with a Secchi disk was 1.0 meters.
- September 2017 – No formal monitoring or management of the lake was conducted in 2017. The District reported exceptional water clarity during that summer.
- May 2018 – ESS conducted early growing season plant mapping at Cedar Meadow Lake which documented relatively low aquatic plant cover. Variable-leaf milfoil was found to have expanded since 2016, but remained sparse throughout most of the lake. A visible algae bloom was observed during ESS's site visit, and a water sample was collected for qualitative analysis of algae community. The cyanobacterium *Anabaena* was observed in the sample.
- August 2018 – Leicester Conservation Commission issued an extension for the Order of Conditions with a new expiration date of March 11, 2021.
- October 2019 – No formal monitoring or management of the lake was conducted in 2019. The District reported very good water clarity in August; however around mid-October a likely cyanobacteria bloom was observed. The visible bloom dissipated by the end of October.
- July 2020 – A visible algae bloom developed in the lake in late June to early July. Water samples were collected by the District and sent to Aquatic Analysts for algal community analysis. The results indicated that the toxic cyanobacteria *Microcystis aeruginosa* was present in the samples at concentrations ranging from 23,151 to 39,902 cells/mL, below the World Health Organization (WHO) guideline for taking action of 100,000 cells/mL and the Massachusetts Department of Public Health (DPH) Guidelines for waterbody closure of 70,000 cells/mL. Other potentially toxic species were present at lower densities.
- August 2020 – Following concerns about this summer's cyanobacteria bloom, ESS completed a full-lake plant mapping effort and collected general water quality measurements at three locations in the lake.

## AQUATIC PLANT MAPPING RESULTS

ESS documented 22 species of aquatic macrophytes in Cedar Meadow Lake this year, an increase in overall species diversity compared to the 2016 and 2018 aquatic plant mapping results. Four aquatic invasive species were documented in the lake this year, including two species which had not previously been documented in the lake. Similar to past years, the aquatic invasive species fanwort (*Cabomba caroliniana*) and variable-leaf milfoil (*Myriophyllum heterophyllum*) were documented in the lake during 2020, while brittle naiad (*Najas minor*) and water chestnut (*Trapa natans*) were documented for the first time. Table 1 provides a summary of the aquatic plant mapping results from August 6, 2020.

**Table 1. Cedar Meadow Lake Aquatic Macrophyte Summary, August 6, 2020.**

Common Name	Scientific Name	Status
Watershield	<i>Brasenia schreberi</i>	Native
<b>Fanwort</b>	<b><i>Cabomba caroliniana</i></b>	<b>Invasive</b>
Coontail	<i>Ceratophyllum demersum</i>	Native
Waterwort	<i>Elatine sp.</i>	Native
Spikerush	<i>Eleocharis sp.</i>	Native
Canadian waterweed	<i>Elodea canadensis</i>	Native
Aquatic moss	<i>Fontinalis sp.</i>	Native
Golden hedge-hyssop	<i>Gratiola aurea</i>	Native
<b>Variable-leaf milfoil</b>	<b><i>Myriophyllum heterophyllum</i></b>	<b>Invasive</b>
Slender naiad	<i>Najas flexilis</i>	Native
Southern naiad	<i>Najas guadalupensis</i>	Native
<b>Brittle naiad</b>	<b><i>Najas minor</i></b>	<b>Invasive</b>
Stonewort	<i>Nitella sp.</i>	Native
Yellow water lily	<i>Nuphar lutea</i>	Native
White water lily	<i>Nymphaea odorata</i>	Native
Ribbonleaf pondweed	<i>Potamogeton epihydrus</i>	Native
Thinleaf pondweed	<i>Potamogeton pusillus</i>	Native
Spiral pondweed	<i>Potamogeton spirillus</i>	Native
<b>Water chestnut</b>	<b><i>Trapa natans</i></b>	<b>Invasive</b>
Common bladderwort	<i>Utricularia macrorhiza</i>	Native
Purple bladderwort	<i>Utricularia purpurea</i>	Native
Water celery	<i>Vallisneria americana</i>	Native

As in past years, aquatic plant cover (a measure of the two-dimensional extent of plant growth across the lake) was generally low (Figure 1). Aquatic plant cover exceeded 50% only in the northeastern cove and in the small marsh located on the western side of the lake. Throughout most of the lake, aquatic plant cover was 25% or less. Aquatic plant biovolume (a measure of the three-dimensional extent of plant growth through the water column) was similarly low and never exceeded 50% (Figure 2). Aquatic plant biovolume exceeded 25% only at two locations: near the inlet at Rawson Street and in the marsh on the

western shoreline. These results suggest that the overall extent of aquatic plants in Cedar Meadow Lake is currently low to moderate, and unlikely to impair recreational uses of the lake such as boating, fishing, and swimming.

The aquatic plant mapping conducted this year documented two aquatic invasive plant species which had not previously been known to occur in Cedar Meadow Lake: brittle naiad and water chestnut. Additionally, fanwort was documented within the main basin of the lake for the first time this year. Fanwort is currently the most wide-spread aquatic invasive plant species in the lake, and was documented at 22 of 99 (22%) survey locations (Figure 3). Overall fanwort cover throughout the lake is still low, with the only notably dense patch of fanwort located at the northern end of the northeastern cove. Fanwort was also documented near the inlet, along the southwestern shoreline, and at a few other scattered locations. Variable-leaf milfoil was documented at 12 of 99 (12%) survey locations, with the highest density observed in the marsh along the western shoreline (Figure 4). Variable-leaf milfoil was also observed in the northeastern cove and at a few other scattered shoreline locations. Variable-leaf milfoil cover remains largely unchanged compared to the 2018 mapping results. This species was observed at a small number of locations where it was not documented in 2018; however it was not observed this year at a few locations where it was documented in 2018. Variable-leaf milfoil density in the northeastern cove was lower in 2020 compared to 2018, possibly because the species is being out-competed in this area by fanwort. Brittle naiad was observed at two of 99 (2%) survey locations – at the inlet and in the western marsh – and was found at low densities at both locations (Figure 5). Water chestnut was found only at one survey location (1%) and only two stems of the plant were observed (Figure 6). ESS hand-pulled the water chestnut stems and disposed them offsite. Both brittle naiad and water chestnut were very limited geographically within the lake and were growing at very low densities at the locations where they were found. Both of these characteristics indicate that these species have entered the lake recently and are not yet well-established.



