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Mr. Larry Johnson, Health Director
Shiawassee County Health Dept.
149 E. Corunna Ave.
Corunna, MI. 48817

February 16, 2020

Dear Mr. Johnson,

The Lake Manitou Association is sending this letter as an informational notice of the association's continued concern and a call for action regarding hazardous water quality test findings in the Hardy Jennings drain in Bennington Township. Much of the time drain water contains hazardous levels of Escherichia Coli, a bacterial pathogen of human and animal waste. Additionally, agribusiness is contributing excessive amounts of fertilizers such as nitrogen, phosphorus and suspended soil sediment. With your awareness of these circumstances, we are asking for your support and partnership as the county health department Director in lobbying for clean waters in the Hardy Jennings drain which is within the Upper Maple River Watershed.

Degraded water quality can adversely affect residential property values for the township and county. It is an objectionable influence in the desirability of new residential and business development, as well as creating an unfavorable reputation toward the township and county if ignored and not remediated. The water quality in the Hardy Jennings drain is a human and pet health hazard.

Enclosed is the Lake Manitou Association summary and data regarding our findings which have been confirmed by the Michigan Department of Environment, Great Lakes and Energy and the Shiawassee Conservation District. The Lake Manitou Association informed residents along the Hardy Jennings drain last year as part of the association's informational program. You are welcome at any time to contact Fred Farkas with any questions.

Sincerely,

Lake Manitou Association Board of Directors

Encl.

Cc Casey Elliott, Shiawassee Health Dept. Tony Newman, Shiawassee County Drain
Commissioner. Cindy Garber, Shiawassee County Commissioner. Bennington Township Board.



P. O. Box 61, Owosso, MI. 48867

February 11, 2019

Upper Maple River Watershed

HUC040500050101

Shiawassee County – Bennington Township

Hardy Jennings Drain; Bennington Township sections 11, 13, and 14.

The Lake Manitou Association (LMA) has been investing in water quality testing and monitoring in and around Lake Manitou since 2016 and have confirmed that the Hardy Jennings Drain (HJD) is carrying into the lake, hazardous levels of human and bovine E. coli bacteria, excessive phosphorus, and high levels of ammonium in the form of nitrogen, potassium and large amounts of soil sediment.

E. COLI BACTERIA

On October 7, 2018 the HJD water was saturated with over **1,000,000 cfu/100 ml of E. coli bacteria.**ⁱ Since 2016, LMA have collected 18 water samples from the HJD up stream of Lake Manitou, near Garrison and Morrice roads (section 14). The average E. coli level is 6,965 cfu/100ml. During the same time frame 29 water samples have been collected from Lake Manitou shores and the other two surface water inlets. The average E. coli level is 106 cfu/100ml. Public swimming beaches are closed when E. coli numbers are 300 cfu/100ml.

The Michigan Department of Environmental Quality (MDEQ) located point source dischargesⁱⁱ into the Hardy Jennings Drain, up stream of Lake Manitou on November 7, 2018 and December 9, 2017. Both occurrences were on the same farm property.

On March 31, 2017 and July 11, 2017, LMA collected water samples from the HJD for Microbial Source Tracking.ⁱⁱⁱ

Proportional Fold Difference (3/31/2017)

68.59 Bovine / Deer

15.03 Human / Deer

4.56 Bovine / Human

Proportional Fold Difference (7/11/2017)

5.28 Bovine / Human

In August and September 2017 the Michigan Department of Environmental Quality (MDEQ) collected water samples from the Hardy Jennings drain for analysis of E. coli levels and microbial source tracking. MDEQ confirmed previous LMA findings. It is notable that their positive detections of human and cattle sources occurred during dry weather and thus are not likely due to runoff. As of January 2019, MDEQ has now added the Hardy Jennings Drain to a list of state water bodies that exceed safe levels of body contact. The interactive map can be found at:

<http://mdeq.maps.arcgis.com/apps/MapSeries/index.html?appid=2a060da30e25451292220861632b2c99>

MDEQ data of Microbial Source Tracking from the Hardy Jennings drain in 2017.^{iv}

		Date	Human	Bovine
780260	Hardy-Jennings Dr - Waugh Rd	8/17/2017	N/A	N/A
		8/24/2017	+	+
		8/31/2017	+	+
		9/7/2017	+	-
		9/14/2017	+	+

MDEQ data of E. coli levels in the Hardy Jennings drain during August and September 2017.^v

