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# RESILIENCY IMPROVEMENTS AT WATERSHOPS POND DAM DRAWDOWN PERIOD MONITORING REPORT #14

**July 5, 2022**

**For Compliance with:**

**Order of Conditions, DEP File No. 294-0607, issued 09/17/2020**

**Section 401 Water Quality Certification, BRP WW 08, DEP Transmittal No. X286704, issued 07/23/2021**

**Section 404 Permit, File No. NAE-2020-02301, issued 10/21/2020**

**Certificate on the SEIR, Secretary of Energy and Environmental Affairs, EOEEA No. 16234, issued 07/31/2020**

Prepared by: Paul G. Davis, PhD, and Adrienne Dunk, WPIT

Reviewed by: Guy Dalton, LSP, Associate Principal

## INTRODUCTION AND METHODOLOGY

In compliance with authorized procedures approved under the above-referenced permits and authorizations, GZA is monitoring dissolved oxygen levels, temperature, and transparency during the period of drawdown associated with the Resiliency Improvements at Watershops Pond Dam Project. This report presents the results of the fourteenth monitoring event conducted during the period of drawdown, which commenced with the opening of the low-level outlets at the dam on October 26, 2020.

Ecological resource monitoring was initially identified as a means to gauge the environmental impacts associated with a partial or full drawdown of Watershops Pond that may occur during the Project. The monitoring was described conceptually in the Alternatives Analysis included in the Expanded Environmental Notification Form (EENF) for the Project (EOEEA No. 16234, EENF dated June 15, 2020). On July 31, 2020, the Secretary of Energy and Environmental Affairs issued the Certificate on the EENF requiring the preparation of a Single Environmental Impact Report (SEIR). In response to comments received on the EENF and in response to the Secretary's Certificate on the EENF, a detailed draft "Aquatic and Wetland Resource Monitoring and Mitigation Plan" (the "Plan") was developed in coordination with regulatory agencies and was submitted as an integral mitigation commitment detailed within the SEIR dated August 28, 2020. The Plan was referenced in the Secretary's Certificate on the SEIR (October 16, 2020) and became a mitigation requirement associated with the City of Springfield's Preferred Alternative of full pond drawdown during the Project. The basic elements of the Plan were developed based upon prior studies of the pond and consultations with the Springfield Conservation Commission and State and Federal regulatory officials.



A copy of the Plan was provided in **Appendix 1** to the “Pre-Drawdown Ecological Monitoring Report,” GZA, September 2020.

During the 2022 spring drawdown, dissolved oxygen monitoring occurred monthly from April to June and will occur between August and November. During the winter drawdown period, dissolved oxygen monitoring occurred at a frequency of once every 2 months. During the 2021 drawdown period, from March through October, dissolved oxygen monitoring occurred monthly. After the pond refilling process began in May 2022, vertical profiles were conducted at four locations and Dissolved Oxygen (DO) and Temperature (°C) were measured at one-foot depth intervals, incorporating one of the pre-drawdown sampling locations, with the other two locations being unavailable due to lack of water depth at those locations. Beginning in June 2022, the two additional pre-drawdown sample profile locations were added as water depths allowed access (**Figure 1C**) for a total of six monitoring locations. Secchi disk depth was recorded at each monitoring location. During the 2021 and 2022 growing season, April through October, groundwater monitoring occurred monthly at the six stations located within the three bordering vegetated wetlands (BVWs) identified during the pre-drawdown report and depicted on **Figures 2 through 4**. Vegetation community monitoring occurs twice per growing season, in late May and between August 15 and September 15 at the same six stations as the groundwater monitoring.

The most recent water quality monitoring event was conducted on June 23, 2022 (see **Figure 1C** for data collection locations).

