

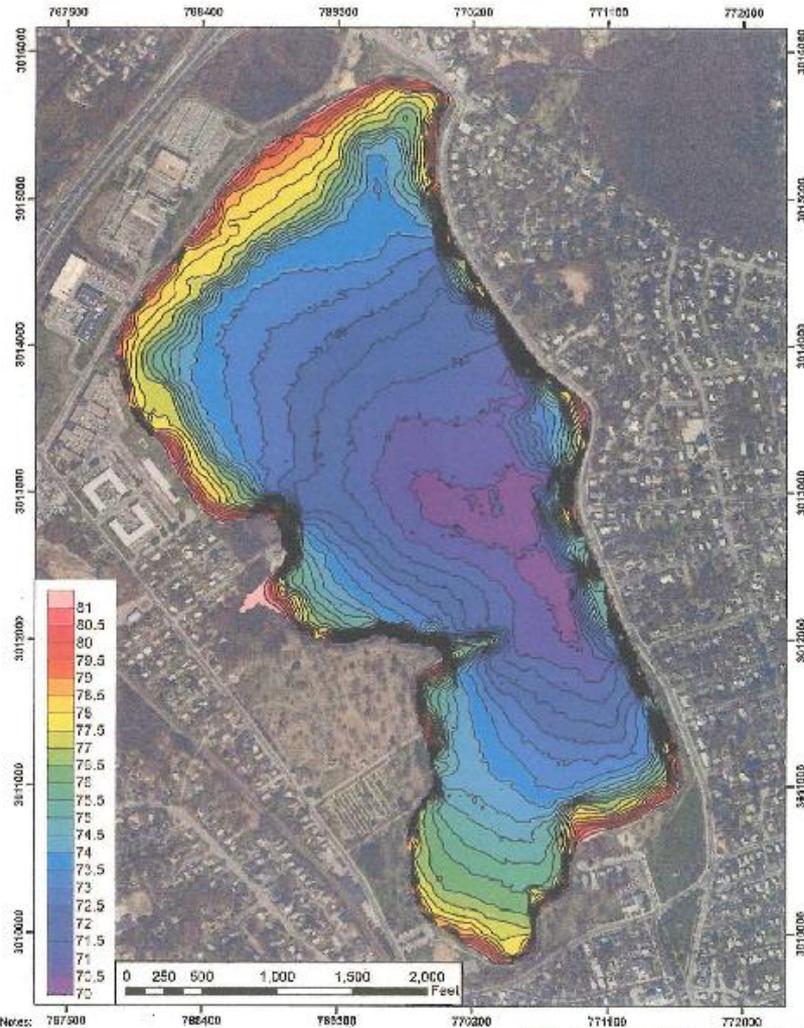
LAKE QUANNAPOWITT COMMITTEE REPORT

June 27, 2016



FIGURE 1

BATHYMETRIC CONTOUR MAP OF LAKE QUANNAPOWITT, WAKEFIELD, MA



Notes: 1. NAVD83 Elevations. Contour interval = 0.5 feet.
2. GCS: MA State Plane, NAD83, US Feet.



