

Memorandum

To: Steve Gallo, Business Administrator, Borough of Freehold
From: Chris Mikolajczyk, CLM, Princeton Hydro
cc: J. Smith, Princeton Hydro
Date: 22 September 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 begun 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. Currently, this task is 12% complete.



Task 5- Field Based Lake Water Quality Monitoring. This task is ongoing as part of the growing season of 2022. Specifically, boat based water quality monitoring has occurred in March, June, July, August and September of 2022. Further events will occur in October of 2022. Currently, this task is 60% complete, however laboratory invoices have only been received through August. Data collected to date 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 57% 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 (July 14, 2022)

Station	DEPTH (meters)			Temp	Sp Cond	Dissolved Oxygen		pH
	Total	Secchi	Sample	°C	µS/cm	mg/L	% Sat.	S.U.
L-1	2.0	1.9	Surface	27.77	259	9.5	121.6	7.3
			0.5	27.71	259	9.69	123.3	7.31
			1.0	27.4	259	9.59	120.5	7.31
			1.5	26.26	261	8.87	103	7.18
Mid-Lake	1.9	1.9+	Surface	27.63	260	9.13	116.1	6.95
			0.5	27.64	259	9.16	116.3	6.98
			1.0	27.36	259	9.35	118	7.02
			1.5	26.39	259	8.5	105.1	7.01
L-2	1.3	1.3+	Surface	27.48	257	8.74	110.5	6.48
			0.5	27.37	257	8.91	112.5	6.56
			1.0	27.17	258	8.87	111.3	6.63
North Inlet	N/A	N/A	Surface	18.88	231	3.78	39.3	7.15
East Inlet	N/A	N/A	Surface	18.04	267	8.82	93.0	7.05

Table 2 – Lake Topanemus *In-Situ* Data (August 8, 2022)

Station	DEPTH (meters)			Temp	Sp Cond	Dissolved Oxygen		pH
	Total	Secchi	Sample	°C	µS/cm	mg/L	% Sat.	S.U.
L-1	2.0	1.8	Surface	29.58	347.06	7.64	100.7	7.09
			0.5	29.29	347.16	7.83	102.66	6.99
			1.0	29.14	346.85	8.11	105.79	6.94
			1.5	29.02	346.18	7.98	104.32	6.9
Mid-Lake	1.9	1.5	Surface	29.59	346.67	8.58	112.65	7.25
			0.5	29.57	346.39	8.56	112.83	7.2
			1.0	29.41	345.16	8.94	118.42	7.22
			1.5	29.11	343.53	9.06	115.98	7.07
L-2	1.2	1.2+	Surface	29.44	343.49	8.41	110.26	7.34
			0.5	29.36	342.7	8.49	111.34	7.3
			1.0	28.95	339.18	9	118.08	7.29
North Inlet	N/A	N/A	Surface	21.18	285.48	<1	<1	6.45
East Inlet	N/A	N/A	Surface	19.65	285.48	8.46	92.38	6.77

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 (July 14, 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	15	0.01	0.26	0.002	0.02	2	2,830
L-1 DEEP	27	ND <0.01	0.25	0.002	0.02	4	2,920
L-2	5.9	0.01	0.47	ND <0.002	0.01	ND <2	2,330
L-2 DEEP	3.5	0.01	0.59	ND <0.002	0.02	ND <2	2,160
Field Rep	3.4	X	X	X	X	X	X
Field Blank	ND <0.3	ND <0.01	ND <0.01	ND <0.002	ND <0.01	ND <2	ND
North Inlet	X	X	1.00	ND <0.002	0.05	2	X
East Inlet	X	X	2.50	ND <0.002	0.02	ND <2	X

Table 4 – Lake Topanemus Lab Data (August 8, 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	4.3	0.03	0.40	ND <0.002	0.02	ND <2	2,780
L-1 DEEP	2.0	0.02	0.36	ND <0.002	0.02	ND <2	2,220
L-2	1.4	0.01	0.46	ND <0.002	0.01	ND <2	2,160
L-2 DEEP	1.2	0.01	0.47	ND <0.002	0.02	ND <2	2,450
Field Rep	X	X	X	X	X	ND <2	X
Field Blank	ND <0.5	ND <0.01	ND <0.01	ND <0.002	ND <0.01	ND <2	ND
North Inlet	X	X	1.3	ND <0.002	0.04	7	X
East Inlet	X	X	2.4	ND <0.002	0.02	ND <2	X

