July 1, 2024

RE: Dane County Zoning Petition #12048

Kennedy Hills in the Town of Cottage Grove WI

As an infill development, Kennedy Hills proposed 50-lot project is the continuation of the “greater American Heritage rural neighborhood” which started in 1976 and has over 200 homes in the area at the present time. This greater neighborhood was formed on agricultural land and is still presently surrounded by agricultural land on which mostly row crops are grown. The original phase of 16 lots in Kennedy Hills was platted in 2020 and the last home of the 16 is presently under construction. Most of those homes were completed in 2022.

At the public hearing on the 18th of June 2024, the owner of 4566 Kennedy Road Cottage Grove WI 53527 submitted the following:

My family and I live at 4566 Kennedy Rd, and we are concerned with the addition of 50 residential lots in our immediate area. We use a private well and septic system which are not designed for high density use. When we purchased the property in 2014 our well tested high for levels of nitrates. There are numerous studies indicating ground water contamination occurs when septic systems are used in lots that are less than 3 acres in size. The proposed plan and already existing properties in the area average to be approximately 1 acre in size. I do not believe it would be a wise decision to add a high-density load of effluent into the groundwater. I brought this up to the Town of Cottage Grove Planning commission years ago and it is still a concern of mine.

In addition, I also have concerns of 50 additional property owners that may be using pesticides/herbicides on a regular basis which will further jeopardize the groundwater quality for myself and others as well as future owners who source their drinking water from a private well.

The concerned neighbor has definitely stated a problem in living the rural style of life in eastern Dane County. As pointed out in publications by Madison-based Clean Wisconsin and numerous other sources:

In an agricultural state like Wisconsin, nitrogen in the form of fertilizer and manure is spread on farm fields to help promote and accelerate the growth of crops.

An overabundance of nitrogen use in agriculture has led to nitrate leaching into groundwater. While other sources, like septic systems, also contribute to nitrate pollution in drinking water, **estimates suggest that 90% of the nitrate contaminating groundwater come from agricultural sources.**

Private water wells, which serve about one third of Wisconsin families, are at continued risk of nitrate contamination. Statewide, about 10% of private well samples exceed the MCL for nitrate-N, although one third of private well owners have never had their water tested for nitrate. In agricultural areas, such as the highly cultivated regions in south-central Wisconsin, around 20%-30% of private well samples exceed the MCL. Nitrate concentrations affect deeper wells over time as nitrate pollution penetrates aquifers and migrates farther from original source areas.

This information is backed up by an October 2015 "Final Report to WDNR for Groundwater Joint Solicitation Program, Project #218" which was in part authored by Michael T. Kakuska of Capital Area Regional Planning Commission (our very own CARPC). More information on this Report is attached but the pertinent portion to the present issue follows:

This study has revealed strong spatial patterns in shallow well nitrate concentrations throughout Dane County that have remained fairly stable over time. These patterns are driven by a combination of land use (specifically the intensity of agricultural activity) and hydrologic setting, with higher concentrations occurring high in the landscape near groundwater divides (younger water) and lower concentrations occurring low in the landscape near surface water features (older water). Proxy estimates of historical nitrogen loading to the shallow aquifer correspond remarkably well with historical nitrogen fertilizer use, suggesting leaching of agricultural nitrogen sources is primarily responsible for nitrate contamination at the county-wide scale. In contrast, areas of intensive residential development do not appear to exert a significant influence on local nitrate concentrations. This does not imply that septic systems or other point sources cannot be significant sources of nitrate to individual wells, however.

The results of this study also suggest that in some aspects, groundwater quality in Dane County is slightly improving – likely due in large part to improvements in agricultural nutrient management. Most notably the area of the county where average nitrate concentrations exceed the Maximum Concentration Limit (MCL) of 10 mg/L is declining, and wells with high nitrate concentrations appear to be decreasing. However, results also indicate that wells with low nitrate concentrations (far below the MCL) are increasing. This suggests that the groundwater system is not at steady state with respect to nitrate, and areas or geological strata with older water are being increasingly impacted by nitrate contamination.

To add a positive note to this discussion, Clean Wisconsin states:

After years of work to encourage state officials to tackle the nitrate pollution issue, Gov. Evers announced in 2019 the start of work to develop new rules for how nitrogen is applied to farm fields. These new administrative rules will

stipulate how nitrates from commercial fertilizer and manure are applied to farm fields.