*Fanwort was detected in the main basin of Cedar Meadow Lake for the first time this year, and is currently the most wide-spread of the four non-native aquatic plant species documented in the lake.*

## **WATER QUALITY MONITORING RESULTS**

Water temperature, dissolved oxygen, and specific conductance were measured vertically through the water column at 0.5-meter intervals at three locations in the lake: the inlet, a mid-lake location, and the outlet (Table 2). These parameters were consistent both vertically (i.e., from the surface to the bottom) within each sampling location as well as horizontally between locations. Consistent water temperatures from the surface to the bottom indicate that Cedar Meadow Lake was not stratified during the time of sampling. Stratification occurs in some lakes due to a lack of mixing between surface and bottom waters, typically during the summer, and results in a warmer, well-oxygenated surface layer and a cooler bottom layer with lower dissolved oxygen concentrations. Given that sampling occurred in mid-summer, when lakes typically become stratified, it is likely that Cedar Meadow Lake does not become stratified for

significant lengths of time during most years. Lack of stratification indicates sufficient mixing of the water column, which distributes dissolved oxygen and nutrients more evenly between the surface and bottom waters throughout the year compared to stratified lakes. A well oxygenated water column reduces the potential for phosphorus (a key algal nutrient) to be released from bottom sediments.

Dissolved oxygen concentrations generally ranged from 6.5 to 7.5 mg/L, which is sufficient for supporting a warm-water fish community including species such as bass, perch, and bluegill. Specific conductance values are related to the concentration of dissolved solids in water. Specific conductance values observed at Cedar Meadow Lake were within the expected range of values for freshwater lakes in Massachusetts.

**Table 2. Water Quality Vertical Profiles at Cedar Meadow Lake, August 6, 2020.**

Depth (m)	Temperature (°C)			Dissolved Oxygen (mg/L)			Dissolved Oxygen (%)			Specific Conductance (µS/cm)		
	I	M	O	I	M	O	I	M	O	I	M	O
0.0	27.0	26.9	27.5	6.38	7.31	7.22	81.6	93.9	93.3	157	157	157
0.5	27.0	26.9	27.2	6.54	7.25	7.15	83.9	93.2	92.1	158	157	157
1.0	26.5	26.8	26.9	6.51	7.20	7.09	83.0	92.3	91.3	158	157	157
1.5	25.5	26.4	26.8	6.60	7.23	6.81	82.4	92.0	86.8	164	157	157
2.0	-	26.2	26.7	-	7.21	6.71	-	91.0	85.8	-	156	157
2.5	-	26.1	-	-	7.14	-	-	90.2	-	-	156	-

I = Inlet, M = Mid-Lake, O = Outlet

Turbidity, pH, water clarity (Secchi depth), and apparent color were measured at the surface at each of the three sampling locations (Table 3). Surface 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).

**Table 3. Surface Water Quality Parameters at Cedar Meadow Lake, August 6, 2020.**

Parameter	Units	Inlet	Mid-Lake	Outlet
Turbidity	NTU	2.29	2.32	2.63
pH	SU	7.60	7.72	7.69
Secchi Depth	m	1.5	1.5	2.5
Total Depth	m	1.7	3.0	3.0
Apparent Color	Color Units	10	10	10
True Color	Color Units	30.0	30.0	30.0
Dissolved Organic Carbon	mg/L	6.1	5.1	4.9
Nitrite	mg/L	< 0.010	< 0.010	< 0.010
Nitrate	mg/L	< 0.02	< 0.02	< 0.02
Total Kjeldahl Nitrogen	mg/L	0.48	0.45	0.44
Total Nitrogen	mg/L	0.48	0.45	0.44
Total Phosphorus	mg/L	0.027	0.023	0.019

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



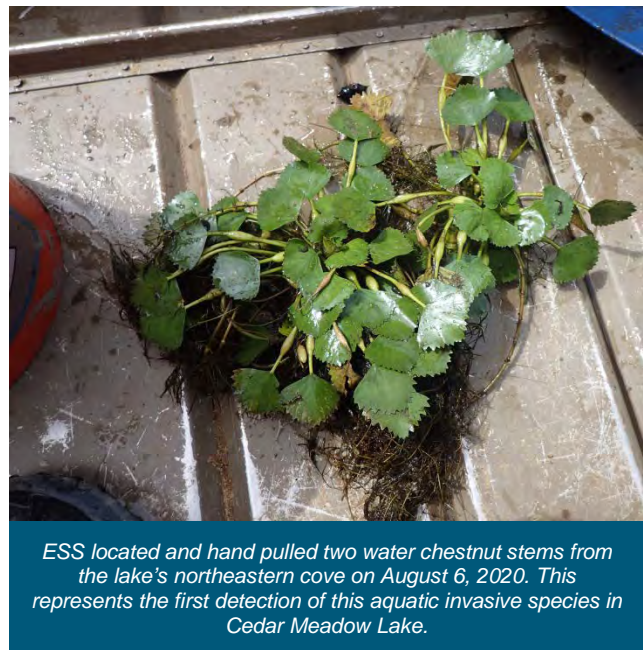
above this threshold. Total phosphorus concentrations in Cedar Meadow Lake were observed just above and below this threshold, with the highest concentrations at the lake's inlet and the lowest concentrations at the outlet. This gradient suggests that Burncoat Brook contributes to phosphorus loading in the lake, though phosphorus loading from other watershed sources is also likely.

## **MONITORING AND MANAGEMENT RECOMMENDATIONS**

Based on our past experience at Cedar Meadow Lake and the results of this year's monitoring, ESS provides the following monitoring and management recommendations for the lake.

**Annual Aquatic Plant Monitoring.** The results of this year's aquatic plant monitoring effort, which resulted in the early detection of two invasive plant species not previously documented in the lake, demonstrate the value of annual aquatic plant monitoring in waterbodies. ESS recommends that the District continue annual monitoring of aquatic plant species in the lake, with special emphasis on the four invasive species documented in the lake to date as well as other invasive species that could represent pioneer infestations. Annual monitoring will provide the District with current data to help inform management decisions. At this time, ESS does not recommend active management of aquatic invasive plant species in Cedar Meadow Lake (with the exception of hand pulling of water chestnut; see below) as the current populations of these species in the lake do not appear to be adversely affecting the ecological, recreational, or aesthetic values of the lake. However, the plant community should be monitored closely to determine whether management may be warranted in the future.

