58 Farm Road
Sherborn, Massachusetts 01770

March 20, 2024

BY ELECTRONIC MAIL: rick.novak@sherbornma.org
Richard S. Novak, Chairman
Sherborn Zoning Board of Appeals
19 Washington Street
Sherborn, Massachusetts 01770

Re: Birth Defects, Infant Death, Childhood Cancer, and Other Health Risks

Dear Chairman Novak:

There is substantial evidence in the record to support the Sherborn Zoning Board of Appeals (ZBA) determining that wastewater discharges from the "Farm Road Homes" development will result in nitrate-nitrogen concentrations in excess of the 10 mg/L (10 ppm) Maximum Contaminant Level (MCL) for nitrate-nitrogen in groundwater used for drinking.[1] While likely well known to the ZBA and to public health officials, for the record, the acute and chronic health effects observed with elevated levels of nitrate in drinking water include:

> **increased risk of fifteen (15) different types of cancer, including childhood cancer; hypertrophy of the thyroid; hypertension; nervous system defects; miscarriage; premature birth; impaired growth of babies in utero; various birth defects; and methemoglobinemia, commonly known with infants as "blue baby syndrome."**[2]

Indeed, "repeated consumption of this water [by an infant] over a period of days or weeks **can cause . . .death**."[3]

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[1]S. Horsely, "Letter to Brian Moore," (Nov. 5, 2023); S. Horsely, "Letter to Brian Moore" (Feb. 22, 2024). And, notably, while Mr. Horsely's analysis pertains to the property boundary with 49 Farm Road, he expressly provides that wastewater effluent will impact other properties. See id.

[2]See, e.g., Environmental Working Group, Pouring It On, Nitrate Contamination of Drinking Water (Feb. 1, 1996); Manassaram DM, Backer LC, Moll Dm. A Review of Nitrates in Drinking Water: Maternal Exposure and Adverse Reproductive and Developmental Outcomes. Environ. Health Perspect., 2006 Mar;114(3):320-7.

[3]Environmental Working Group, Pouring It On,, supra.

However, even nitrate-nitrogen levels **lower than the MCL – "often . . . significantly lower"**[4] – have been associated with severe health risks, as illustrated by the following excepts from only a handful of the published studies on the subject:

"**To date, five of six studies of neural tube defects showed increased risk with exposure to drinking water nitrate below the MCL.** Thus, the evidence continues to accumulate that higher nitrate intake during the pregnancy is a risk factor for this group of birth defects. . . . **Several studies of adverse reproductive outcomes since 2004 have indicated a positive association between maternal prenatal exposure to nitrate concentrations below the MCL and low birth weight and small for gestational age births**. . . . **Increased risks of specific cancers and central nervous system birth defects in study populations consuming nitrate below the MCL** is indirect evidence that nitrate ingestion at these levels may be a risk factor under some conditions."[5]

"[T]here have been **a number of reported cases of methemoglobinemia caused by nitrate at less than 10 ppm in drinking water** (Sattelmacher 1964; Simon 1962)."[6]

"**The latest research has produced strengthened epidemiological evidence for the risk of colorectal cancer at nitrate levels below the regulatory standard of 10 mg/L of nitrate as nitrogen**."[7]

"**Nitrate in drinking water has also been associated with other adverse birth outcomes, including markers of fetal growth restriction** (Coffman et al., 2021)**, birth defects** (Blaisdell et al., 2019, Stayner et al., 2022)**, preterm birth** (Coffman et al., 2022, Sherris et al., 2021, Stayner et al., 2017)**, and some childhood cancers** (Stayner et al., 2021) **at nitrate concentrations lower than the existing regulatory standard [of 10 mg/L]."**[8]

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[4]Temkin A, Evans S, Manidis T, Campbell C, Naidenko OV, Exposure-Based Assessment and Economic Valuation of Adverse Birth Outcomes and Cancer Risk Due to Nitrate in United States Drinking Water., Environ. Research, Vol. 176, 2019, citing Ward, et al. 2018, infra.

[5]Ward MH, Jones RR, Brender JD, de Kok TM, Weyer PJ, Nolan BT, Villanueva CM, van Breda SG. Drinking Water Nitrate and Human Health: An Updated Review. Int J Environ Res Public Health. 2018 Jul 23;15(7):1557.

[6]Environmental Working Group, Pouring It On,, supra.

[7]Temkin A, et al., 2019, supra.

[8]Jensen AS, Coffman VR, Schullehner J, Trabjerg BB, Pedersen CB, Hansen B, Olsen J, Pedersen M, Stayner LT, Sigsgaard T. Prenatal Exposure to Tap Water Containing Nitrate and the Risk of Small-for-Gestational-Age: a Nationwide Register-based Study of Danish Births, 1991-2015. Environ Int. 2023 Apr;174:107883.

"The observed **increase in the incidence of congenital anomalies with drinking-water nitrate exposure greater than 1 mg/L, which is just 10% of the [10 mg/L Health Canada Maximum Allowable Concentration of nitrate-nitrogen],** is an intriguing finding and suggests that further investigation of the relationship between drinking-water nitrate and congenital anomalies at lower exposure levels is warranted."[9]

Accordingly, even where the relevant nitrate-nitrogen levels are below, or indeed "significantly" below, the MCL, a reasonable basis, grounded in the protection of health and safety, exists to deny a comprehensive permit. See G. L. c. 40B, § 20 (concerns considered include "need to protect the health or safety of the occupants of the proposed housing or of the residents of the city or town"); 760 Code Mass. Regs. § 56.07(3)(b) (2012) (among other factors, "weight of the Local Concern will be commensurate with the degree to which the health and safety of occupants or municipal residents is imperiled"); cf. Reynolds v. Zoning Bd. of App. of Stow, 88 Mass. App. Ct. 339 (2015).

As I previously wrote in this matter, the gravity of these concerns in Sherborn cannot be overstated – families near this development have no alternative source of drinking water. Just as in Reynolds, supra, "there is no public water source in the area and no proposal to provide the abutter with clean water . . . ." 88 Mass. App. Ct. at 350. Any risk of irreparable harm to the vital resource of safe and potable drinking water is unacceptable. Any risk to health and safety, as evidently is the situation here, must in good conscience be deemed of decisive consequence in rejecting the permit sought for this development.

Very truly yours,

/s/

Arthur C. Fenno, Esq.

[9]Holtby CE, Guernsey JR, Allen AC, Vanleeuwen JA, Allen VM, Gordon RJ. A Population-based Case-control Study of Drinking-Water Nitrate and Congenital Anomalies Using Geographic Information Systems (GIS) to Develop Individual-level Exposure Estimates. Int J Environ Res Public Health. 2014 Feb 5;11(2):1803-23.