LAKE QUANNAPOWITT

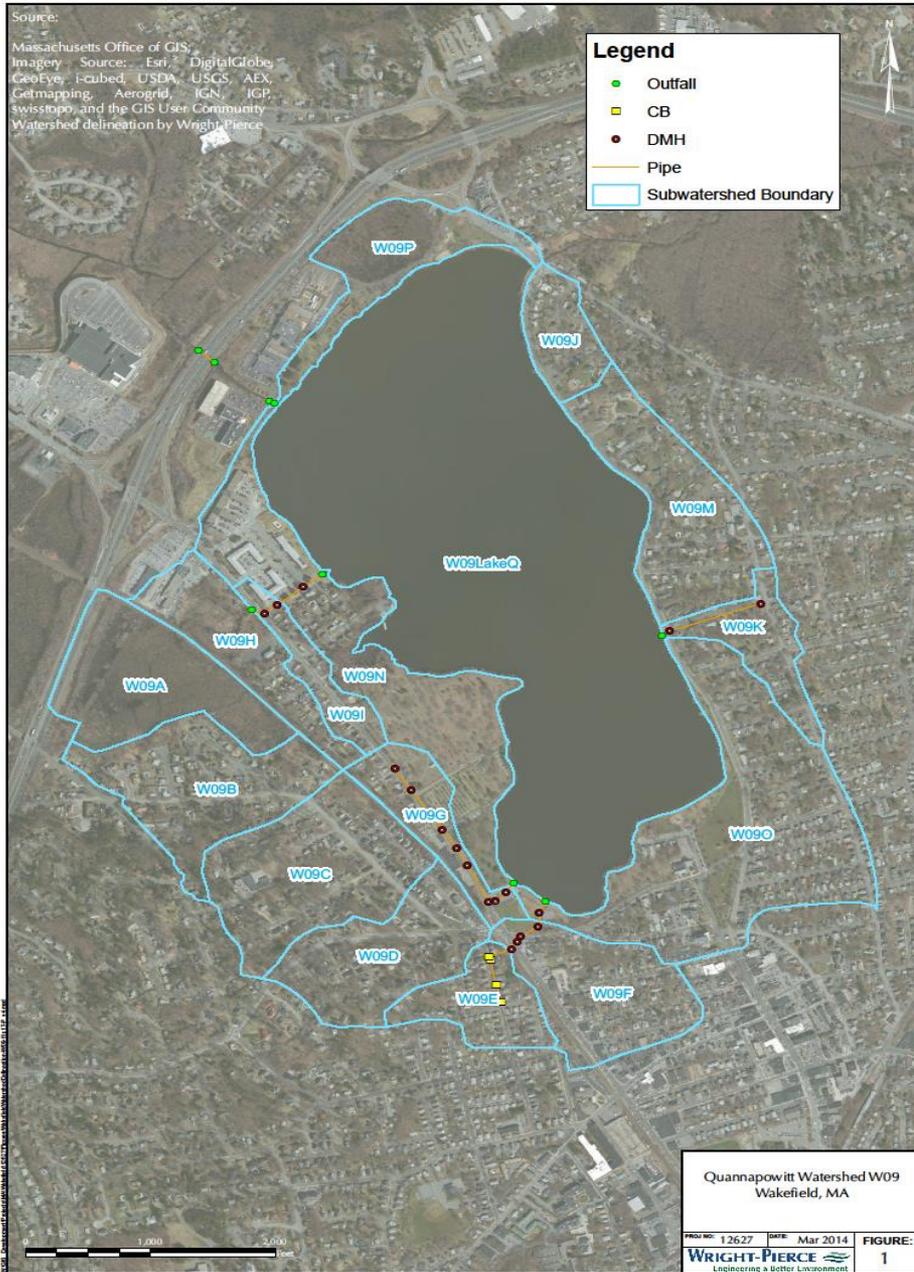
LAKE AREA 250 ACRES
(MA GREAT POND)

AVG. DEPTH 6 FT
MAX. DEPTH 11 FT

IMPOUNDED LAKE
WITH CONTROL DAM
OUTLET AT LOWELL
STREET

GLACIER FORMED
KETTLE HOLE

VOLUME 489M GAL.



Lake Quannapowitt Watershed

Total Area 450 Acres

300 Acres through over 30 Drain outlets

150 Acres Direct Runoff Areas to Lake)

Avg. Impervious Area to lake greater than Town Avg. of 31%

LAKE QUANNAPOWITT COMMITTEE MARCH 2014 THROUGH JUNE 2016 OVER 30 OPEN PUBLIC MEETINGS

Committee Goals

- Meet MA Water Quality Standards (314 CMR 4) Swimmable / Fishable, Lake is on DEP Impaired Waters 2014 List for Non-Native Aquatic Plants, DDT, Excess Algal Growth and Turbidity
- Eliminate Blue Green Algae (a.k.a. Cyanobacteria) from Lake due to toxicity, and being competitive with healthy lake organisms

COMMITTEE VOTE (APR-25-2016)