**Hand Pulling of Water Chestnut.** As stated previously, ESS located and pulled two stems of water chestnut from the northeastern cove this year. Water chestnut can be effectively managed by hand pulling where it occurs at low densities. If effective control can be achieved early, the species can be prevented from spreading throughout the lake. Water chestnut floats on the water's surface, has a distinctive growth form and appearance, and is unlikely to be confused with any other aquatic plant species; these factors make the species an excellent candidate for an effective hand pulling effort by District volunteers. ESS recommends that the District undertake an aggressive monitoring and hand pulling effort for water chestnut beginning next year to manage this species in the lake. Hand pulling must be conducted prior to the end of July to ensure plants are removed before seeds are dropped. Pulled plant material must be composed at an upland location far from any waterbody, or sent to a landfill.



**Weekly Secchi Disk Monitoring.** ESS recommends that the District conduct regular monitoring of water clarity in Cedar Meadow Lake using a Secchi disk. Ideally, monitoring would occur on a weekly basis from April through October. Water clarity generally decreases as algae activity increases, and this effect may be noticeable before a surface bloom is visible. Therefore, a consistent record of water clarity may



Mr. Tommy Lee  
October 9, 2020

provide advanced notice of an upcoming algae bloom, which would allow the District to potentially engage in management actions to prevent or control the bloom.

**Low Dose Alum Treatment.** A primary concern of the District over the past few years has been the periodic occurrence of cyanobacteria blooms in the lake. Water quality sampling conducted by ESS this year indicates that phosphorus concentrations in the water column are relatively high, consistent with the District's observations of algae blooms in the summer and fall. Managing algae blooms requires either preventing algae blooms from developing by creating conditions that are less conducive to their development, or treating algae blooms after they develop. The District's Order of Conditions includes the option for copper-based algaecide treatments, which could be used to control an active bloom but cannot prevent blooms from occurring in the first place.

Nutrient inactivation using a low-dose treatment of either 1) a combination of alum and sodium aluminate or 2) poly-aluminum chloride (PAC) represents a proactive strategy for management of algae blooms in a waterbody. These treatments work by binding with phosphorus in the water column and forming a flocculent that settles to the bottom and becomes incorporated into the sediment. This management strategy strips available phosphorus from the water column, thus making it unavailable to fuel algae growth. Alum treatments have been used recently at Indian Lake in Worcester, at Lake Attitash in Amesbury, which is a backup public water supply, and at Moswansicut Reservoir in Scituate, Rhode Island, which is part of the state's largest public drinking water supply system. The cost for a single low-dose alum treatment of Cedar Meadow Lake would likely range from \$15,000 to \$20,000. Actual costs for treatment would be based in part on the lake's flushing rate, which could be calculated as a next step if the District wishes to investigate this option further. Implementing an alum treatment program at Cedar Meadow Lake would require additional approval from the Leicester Conservation Commission. If the Commission is amenable to approving this work as an amendment to the existing Order of Conditions, permitting costs would likely be on the order of \$1,500 to \$2,500. If a new Notice of Intent is required, permitting costs would likely range between \$6,000 and \$8,000.

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 (401) 330-1233 or [apatterson@essgroup.com](mailto:apatterson@essgroup.com) if you have any questions.

Sincerely,

**ESS GROUP, INC.**

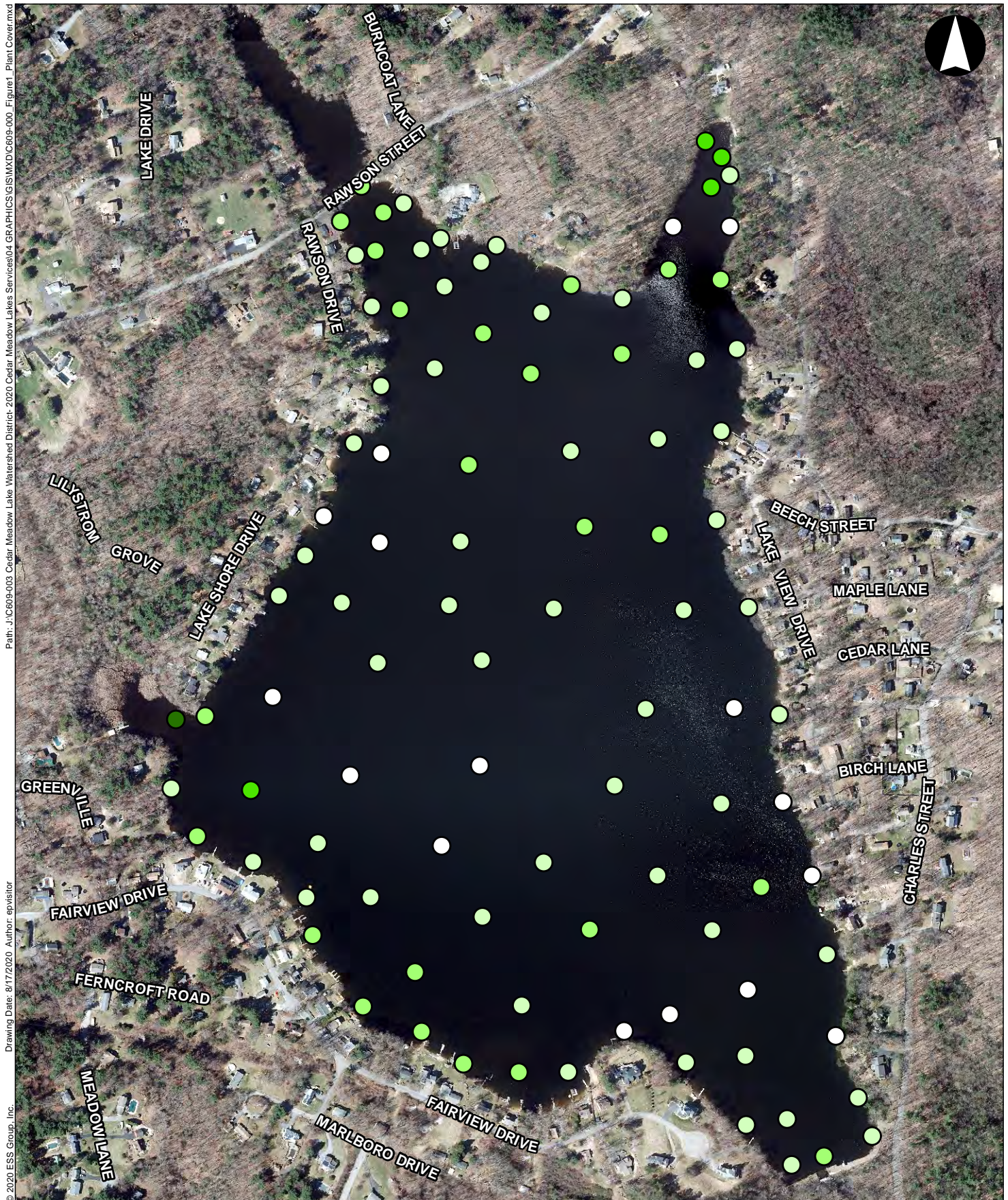
A handwritten signature in blue ink, appearing to read "Alexander H. Patterson".