Site ID	Date	Sample1	Sample2	Sample3	duplicate	Daily_Geomean	30 Day Geomean
780260	14-Sep-17	480	370	380		407	501
780260	07-Sep-17	540	430	350	460	433	
780260	31-Aug-17	450	470	640		513	
780260	24-Aug-17	520	430	480		475	
780260	17-Aug-17	570	690	990		730	

NITROGEN

The photo below is of the Hardy Jennings Drain water on May 15, 2018^{vi} between the farm and Lake Manitou. The water was a distinct yellowish color, nontransparent and cloudy with floating and suspended semisolid matter. The day before and the day after, the drain water did not have this appearance. A water sample was collected by LMA and forwarded to Michigan State University Plant and Soil laboratory for analysis.^{vii} The results measured 62.2 ppm ammonium nitrogen, (High) and 364ppm potassium, (High). Nitrate and phosphorus were low. This type of visual observation is not uncommon. A previous water quality study (1993-2002) by Limnologist W. Fusilier, PhD^{viii} concluded that the Hardy Jennings drain carries 85 times more nitrogen than the other two inlets to Lake Manitou.^{ix}



TOTAL PHOSPHORUS

Since 2016, Total Phosphorus from 18 water samples collected from the HJD up stream of Lake Manitou average 163 ppb. During the same time period, 21 water samples have been collected from within Lake Manitou and the average Total Phosphorus is 47ppb. W. Fusilier^x concluded that the Hardy Jennings Drain delivers 12 times more Total Phosphorus to Lake Manitou than the other two inlets combined.^{xi}

MORPHOLOGY OF Hardy Jennings Drain (HJD)

From the entrance to Lake Manitou at Waugh road, the HJD extends east southeast approximately 3 miles in length. Upstream from Lake Manitou it first meanders through a wood lot about ½ miles, in which the first 1,900 feet is not under county drain authority. The next 740 feet is within the woodlot. There are several bends and banks in the woodlot that are from 3 to 7 feet in height. The soil is primarily Gilford Sandy Loam and the relic stream bed is approximately 35 feet. The average width of flowing water ranges from 5 feet to 10 feet wide and is just inches to 24 inches in depth. The drain floor is primarily packed small stone. The remainder of the drain cuts through agricultural land and branches into an east arm and a southerly arm west of Garrison road.



HJD meandering through the woodlot

SOIL SEDIMENT

The photos below are of an arm of Lake Manitou that first receives water from the HJD. The photo on the left was taken May 9, 2014. The photo on the right was taken May 14, 2014 after a significant rain. Some HJD stream banks and bends up stream of Lake Manitou are seven feet in height and there is a significant amount of cropland upstream and adjacent to the HJD.



ALGAL BLOOMS

https://www.canr.msu.edu/news/will_they_restore_the_lake_on_their_own

https://www.canr.msu.edu/news/clear_lakes_happy_swimming

Historically, the lake experiences severe seasonal algal blooms, (especially predominant at the inlet from the Hardy Jennings Drain). This is a direct result of excessive nutrient loading from the drain

The photo below is the arm of Lake Manitou that first receives water from the HJD. Photo taken August 31, 2018.





June 12, 2017. Filamentous algae from the lake floor of the arm of Lake Manitou that first receives water from the HJD.



July 12, 2017. The Main body of Lake Manitou showing an algae bloom.



October 5, 2017. Boot covered in paint like algae from the surface of Lake Manitou water.



October 5, 2017. Algae concentrated in Lake Manitou near shore due to wind and water currents.

LAKE MANITOU HYDROLOGY

Lake Manitou is located in the Upper Maple River Watershed in Bennington Township, Shiawassee County and is included in the Upper Maple River Watershed Management Plan. The lake is a seventy three acre^{xii} reservoir, built in 1959 by damming the Hardy Jennings drain. South of Lake Manitou is five other lake reservoirs not connected to the HJD; Spring Brook, Bambi, Forrest, Eve and Mirror, (collectively identified as Cummings lakes) with a total of 30 residential homes. The lakes all drain from one to the other and ultimately, into Lake Manitou through Forrest and Mirror lakes. Within Lake Manitou Association, there are 74 lakeside homes and 28 back lot homes. All homes have an individual waste water treatment system.