## RESULTS

During the June 2022 sampling event, the maximum pool depth observed was 13.5 feet, with most of the pool area less than 11 feet deep. However, observed pool depths varied from previous observations due to slight variations in monitoring locations as well as the partial closure of the low-level dam outlet on May 16, 2022, and the subsequent refilling of the pond. The height of the pool was determined by measuring the surface water elevation below the deck of the privately-owned steel bridge located approximately 200 feet upstream of the dam. The measured surface water elevation was at Elevation 150.2± which is approximately 4.0± feet higher than the water surface elevation that was measured in May 2022 and 5.25± feet higher than the April 2022 measurement.

Based upon the Secchi Disk depths which ranged from 3.5 to 4.5 feet, the water within the pool basin was observed to be less turbid than the May 2022 sampling event which recorded Secchi Disk depths of 1.5 to 3.0 feet.

Watershops Pond had an average temperature of 19.7° C for locations measured. The measured temperatures ranged from a low of 15.6° C in the West Branch Cove to a high of 22.4° C in the main pool area. The DO levels measured ranged from 1.6 at the pond bottom to a maximum of 10.8 mg/l within the water column (**Table 1**).



**Table 1. Watershops Pond Drawdown Pool Dissolved Oxygen, Temperature, and Secchi Depth Measurements**  
**Date of Data Collection: 06/23/2022 11:00 AM – 13:00 PM**

Surface Water Elevation: 150.2							
Location: Main Body, Near Dam, East of Steel Bridge; 42°05.861 N; 072°33.624 W				Location: Main Body, Central Pond, East of RR Bridge; 42°05.940 N; 072°33.345 W			
Secchi Depth (ft)	Depth (ft)	DO (mg/l)	Temp °C	Secchi Depth (ft)	Depth (ft)	DO (mg/l)	Temp °C
3.75	0	10.0	21.9	3.5	0	10.0	21.7
	1	10.0	22.0		1	10.2	21.3
	2	9.6	21.6		2	10.6	20.9
	3	9.7	21.1		3	10.8	20.7
	4	9.7	20.9		4	8.9	20.3
	5	9.7	20.7		5	7.2	19.6
	6	7.9	20.1		6	6.5	19.1
	7	6.4	20.7		7	6.1	18.9
	8	4.3	19.9		8	5.5	18.9
	9	4.3	19.7		8.5	4.5	18.9
	10	4.3	19.5				
	11	4.4	19.5				
	11.5	2.4	19.4				
Location: Main Body, Near Dam, 100'± West of Steel Bridge; 42°05.848 N; 072°33.735 W				Location: Main Body, Central Pond West of Roosevelt St. Bridge 42°06.212 N; 072°33.061 W			
Secchi Depth (ft)	Depth (ft)	DO (mg/l)	Temp °C	Secchi Depth (ft)	Depth (ft)	DO (mg/l)	Temp °C
4.5	0	9.7	22.4	3.5	0	10.1	22.1
	1	9.9	22.0		1	10.7	21.8
	2	10.3	21.2		2	10.6	21.6
	3	10.2	21.0		3	10.5	21.1
	4	10.2	21.0		4	10.0	20.9
	5	10.1	20.9		5	8.8	20.3
	6	9.6	20.9		6	7.4	19.2
	7	7.5	20.5		6.75	6.5	18.4
	8	5.8	20.3				
	9	5.3	19.8				
	10	4.4	19.7				
	11	4.3	19.6				
	12	3.8	19.6				
	13	3.9	19.6				
	13.5	1.6	19.6				
Location: West Branch Mill River Cove 42°06.606 N; 072°32.509 W				Location: East Branch Mill River Cove Near Pease Cove 42°06.473 N; 072°32.049 W			
Secchi Depth (ft)	Depth (ft)	DO (mg/l)	Temp °C	Secchi Depth (ft)	Depth (ft)	DO (mg/l)	Temp °C
3.5	0	7.5	19.9	3.5	0	8.7	17.8
	1	7.4	18.8		1	8.9	17.2
	2	7.5	17.4		2	8.8	17.1
	3	7.6	15.7		3	8.6	17.0
	3.5	7.9	15.6		4	8.4	17.0



The average DO concentration at each depth range of the water column is shown in **Table 2**. Despite variation in the DO concentration over depth, the average of all depths is 6.2 mg/l which exceeds the action level of 5.0 mg/l for 75% of the total pond volume. Additionally, within the first 9 feet of depth, which represent 92.8% of the total water volume in the pond, each average DO exceeds 5.0 mg/l.