Alexander H. Patterson  
Project Scientist

Attachments: Figures 1 through 7  
Laboratory report







Path: J:\C609-003 Cedar Meadow Lake Watershed District- 2020 Cedar Meadow Lakes Services\04 GRAPHICS\GIS\MXD\0609-000\_Figure1\_Plant Cover.mxd

Drawing Date: 8/17/2020 Author: epv:jsr

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### Cedar Meadow Lake 2020 Leicester, Massachusetts

1 inch = 500 feet

Source: 1) GPS data, ESS 2020;  
2) Aerial imagery, MassGIS 2019

### Aquatic Plant Cover

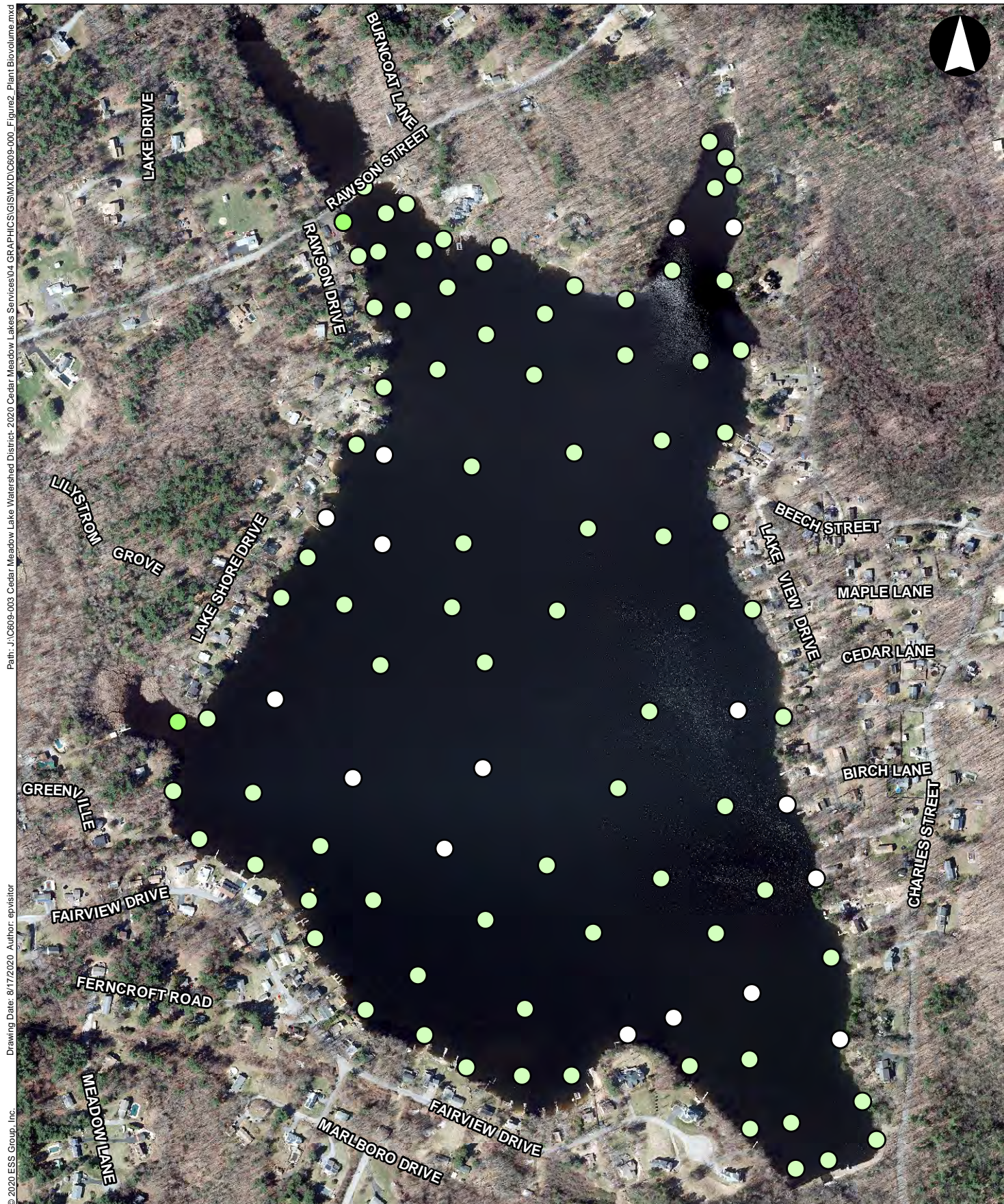
- 0%
- 1% to 25%
- 26% to 50%
- 51% to 75%
- 76% to 100%

### Aquatic Plant Cover August 6, 2020

Figure 1

0 500 Feet





Path: J:\C609-003 Cedar Meadow Lake Watershed District, 2020 Cedar Meadow Lakes Services\04 GRAPHICS\GIS\MXD\C609-000\_Figure2\_Plant Biovolume.mxd

Drawing Date: 8/17/2020 Author: epv:jsr

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# **Cedar Meadow Lake 2020** Leicester, Massachusetts