TABLE 1 - Lake Quannapowitt Committee Summary				Vote date: 25-Apr-16	
Objectives and Approaches	Yes	No	Emerging	Abstain	Total
Lake Water Quality Objective					
Meet MA Water Quality Standards for Class B Water (SWIMMABLE / FISHABLE:)	12	0	0	1	13
Eliminate Cyanobacteria from Lake	12	0	0	1	13
Voting Options:					
Y - Yes vote to further pursue option		N- No vote for no further consideration			
E - Potential emerging technology for future use					
W.T. Conley, Secretary					

LAKE QUANNAPOWITT COMMITTEE VOTE (APR-25-2016)

TABLE 1 - Lake Quannapowitt Committee Summary				Vote date:	
				25-Apr-16	
IN LAKE CONTROL	YES	NO	EMERGING	ABSTAIN	
Aeration and Circulation	9	4	0	0	
Aluminum sulfate phosphorous control	5	7	0	1	
Copper sulfate dosing	3	10	0	0	
Algaecide Treatment (other than copper sulfate)	3	10	0	0	
Algae Control Ultrasonic (burst air vesicles)	0	7	6	0	
Aeration-Bioaugmentation	0	9	4	0	
Dredging	0	10	2	1	
Spot Dredging	12	0	0	1	
Spot Beemats	11	0	2	0	
Restore Lake Quannapowitt natural high water mark and unblock feeder streams	1	10	1	1	
Algae harvesting by other flocculation / filtering	0	5	8	0	
Organic Sediment layer removal	0	4	8	1	
Herbicide treatment	0	7	0	5	
Voting Options:					
Y - Yes vote to further pursue option	N- No vote for no further consideration				
E - Potential emerging technology for future use					
W.T. Conley, Secretary					

LAKE QUANNAPOWITT COMMITTEE VOTE (APR-25-2016)

TABLE 1 - Lake Quannapowitt Committee Summary Vote				Vote date:
				25-Apr-16
LAND SIDE CONTROL	YES	NO	EMERGING	ABSTAIN
Fertilizers/Runoff Nutrient Control	12	0	0	0
Public Education for Nutrient Control and Watershed Management	12	0	0	0
Watershed Control/Green Infrastructure	12	0	0	0
DPW Leaf collection, pit for leaves and brush, composting	12	0	0	0
Street Sweeping	12	0	0	0
Catch Basin Cleaning	12	0	0	0
Watershed Stormwater Runoff Phosphorus Removal Treatment System(s)	12	0	0	0
Riparian shoreline treatment	12	0	0	0
Reduce impervious cover	12	0	0	0
Consolidate and Treat Drains	11	1	0	0
Enhance Infiltration	12	0	0	0
Upgrade substandard catch basins	12	0	0	0
Voting Options:				
Y - Yes vote to further pursue option		N- No vote for no further consideration		
E - Potential emerging technology for future use				
W.T. Conley, Secretary				

There are two *In Lake* approaches which are seen to be the most reliable and cost-effective by a majority of members of the committee:

Aeration and circulation of the entire lake water body, may potentially include hydrogen peroxide addition to the units in shallow potentially problem areas (less than 3-to-4 feet deep) and potentially iron ion chemical adjustment from Fe⁺² to Fe⁺³ valance.

Dosing the entire lake waterbody with aluminum sulfate to bind with and remove the available nutrient phosphorous to an average concentration lower than 30 ppb which exceedance of typically is associated with cyanobacteria blooms.

A present day value for a 10-year period for either approach is expected to total less than \$1M.

The Land Side approaches are seen as supplemental, but none of which individually or in combination have been identified as achieving the Committee's goals for the lake in the near term at a reasonable cost, if at all.

Near Term Committee Recommendations prior to Selected Approach Implementation:

- A well-experienced professional be hired to review the available information and recommend to the Town if additional investigations should be conducted to select the final action plan and its implementation.
- Consideration of the new MS4 NPDES Stormwater Permit which will begin in the second half of 2017
- Continued monitoring of the lake cyanobacteria toxicity and water column dissolved oxygen and temperature conditions through the fall of 2016
- If aeration / circulation of the lake is selected further investigations into available methods, configurations and manufacturers be investigated. Also, investigate possible interactions with in-lake non-natural chemicals, etc.
- The Town develop and implement a property pervious area advisory contact.
- Public Forum(s) to discuss the Lake Quannapowitt conditions and recommended approach(s)

Discussion, Questions & Answers

