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RESILIENCY IMPROVEMENTS AT WATERSHOPS POND DAM DRAWDOWN PERIOD MONITORING REPORT #1

DECEMBER 15, 2020

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

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Reviewed by: Tom Jenkins, P.E.

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 first 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. During the winter drawdown period, dissolved oxygen monitoring will occur at a frequency of once every 2 months. From March through October, during the growing season, monitoring will occur monthly.

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 discussed 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 her 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.

Monitoring was conducted on December 15, 2020, per the methodology presented in the “Pre-Drawdown Ecological Monitoring Report.” Monitoring occurred within the drawdown residual pool at two representative locations, one of which approximately replicated the pre-drawdown location within this area. Vertical profiles were conducted at the two locations, and Dissolved Oxygen (DO) and Temperature (°C) were measured at one-foot depth intervals. Secchi disk depth and GPS location were recorded at each site.

GZA assessed DO at two locations within the residual pool basin; the westerly sampling location is located about 900 feet west of the railroad bridge, and the easterly location is located about 500 feet east of the railroad bridge. These locations were shifted slightly based on observed field conditions to find locations with maximum local depth for profiling DO. The westerly location was shifted slightly to the west from what was proposed in the Plan (GZA, August 28, 2020). The easterly location was also moved from the sampling location proposed in the Plan based on a review of field conditions. The residual pool was shallower than anticipated and had a fairly uniform depth of only 1.5 to 2.0± feet in the area of the originally-proposed easterly point. Pool depth was measured in multiple locations between the original easterly Plan location and the eastern portions of the residual pool, searching for a deeper area of the residual pool which would provide a more robust profile for future monitoring during the drawdown period. Ultimately, a new easterly monitoring location was selected because it was deeper than other locations, with a total observed water depth of approximately 2.2 feet. The modified locations are depicted on **Figure 1** and will be used for future monitoring events.

RESULTS

The Watershops Pond residual pool encompasses about 17 acres upgradient of the dam where the water exits the pond basin through the dam’s low-level sluice gates. The maximum pool depth is slightly over 4 feet, with most of the pool area less than 2 feet deep. 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 140.70 feet± on the date of sampling (NAVD88 vertical datum).

The water within the pool basin was uniformly turbid based upon a Secchi Disk depth recorded at 1.0 feet. Dissolved oxygen levels were relatively high and uniform throughout the shallow water column. DO exceeded 12.0 mg/l, with a water temperature of just above 2° C (**Table 1**).



Photo 1: View to West from boat launch (Springfield College). Bridge shown is the unused “railroad bridge.”



Photo 2: View to East from the boat launch.



Table 1. Watershops Pond Drawdown Pool Dissolved Oxygen, Temperature, and Secchi Depth Measurements
Date of Data Collection: 12/15/2020 10:00AM – 12:00 PM

Location: Main Body, Near Dam, East of Steel (private) Bridge; 42°05.861 N; 072°33.624 W				Location: Main Body, Central Pond, East of Railroad 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
1.0	0	12.9	2.3	1.0	0	12.6	2.0
	1	12.9	2.3		1	12.5	2.2
	2	12.7	2.3		2	12.0	2.3
	3	12.5	2.3		2.2 - bottom	12.0	2.3
	4.0 - bottom	12.1	2.1				

The average DO concentration at each depth range of the water column is shown in Table 2. Because the DO concentration changed very little over depth, the entire water column was above 12 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) (from Table 1)
0-1	17.2	623,461.0	58.4	58.4	12.75
1-2	11.6	335,447.7	31.4	89.8	12.70
2-3	4.3	96,265.6	9.0	98.8	12.35
3-4	0.63	11,608.4	1.1	99.9	12.25
4-5	0.01	435.1	0.04	100	12.10
Total		1,067,217.8			

Water elevation at time of monitoring: 140.70 ft

DISCUSSION

The Plan suggested the action level for DO should be 5 mg/l for at least 75% of the surface waters in the residual pool. During the December 2020 monitoring event, this standard was readily met, as the average DO concentration exceeded 12 mg/l at all contour elevations. This is an unsurprising result during the non-growing season with low water column temperatures.




During the growing season, it is likely that DO levels will markedly decrease. Based upon the average DO concentration observed at the end of the 2020 growing season in late September, there might be reason to reconsider this action level. The average DO concentration observed in late September under normal pond conditions indicated approximately 67% of the pond volume met the suggested minimum DO of 5 mg/l. This indicates that the Watershops Pond biota likely experience lower average DO concentrations across a large percentage of the basin on a normal basis, especially since the September sampling event represented less extreme conditions than those likely to be encountered during peak summer months. While no change of the standard is recommended at this time, the action level to trigger mitigation measures such as aeration may want to be reconsidered as the 2021 growing season progresses. Nevertheless, with about 90% of the residual pool basin less than 2 feet deep, shallow adequate DO levels may persist due to wind perturbation of the pool



surface. GZA will continue to monitor the pond conditions and initiate discussions should the DO not meet the attainment standards provided in the Plan.