1 inch = 500 feet

Source: 1) GPS data, ESS 2020;  
2) Aerial imagery, MassGIS 2019

## Aquatic Plant Biovolume

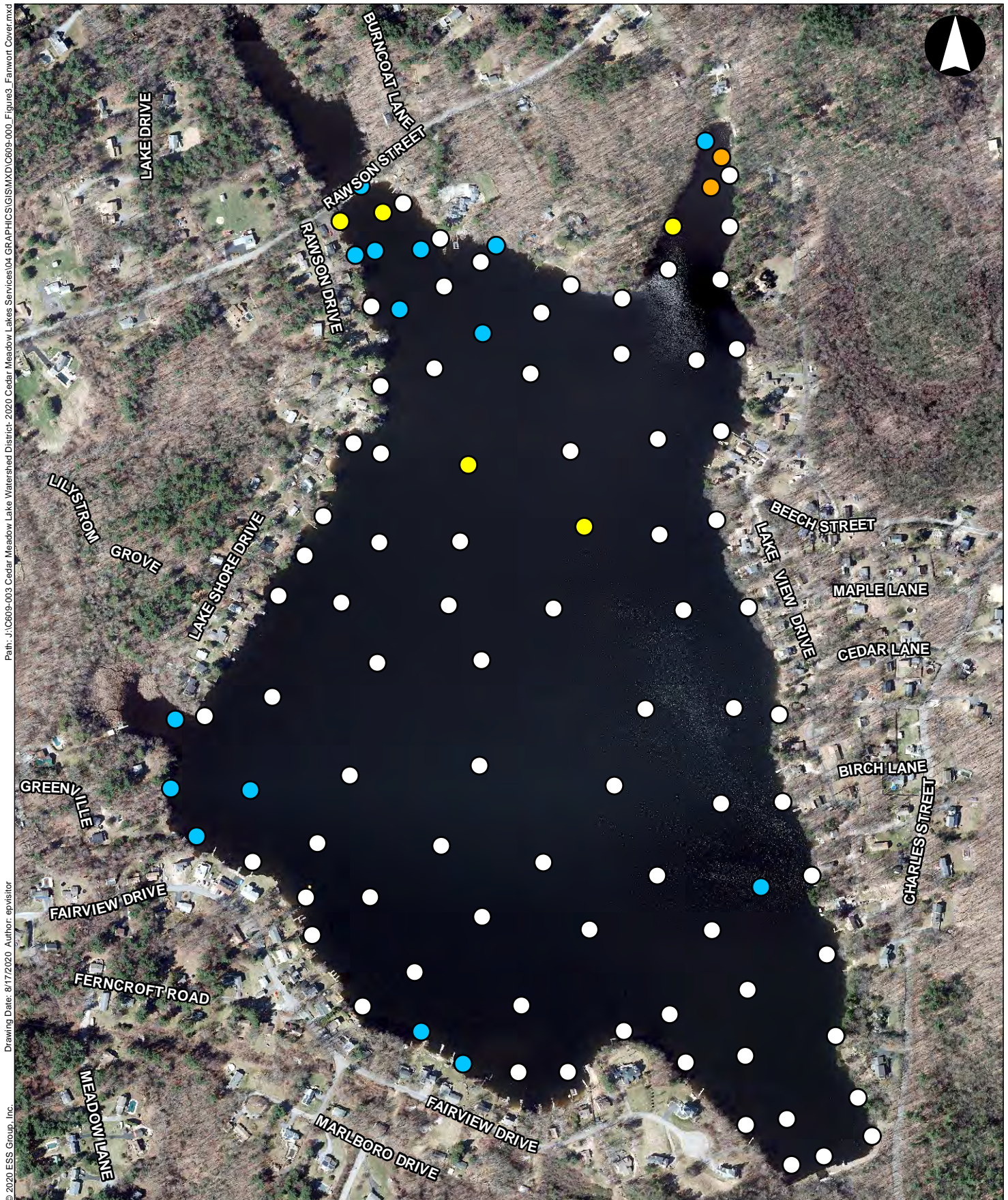
- 0%
- 1% to 25%
- 26% to 50%

## **Aquatic Plant Biovolume** **August 6, 2020**

0 500 Feet

**Figure 2**





Path: J:\C609-003 Cedar Meadow Lake Watershed District- 2020 Cedar Meadow Lakes Services\04 GRAPHICS\GIS\MXD\C609-000\_Figure3\_Fanwort\_Cover.mxd

Drawing Date: 8/17/2020 Author: epv:jsr

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### Cedar Meadow Lake 2020 Leicester, Massachusetts