**Table 2. Hypsometric Distribution of Lake Volume and Dissolved Oxygen by Depth**

Depth (ft)	Acres Encompassed by Contour Depth	Water column volume by depth interval (CF)	% vol. of water column within depth interval	Cum. % vol. above interval depth	Average DO (mg/l)
0-1	125.46	5,178,393.9	19.6	19.6	9.3
1-2	112.41	4,469,620.2	16.9	36.5	9.5
2-3	93.11	3,593,650.4	13.6	50.1	9.6
3-4	72.33	2,850,450.2	10.8	60.9	9.6
4-5	58.78	2,321,613.8	8.8	69.7	9.2
5-6	48.00	1,930,250.4	7.3	77.0	8.95
6-7	37.88	1,650,247.5	6.2	83.2	7.85
7-8	32.42	1,412,099.0	5.3	88.5	6.6
8-9	26.06	1,135,237.4	4.3	92.8	5.2
9-10	22.5	860,941.9	3.3	96.1	4.7
10-11	17.2	623,461.9	2.4	98.5	4.4
11-12	11.6	335,447.7	1.3	99.8	4.4
12-13	4.3	96,265.6	0.4	100.2	3.1
13-14	0.63	11,608.4	0.0	100.2	3.9
14-15	0.03	435.0	0.0	100.2	1.6
Total				100	

Groundwater levels were measured at the six stations described above by auguring a 3-inch diameter hole to a depth of at least 24 inches and allowing time for equilibration of the groundwater level within the hole. The observed depths to groundwater are shown in **Table 3**.

**Table 3. Watershops Pond Drawdown Groundwater Monitoring Measurements (inches below ground surface)  
Date of Data Collection: 06/30/2022 8:00 AM – 10:00 AM**

Date	Springfield College	Springfield College East Campus		GYSGT J. Sullivan Park		
	Station 1	Station 1	Station 2	Station 1	Station 2	Station 3
06/30/2022	-24+	-24+	-24+	-24+	-24	-20

Note: Depths denoted with a "+" indicate that groundwater was not observed at this depth.

**DISCUSSION**

The Plan suggested an action level for DO of 5 mg/l for at least 75% of the surface waters in the residual pool, with lesser values potentially triggering mitigation action. During the June 2022 monitoring event, this action level was met as the average DO concentration exceeded 5 mg/l for over 92% of the surface water volume. This result demonstrates somewhat increased DO levels from May 2022 which suggests that heterotrophic growth in the lake has not accelerated as yet to







deplete oxygen levels, as may be expected in mid-season sampling. The increase in DO may reflect riverine conditions which continue to dominate water quality during this mid-refill period (Especially given some rainfall the night before sampling), and less oxygen depletion from shallow sediments as the basin deepens.

As temperatures continue to increase, it is likely that the DO will continue to decrease as the summer season progresses. During the ongoing refill period, some areas of vegetation that developed within exposed sediments will be inundated resulting in the death and decay of these plants. Such decomposition could result in localized DO depletion; therefore, continued water quality observations will be useful for the 2022 growing season to determine if DO mitigation is necessary. The areas of vegetation submergence appear relatively small compared to the entirety of Watershops Pond, so we remain optimistic that DO levels should remain above the action thresholds during this refill and post-refill season.

The groundwater levels in the wetlands were expected to drop with the Watershops Pond drawdown. The groundwater depths remained relatively stable from May 2022 with a decrease in depth to groundwater at Gunnery Sergeant Park. The groundwater depths will continue to be monitored throughout the growing season. These data will be discussed and analyzed further in the annual wetland monitoring report. Following the refilling of the pool, wetland impacts, and potential mitigation measures will be discussed.