Lake name.....	Lake Manitou
County.....	Shiawassee
Type of lake.....	Reservoir
River basin.....	Grand
USGS Quad map.....	Owosso south
Lake area (acres).....	73
Maximum depth (feet).....	19
Mean depth (feet).....	11.1
Lake volume (acre feet).....	810
Watershed area (acres).....	2425
Drainage area (acres).....	2498
Lake to watershed ratio.....	1:32.5
Flushing rate.....	2.2 times/year
Elevation.....	781 feet
Longest dimension (feet).....	3437

LAKE MANITOU ASSOCIATION VISION

The Lake Manitou Association is committed to making a positive, substantial and meaningful improvement in the water quality of the Upper Maple River Watershed with emphasis on the Hardy Jennings drain. Our goals are to substantially reduce E. coli bacterial levels, Total Phosphorus, Nitrogen and Suspended Sediment.^{xiii}

LMA has hired an environmental science and engineering firm, Kieser & Associates^{xiv}. Since 2017 they have been studying the watershed and in 2018 they have been collecting surface water samples to better understand critical needs and relevant influences on current water quality issues in Lake Manitou. Kieser & Associates reports can be found at:

www.lake-manitou.org On the navigation bar, click LAKE/WATER, then Lake Studies.

CONCLUSION

Since at least 1993 the Hardy Jennings drain has been a primary and excessive source of pollution. Recent water quality research data, (2016-2018) confirms the historical conclusion from 1993-2002, and the current unabated degradation of the surface water quality in the drain. The effects of the Hardy Jennings drain have a detrimental impact on Lake Manitou surface water and the watershed.

Lake Manitou Association Board of Directors
Lake Manitou Association is a nonprofit organization since 1964

www.lake-manitou.org

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ⁱ All references to E. coli bacteria samples were processed and analyzed at MDEQ laboratory, Lansing, MI.

ⁱⁱ Point Source pollution discharge is from a single identifiable source.

ⁱⁱⁱ Helix Biolab. 28044 James Dr. Warren, MI. (586) 806-4243 Dr. Tom Prychitko

^{iv} MDEQ staff collected water samples for analysis. Cheri Meyer, Water Resources Division, Lansing.

^v MDEQ staff collected water samples for analysis. Cheri Meyer, Water Resources Division, Lansing.

^{vi} Photo and observations by Fred Farkas.

^{vii} Michigan State University Plant and soil laboratory, Manager Jon Dahl (517)355-0218

^{viii} Limnologist. Water Quality Investigators, Dexter, MI.

^{ix} Water Quality Studies, 1993-2002. Supplement; Nitrate Nitrogen, pg. 13.

^x Water Quality Studies, 1993-2002. Supplement; Total Phosphorus, pg. 15.

^{xi} Water Quality Studies, 1993-2002, supplement; Total Phosphorus, pg 15.

^{xii} Water Quality Studies reference.

^{xiii} Lake Manitou Association maintains complete data collection sets for E. coli and Total Phosphorus.

^{xiv} Kieser & Associates, Inc, 536 E. Michigan Ave., Kalamazoo, MI. (269) 344-2493



www.lake-manitou.org

Addendum to February 18, 2019 summary.

In 2019 the Lake Manitou Association continued to collect water samples from the Hardy Jennings Drain throughout the year testing for E. coli and Total Phosphorus levels.

The total average E. coli level was 2,228 cfu.

23 samples were collected from February through October 2019.

Above 300 cfu* is considered hazardous. *Michigan water quality standard.

Individual samples ranged from 50 cfu to 14,000 cfu.

(cfu is colony forming units.)

The total average Total Phosphorus level was 175 ppb.

12 water samples were collected for Total Phosphorus concentrations from February through October 2019.

Individual samples ranged from 40 ppb to 560 ppb.

Above 50 ppb* is considered high. *Michigan Cooperative Lakes monitoring program standard.

On November 20, 2019 EGLE surveyed a portion of the Hardy Jennings Drain (HJD), Bennington Township, Section 13/14, south of Garrison road. A suspected contaminant "point source" (tile drain) was located discharging into the HJD. A violation notice was issued to the property owner. This is the third violation in three years documented by EGLE.

Shiawassee Conservation District Newsletter Winter/Spring 2020

From their water collection and analysis:

"The Maple River Watershed has significant issues with E. coli bacteria in the water, making it unsafe for human use. This study also finds that human and bovine waste is found in all surface water in the watershed. Failing septic systems, illicit wastewater connections, drain tiles, and runoff containing manure are all likely contributors."

The Lake Manitou Association has been monitoring degraded water quality in and around Lake Manitou since 2016. An environmental engineering firm was retained in 2017/2018 to study sources of degraded water quality. The conclusion is that the Hardy Jennings Drain is the primary contributor of degraded water quality in the area. This reconfirms data collected by the Lake Manitou Association water quality study from 1993-2002.