1 inch = 500 feet

Source: 1) GPS data, ESS 2020;  
2) Aerial imagery, MassGIS 2019



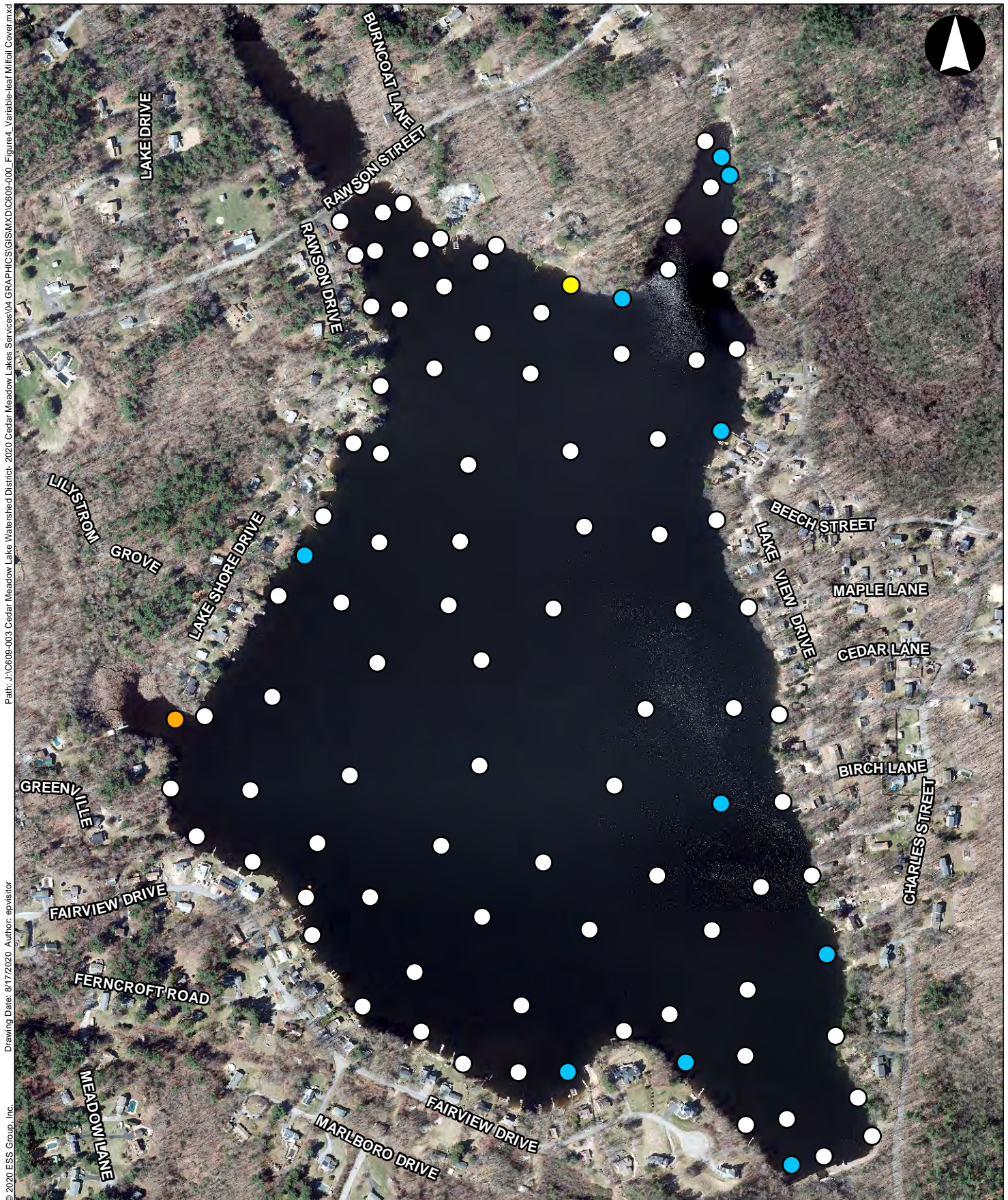
### Fanwort Cover

- 0%
- 1% to 25%
- 26% to 50%
- 51% to 75%

Fanwort Cover  
August 6, 2020

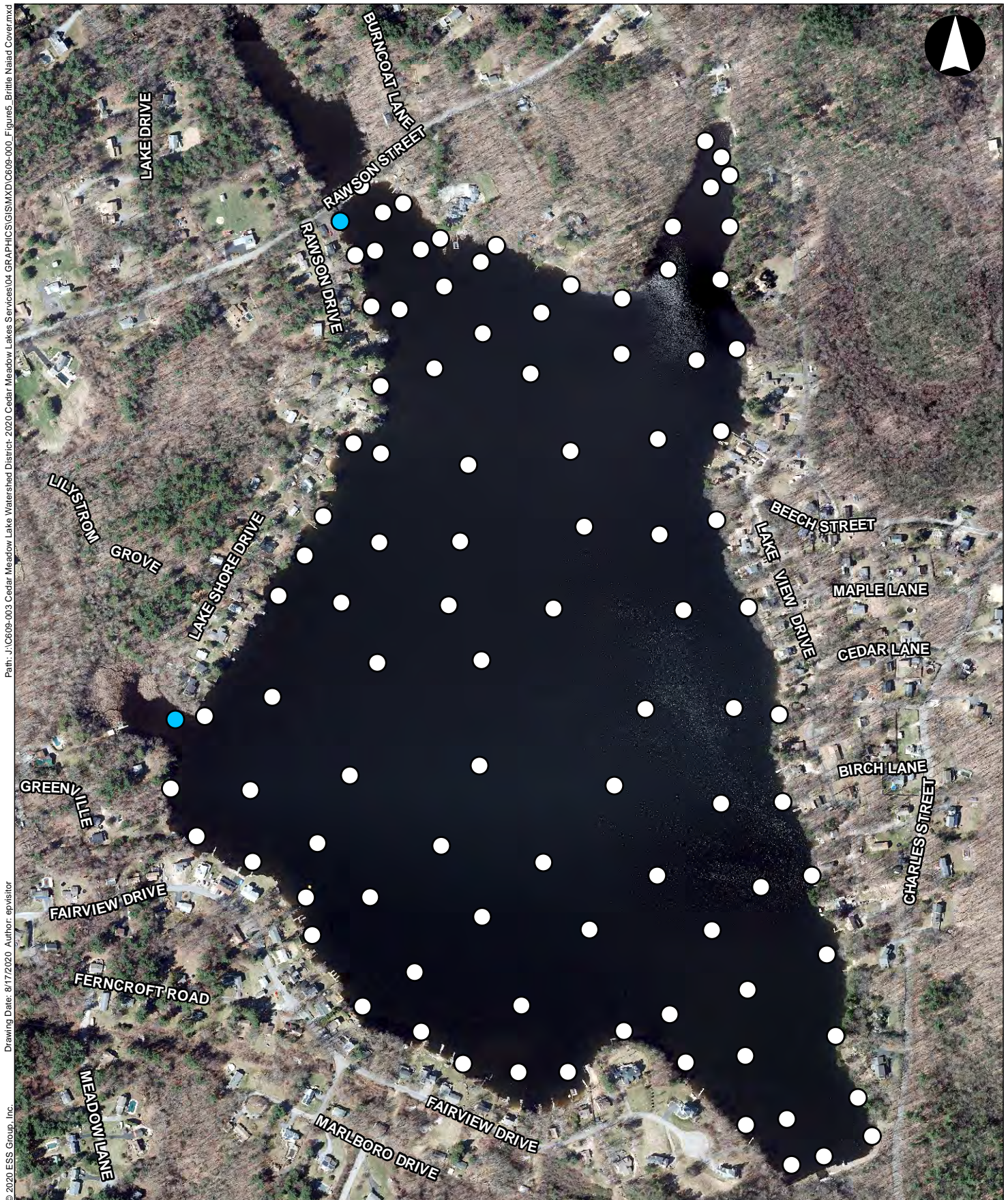
Figure 3





Path: J:\C609-003 Cedar Meadow Lake Watershed District- 2020 Cedar Meadow Lakes Services\04 GRAPHICS\GIS\MXD\C609-000\_Figure4\_Variabl-leaf Milfoil Cover.mxd  
 Drawing Date: 8/17/2020 Author: epv:jsv  
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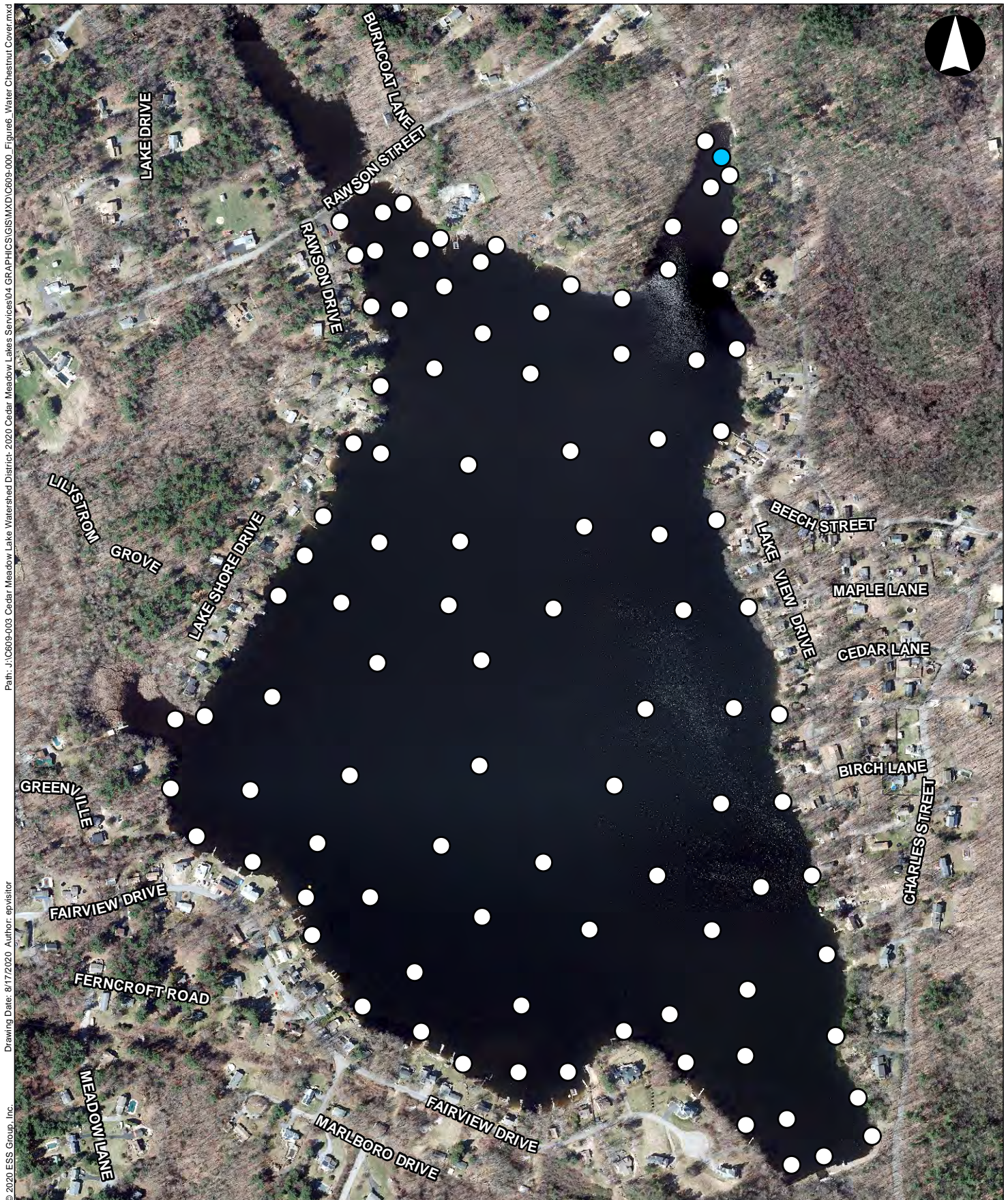




Path: J:\C609-003 Cedar Meadow Lake Watershed District - 2020 Cedar Meadow Lakes Services\04 GRAPHICS\GIS\MXD\C609-000\_Figure5\_Brittle Naiad Cover.mxd  
 Drawing Date: 8/17/2020 Author: epv:jsv  
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**Figure 5**





Path: J:\C0095-003 Cedar Meadow Lake Watershed District- 2020 Cedar Meadow Lakes Services\04 GRAPHICS\GSD\G609-000\_Figure6\_Water Chestnut Cover.mxd  
 Drawing Date: 8/17/2020 Author: epv:jsr  
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**Cedar Meadow Lake 2020**  
 Leicester, Massachusetts

1 inch = 500 feet

Source: 1) GPS data, ESS 2020;  
 2) Aerial imagery, MassGIS 2019

**Water Chestnut Cover**

- 0%
- 1% to 25%

**Water Chestnut Cover**  
 August 6, 2020



**Figure 6**





# **Cedar Meadow Lake 2020** Leicester, Massachusetts

1 inch = 500 feet

Source: 1) GPS data, ESS 2020;  
2) Aerial imagery, MassGIS 2019

## **Water Quality Monitoring Stations** August 6, 2020



**Figure 7**





Tuesday, August 18, 2020

Attn: Alex Patterson  
ESS Group Inc.  
10 Hemingway Drive 2nd Floor  
Riverside, RI 02915-2224

Project ID: CEDAR MEADOW LAKE  
SDG ID: GCG50060  
Sample ID#s: CG50060 - CG50062

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

August 18, 2020