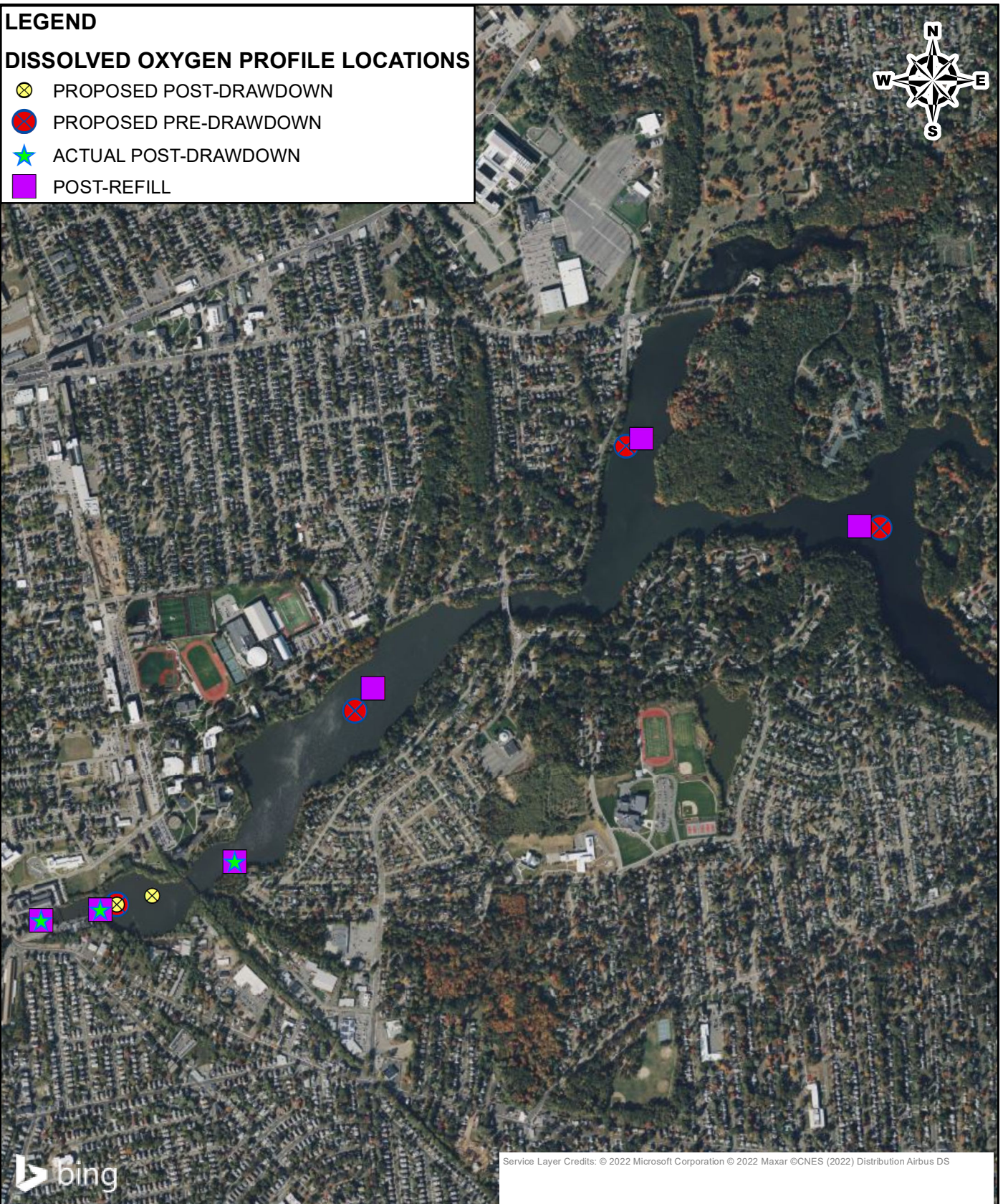
**LEGEND**

**DISSOLVED OXYGEN PROFILE LOCATIONS**

-  PROPOSED POST-DRAWDOWN
-  PROPOSED PRE-DRAWDOWN
-  ACTUAL POST-DRAWDOWN
-  POST-REFILL

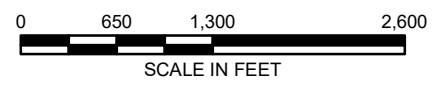


© 2022 - GZA GeoEnvironmental, Inc. J:\0 166600 - 0 166699\15.0166625.20 Watershops Pond Dam\GIS\mxd\DrawdownMonitoringReport\Fig1C\_DO\_Monitoring\_Location.mxd, June 30, 2022 - 3:58:57 PM, Adrienne.dunk



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 1 ALLEN STREET  
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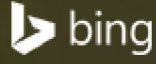
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**DISSOLVED OXYGEN PROFILE  
 MONITORING LOCATIONS**

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DESIGNED BY: ARD	DRAWN BY: ARD	SCALE: 1 in = 1,300 ft
DATE: 06/30/2022	PROJECT NO: 15.0166625.20	REVISION NO:

FIG.  
**1C**

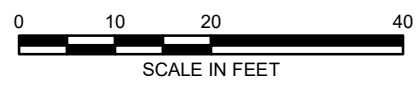


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### LEGEND

- MONITORING STATION
- WETLAND BOUNDARY POINT
- OBSERVED MEAN HIGH WATER
- WETLAND BOUNDARY
- BVW SURVEY AREAS