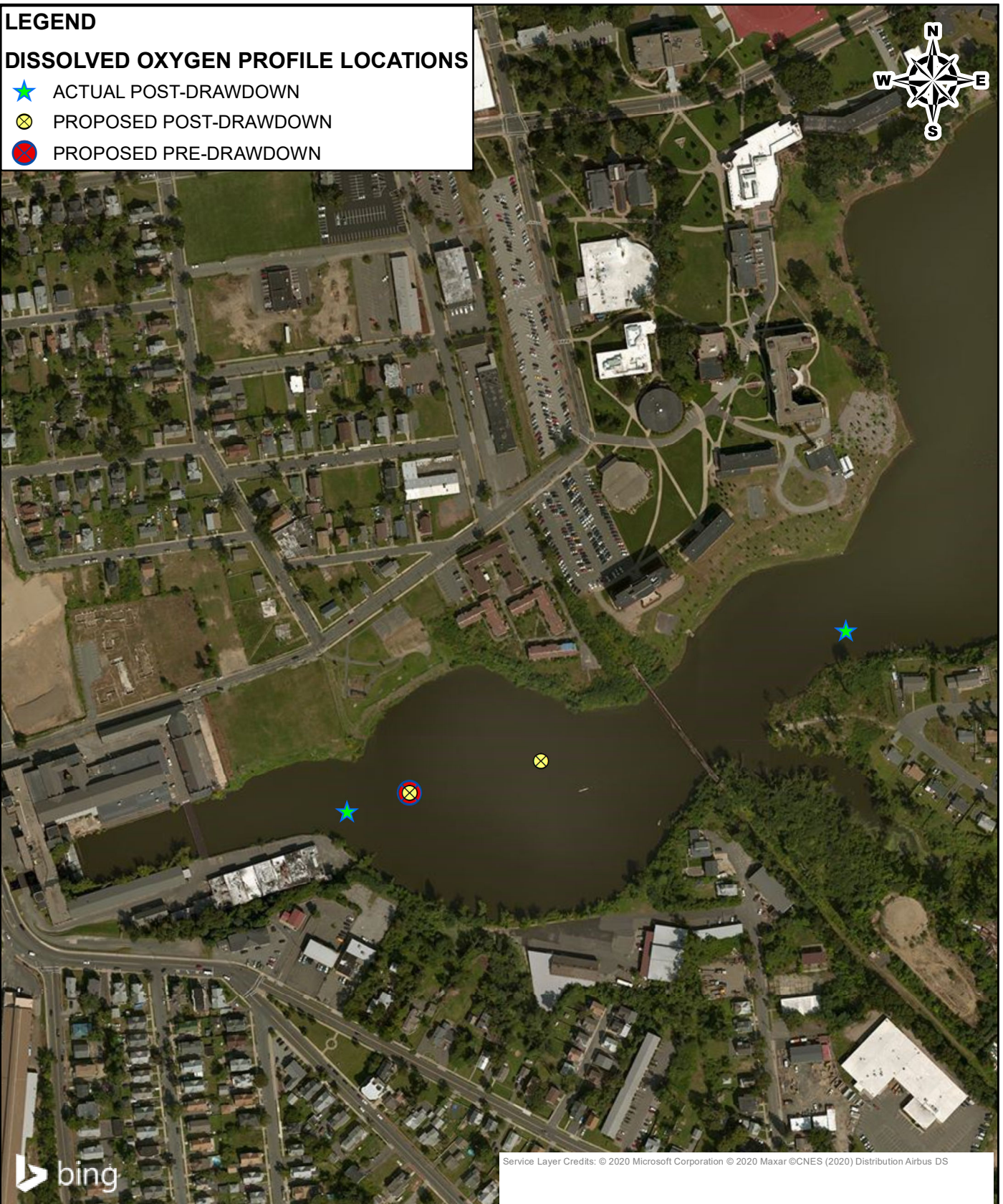
LEGEND

DISSOLVED OXYGEN PROFILE LOCATIONS

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

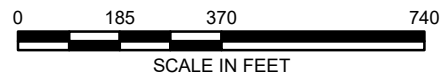


© 2020 - GZA GeoEnvironmental, Inc. J:\0 166600 - 0 166699\15.0166625.20 Watershops Pond Dam\GIS\mxd\DrawdownMonitoringReport\Fig1_DO_Monitoring_Location.mxd, December 21, 2020 - 2:50:01 PM, Adrieme.dunk



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RESILIENCY IMPROVEMENTS AT WATERSHOPS POND DAM
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PREPARED FOR:
CITY OF SPRINGFIELD
NATIONAL DISASTER RESILIENCY PROGRAM
CDBG-NDR GRANT#B-13-MS-25-0002

**DISSOLVED OXYGEN PROFILE
MONITORING LOCATIONS**

PROJ MGR: JRB	REVIEWED BY: TEJ	CHECKED BY: SLL	FIG. 1
DESIGNED BY: ARD	DRAWN BY: ARD	SCALE: 1 in = 350 ft	
DATE: 12/21/2020	PROJECT NO: 15.0166625.20	REVISION NO:	