SDG I.D.: GCG50060

Project ID: CEDAR MEADOW LAKE

---

Client Id	Lab Id	Matrix
CML-I-S	CG50060	SURFACE WATER
CML-C-S	CG50061	SURFACE WATER
CML-O-S	CG50062	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 18, 2020

FOR: Attn: Alex Patterson  
ESS Group Inc.  
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

08/06/20  
08/07/20

### Time

14:25  
16:26

## Laboratory Data

SDG ID: GCG50060  
Phoenix ID: CG50060

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

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Color, True	30.0	1	Color Units	1	08/07/20	O	SM2120B-11
Dissolved Organic Carbon	6.1	1.0	mg/L	1	08/10/20	ARG	SM5310B-11
Nitrite-N	< 0.010	0.010	mg/L	1	08/07/20 19:41	TB	E353.2
Nitrate-N	< 0.02	0.02	mg/L	1	08/07/20 19:41	TB	E353.2
Nitrogen Tot Kjeldahl	0.48	0.10	mg/L	1	08/12/20	KDB	E351.1
Total Nitrogen	0.48	0.10	mg/L	1	08/12/20	KDB	SM4500NH3/E300.0-11
Phosphorus, as P	0.027	0.003	mg/L	0.5	08/14/20	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 18, 2020

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

August 18, 2020

FOR: Attn: Alex Patterson  
ESS Group Inc.  
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

08/06/20  
08/07/20

### Time

14:47  
16:26

## Laboratory Data

SDG ID: GCG50060  
Phoenix ID: CG50061

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

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Color, True	30.0	1	Color Units	1	08/07/20	O	SM2120B-11
Dissolved Organic Carbon	5.1	1.0	mg/L	1	08/10/20	ARG	SM5310B-11
Nitrite-N	< 0.010	0.010	mg/L	1	08/07/20 19:44	TB	E353.2
Nitrate-N	< 0.02	0.02	mg/L	1	08/07/20 19:44	TB	E353.2
Nitrogen Tot Kjeldahl	0.45	0.10	mg/L	1	08/12/20	KDB	E351.1
Total Nitrogen	0.45	0.10	mg/L	1	08/12/20	KDB	SM4500NH3/E300.0-11
Phosphorus, as P	0.023	0.003	mg/L	0.5	08/14/20	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 18, 2020