- PROJECT AREA



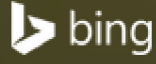
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1 ALLEN STREET  
SPRINGFIELD, MASSACHUSETTS**

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**SPRINGFIELD COLLEGE BVW**

PROJ MGR: TEJ	REVIEWED BY: TEJ	CHECKED BY: SLL	FIG. <h1 style="font-size: 2em;">2</h1>
DESIGNED BY: JRB	DRAWN BY: ARD	SCALE: 1 in = 20 ft	
DATE: 11/24/2020	PROJECT NO: 15.0166625.20	REVISION NO:	



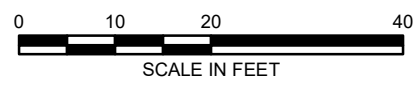
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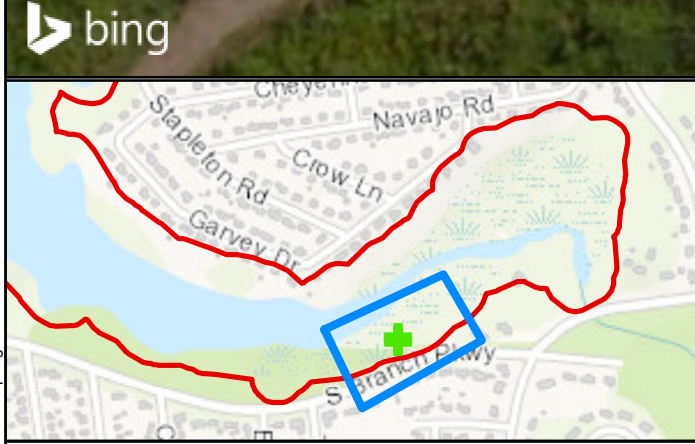
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**SPRINGFIELD COLLEGE**  
**EAST CAMPUS BVW**

PROJ MGR: TEJ	REVIEWED BY: TEJ	CHECKED BY: SLL	<b>FIG.</b> <b>3</b>
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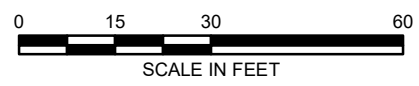




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- WETLAND BOUNDARY
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**GYSGT. J. SULLIVAN PARK BWW**

PROJ MGR: TEJ	REVIEWED BY: TEJ	CHECKED BY: SLL	<b>FIG. 4</b>
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