

# Memorandum

**To:** Steve Gallo, Business Administrator, Borough of Freehold  
**From:** Chris Mikolajczyk, CLM, Princeton Hydro  
**cc:** J. Smith, Princeton Hydro  
**Date:** 8 December 2022  
**Re:** Lake Topanemus Project – Progress Memo

Princeton Hydro (PH) has been progressing on the Lake Topanemus project currently funded by the NJDEP 319(h) program. Specifically, Princeton Hydro is contributing Professional Engineering and Certified Lake Manager Services. An update on specific tasks is listed below:

**Task 1 – Collection of Background Information.** This task will be a work in progress for nearly the length of the project. To date, PH has reviewed previous reports from the NJDEP specific to the Lower Raritan River watershed region, as well as historical reports from the NJDEP specific to the lake itself. Lastly, previous fish stocking efforts have been reviewed. Princeton Hydro will continue to review any reports from agencies such as the NJDEP or USGS, as well as review any reports or data the County and/or Municipalities may have. This task is approximately 22% complete.

**Task 2- Quality Assurance Project Plan (QAPP).** Princeton Hydro authored the QAPP, which was then approved by the NJDEP in March 2022. A copy of the final QAPP has been previously supplied, but an additional copy can be supplied upon request. This task is 100% complete.

**Task 3- Bathymetric Survey.** Princeton Hydro completed the bathymetric survey in December 2021, which was also supplied to the NJDEP in June 2022. A copy of the final maps have been previously supplied, but additional copies can be supplied upon request. This task is 100% complete.

**Task 4- Watershed-Based Modeling.** Princeton Hydro has continued with the preliminary mapping, specifically the watershed has been delineated and the data layers downloaded from the NJDEP GIS database. Much of this task will be completed after the field data collected as part of Task 5 and 6 has been completed. The watershed assessments for nutrient removal techniques are scheduled to occur in January 2023. Currently, this task is 12% complete.

**Task 5- Field Based Lake Water Quality Monitoring.** This task has been completed for the growing season of 2022. Specifically, boat based water quality monitoring occurred in March, June, July, August, September and October of 2022. Currently, this task is 90% complete. The final data collected in September and October can be found in Tables 1 and 2 at the end of this memo.

**Task 6- Visual Watershed Assessment and Modeling.** Princeton Hydro previously conducted a preliminary watershed assessment in March of 2022, specifically the visual assessment. Watershed based inlet stream sampling has since occurred in July, August and September of 2022. Currently, this task is 68% complete.

**Task 7- Fine Tuning of Hydrologic and Pollutant Load Models.** Princeton Hydro has not yet begun this task. This task will be completed after the field data collected as part of Task 5 and 6, as well as the models completed as part of Task 4 have been completed. Currently, this task is 0% complete.

**Task 8- Final Report.** Princeton Hydro has not yet begun this task. This task will be completed after Tasks 1-7 has been completed. Currently, this task is 0% complete.

*In-situ* results can be found in Tables 1-2 below, while laboratory results can be found in Tables 3-4.

**Table 1 – Lake Topanemus *In-Situ* Data (September 15, 2022)**

Station	DEPTH (meters)			Temp °C	Sp Cond µS/cm	Dissolved Oxygen		pH S.U.
	Total	Secchi	Sample			mg/L	% Sat.	
L-1	1.9	1.9+	Surface	24.55	254.83	8.56	102.75	7.18
			0.5	24.48	255.97	8.40	100.46	7.08
			1.0	24.06	255.00	8.06	95.43	6.95
			1.5	23.89	254.25	8.15	96.03	6.85
Mid-Lake	1.5	1.5+	Surface	24.18	245.70	9.07	107.95	7.37
			0.5	24.25	249.00	9.27	110.52	7.22
			1.0	24.12	249.11	9.24	109.23	7.12
L-2	1.5	1.5+	Surface	23.25	244.49	10.33	120.58	7.54
			0.5	23.24	244.50	10.28	119.67	7.51
			1.0	23.00	243.77	11.11	128.88	7.92

**Table 2 – Lake Topanemus *In-Situ* Data (October 17, 2022)**

Station	DEPTH (meters)			Temp	Sp Cond	Dissolved Oxygen		pH
	Total	Secchi	Sample	°C	µS/cm	mg/L	% Sat.	S.U.
L-1	2.3	2.2	Surface	15.96	176.50	10.12	103.50	6.96
			0.5	15.83	176.12	10.05	102.10	6.94
			1.0	15.71	176.19	9.85	100.20	6.92
			1.5	15.68	176.20	9.86	100.25	6.90
			2.0	15.68	176.31	9.91	100.82	6.88
Mid-Lake	2.0	2.0+	Surface	15.74	180.38	10.36	105.39	6.98
			0.5	15.75	179.81	10.42	105.86	6.97
			1.0	15.74	180.48	10.56	107.66	6.97
L-2	1.5	1.5+	Surface	15.50	209.48	7.23	92.56	7.25
			0.5	15.00	220.07	6.98	91.71	6.98
			1.0	14.66	240.32	11.78	116.69	6.87
North Inlet	N/A	N/A	Surface	13.54	299.35	8.04	78.06	6.68
East Inlet	N/A	N/A	Surface	13.11	261.24	9.26	88.97	7.38

Note: Secchi depths with a + were either still visible at the bottom of the lake or became blocked due to plant growth.

**Table 3 – Lake Topanemus Lab Data (October 15, 2022)**

Station ID	Chl a (mg/M3)	NH3-N (mg/L)	NO3-N (mg/L)	SRP (mg/L)	TP (mg/L)	TSS (mg/L)	DOC (mg/L)
L-1	5.1	0.05	0.34	ND <0.002	0.02	ND <2	3090
L-1 DEEP	13	0.05	0.37	ND <0.002	.04	5	3080
L-2	3.8	0.02	0.87	ND <0.002	0.01	3	2840
L-2 DEEP	32	0.02	0.75	ND <0.002	0.02	7	3290
Field Rep	X	X	0.38	X	X	X	X
Field Blank	ND <0.6	ND <0.01	ND <0.01	ND <0.002	ND <0.01	ND <2	ND

**Table 4 – Lake Topanemus Lab Data (October 17, 2022)**

Station ID	Chl a (mg/M3)	NH3-N (mg/L)	NO3-N (mg/L)	SRP (mg/L)	TP (mg/L)	TSS (mg/L)	DOC (mg/L)
L-1	3.4	0.01	1	ND <0.002	ND <0.01	ND <2	3370
L-1 DEEP	4.5	0.04	1	ND <0.002	ND <0.01	ND <2	3480
L-2	8.2	0.01	1.4	ND <0.002	ND <0.01	ND <2	2430
L-2 DEEP	3.9	0.04	1.4	ND <0.002	ND <0.01	5	2320
Field Rep	X	0.04	X	X	X	X	X
Field Blank	ND <0.6	ND <0.01	ND <0.01	ND <0.002	ND <0.01	ND <2	431
North Inlet	X	X	1	ND <0.002	ND <0.01	4	X
East Inlet	X	X	3.2	ND <0.002	ND <0.01	ND <2	X