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

August 18, 2020

FOR: Attn: Alex Patterson  
ESS Group Inc.  
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

08/06/20  
08/07/20

### Time

14:50  
16:26

## Laboratory Data

SDG ID: GCG50060  
Phoenix ID: CG50062

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

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Color, True	30.0	1	Color Units	1	08/07/20	O	SM2120B-11
Dissolved Organic Carbon	4.9	1.0	mg/L	1	08/10/20	ARG	SM5310B-11
Nitrite-N	< 0.010	0.010	mg/L	1	08/07/20 19:45	TB	E353.2
Nitrate-N	< 0.02	0.02	mg/L	1	08/07/20 19:45	TB	E353.2
Nitrogen Tot Kjeldahl	0.44	0.10	mg/L	1	08/12/20	KDB	E351.1
Total Nitrogen	0.44	0.10	mg/L	1	08/12/20	KDB	SM4500NH3/E300.0-11
Phosphorus, as P	0.019	0.003	mg/L	0.5	08/17/20	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 18, 2020

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

August 18, 2020

### QA/QC Data

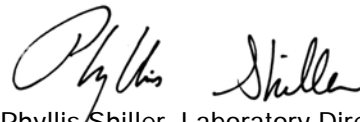
SDG I.D.: GCG50060

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 540868 (mg/L), QC Sample No: CG49898 (CG50060, CG50061, CG50062)													
Total Organic Carbon	BRL	1.0	2.2	2.2	NC	102			92.0			85 - 115	20
Comment:													
Additional: LCS acceptance range is 85-115% MS acceptance range 75-125%.													
QA/QC Batch 541616 (mg/L), QC Sample No: CG50278 (CG50062)													
Phosphorus, as P	BRL	0.01	11.4	11.5	0.90	97.1			97.4			85 - 115	20
Comment:													
Additional: LCS acceptance range is 85-115% MS acceptance range 75-125%.													
QA/QC Batch 541467 (mg/L), QC Sample No: CG52722 (CG50060, CG50061)													
Phosphorus, as P	BRL	0.01	5.65	5.85	3.50	98.8			107			85 - 115	20
Comment:													
Additional: LCS acceptance range is 85-115% MS acceptance range 75-125%.													
QA/QC Batch 540620 (mg/L), QC Sample No: CG50135 (CG50060, CG50061, CG50062)													
Nitrate-N	BRL	0.02	0.26	0.26	0	101			100			90 - 110	20
Nitrite-N	BRL	0.01	0.035	0.04	NC	104			109			90 - 110	20
QA/QC Batch 540930 (mg/L), QC Sample No: CG49614 (CG50060, CG50061, CG50062)													
Nitrogen Tot Kjeldahl	BRL	0.10	54.4	57.8	6.10	110			103			85 - 115	20
Comment:													
TKN is reported as Organic Nitrogen in the Blank, LCS, DUP and MS.													

Additional criteria: LCS acceptance range for waters is 85-115% and for soils is 75-125%. MS acceptance range is 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 18, 2020

Tuesday, August 18, 2020

Criteria: None  
State: MA

Sample Criteria Exceedances Report  
GCG50060 - 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.**  
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045  
Tel. (860) 645-1102 Fax (860) 645-0823



## Analysis Comments

August 18, 2020

SDG I.D.: GCG50060

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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

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

Temp 1.2 °C Pg 1 of 1

Data Delivery/Contact Options:

Fax: ☐  
Phone: ☐  
Email: ☒ ADATTERSON@ESGEO.P.COM

Customer: ESS GROUP INC. Project: CEDAR MEADOW LAKE  
Address: 10 HEMINGWAY DR 2ND FLOOR Report to: A. PATTERSON  
EAST PROVIDENCE, RI 02715 Invoice to: B. CABRAL  
QUOTE # \_\_\_\_\_

This section MUST be completed with Bottle Quantities.

Client Sample - Information - Identification  
Sampler's Signature: [Signature] Date: 8/6/20

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)

PHENIX USE ONLY SAMPLE #	Customer Sample Identification	Sample Matrix	Date Sampled	Time Sampled
50060	CHL-I-S	SW	8/6/20	14:25
50061	CHL-C-S	SW	8/6/20	14:40
50062	CHL-O-S	SW	8/6/20	14:50

Analysis Request	MS/MSD	GL Amber 802 Method	GL Soil container (methanol)	GL Soil container (H2O)	GL Amber Vial (As is)	GL Amber Vial (As is) HCL	PL H2SO4 250ml	PL HNO3 250ml	PL NaOH 250ml	Bacteria Bottle w/o	Bacteria Bottle w/so
TOTAL NITROGEN	X										
TOTAL PHOSPHORUS	X										
DISS. ORGANIC CARBON	X										
TRIC CARBON	X										

Relinquished by: [Signature] Accepted by: [Signature]  
Date: 8-7-20 Time: 14:50  
Date: 8/7 Time: 1626  
Turnaround Time: ☐ 1 Day ☐ 2 Days ☐ 3 Days ☒ Standard ☐ Other  
Comments, Special Requirements or Regulations: LOW DETECT ON PHOS 0.01 MG/L OR BETTER  
\*MS/MSD are considered site samples and will be billed as such in accordance with the prices quoted.

MA ☐ MCP Certification ☐ RCP Cert ☐ GW-1 ☐ GW-2 ☐ GW-3 ☐ S-1 10% CALC ☐ S-1 GW-1 ☐ S-1 GW-2 ☐ S-1 GW-3 ☐ S-2 GW-1 ☐ S-2 GW-2 ☐ S-2 GW-3 ☐ S-3 GW-1 ☐ S-3 GW-2 ☐ S-3 GW-3 ☐ SW Protection ☐ GA Mobility ☐ GB Mobility ☐ Residential DEC ☐ I/C DEC ☐ Other ☐

Data Format: ☐ Excel ☐ PDF ☐ GIS/Key ☐ EQUIS ☐ Other ☐

Data Package: ☐ Tier I Checklist ☐ Full Data Package ☒ Phoenix Std Report ☐ Other ☐

State where samples were collected: MA \* SURCHARGE APPLIES