The single-family residence at 4566 Kennedy Road is about 1,000 feet to the center of the proposed project and about 2,300 feet to the first phase of 16 lots. Our records show that residence, well and septic system were constructed about 1977 which is 47 years ago. The water data for most of the new homes in the Kennedy Hills first phase show nitrates that average about 5.0 to 6.0 as opposed to the “action limit” of 10.0. (Some of these homeowners use reverse osmosis systems and some do not.) As noted above, these nitrate levels are quite common in agricultural areas. More plainly, the issue with nitrates in well water is agricultural activity with the good news being that it is improving by better nitrogen application techniques. The wise farmer wants the costly nitrogen that makes for abundant crops to stay at the crop root level and not dissipate into the deeper ground.

Although much less significant, septic systems can also be a factor in nitrate in well water. In July 2000, Wisconsin revised the Uniform Plumbing Code. This revision affected the design of septic systems. The initial soil evaluation process sets the specific parameters for each individually designed system based on information derived from hundreds of thousands of Private Onsite Wastewater Treatment Systems (POWTS). These science-based systems are lasting longer with minimal failures. It has been long recognized that the failing septic system has is the vehicle for “septic nitrates” to impact well water. Again, the nitrate problem is with the older systems.

Additionally, older or improperly constructed or poorly maintained water wells can allow nitrates to enter the water in a specific well.

Wisconsin regulations require a 50-foot minimum distance between the well head and a septic system. That indicates the safe distance needed for separation. Dane County and Town of Cottage Grove both require a minimum lot size of 20,000 square feet to accommodate safe separation of these two functions. The proposed project is based on 30,000 square foot lots which is 50% larger than required. And it is noted that streets, roadways, parks, and stormwater facilities functionally increase the distance between POWTS and other items.

The Internet is a wonderful research tool. It is easy to find recommendations for rural homesite size in Florida or Utah based on their septic system needs. Fortunately, we are in Dane County and have a wealth of quality information that is germane to our specific needs.

The commenting neighbor also expressed concern about "pesticides/herbicides on a regular basis".

The historic and present use for the subject project land is crop ground. The proposed use would be for homes, lawns, and gardens, streets, community greenspace, and stormwater detention basins. The rate of nitrogen application on row crops is 6 to 10 time per square foot than on the most obsessively tended lawn. It is rare for a homeowner to use much pesticide whereas a farmer must spray annually for several types of insects, etc. The concept is the same is the same for herbicides. It doesn't take too much to keep your densely growing grass looking good, but the farmer must eridicate all kinds of stubborn weeds each and every year to produce an economically viable harvest. The commenting neighbor will probably be pleased with the change.

If you have need for additional information, please contact us.

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Nitrate in private water systems Private water wells, which serve about one third of Wisconsin families, are at continued risk of nitrate contamination. Statewide, about 10% of private well

samples exceed the MCL for nitrate-N, although one third of private well owners have never had their water tested for nitrate24,25 . In agricultural areas, such as the highly cultivated regions in south-central Wisconsin, around 20%-30% of private well samples exceed the MCL26 . Nitrate concentrations affect deeper wells over time as nitrate pollution penetrates aquifers and migrates farther from original source areas

Characterizing the sources of elevated groundwater nitrate in Dane County, Wisconsin

by

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Final Report to WDNR for
Wisconsin Groundwater Joint Solicitation Program, Project #218

October 29, 2015

This report was edited by R. Lathrop. The report will be formally published through the WGNHS following peer review.

This finding is consistent with a study by Bradbury et al. (2015), who observed generally decreasing concentrations of nitrate downgradient in the shallow aquifer following the conversion of an agricultural field to an unsewered subdivision.

As our results indicate, groundwater nitrate as it discharges to springs and is carried by streams during dryweather baseflow are good integrators of past N loading in agricultural areas. Baseflow nitrate concentrations in streams with long-term monitoring data indicate that overall groundwater nitrate increased from the 1940's through the 1980's, with concentrations leveling off since the 1990's and possibly decreasing slightly in some streams in more recent years. The highest spring and stream baseflow nitrate concentrations occurred in the most intensive agricultural areas such as north of Lake Mendota. Areas of lesser agricultural such as in the Driftless Area of western Dane County showed more moderate nitrate concentrations in springs and baseflow. While the high nitrate concentrations in well water is of prime health concern to humans, high nitrate concentrations in streams can rapidly decline when stream waters become sluggish in pools or river wide stretches, or where the stream interacts with wetlands. The limited data that we collected in a few stream locations indicated denitrification may be responsible for a significant decrease in baseflow nitrate in some stream systems.

Conclusions and Recommendations

This study has revealed strong spatial patterns in shallow well nitrate concentrations throughout Dane County that have remained fairly stable over time. These patterns are driven by a combination of land use (specifically the intensity of agricultural activity) and hydrologic setting, with higher concentrations occurring high in the landscape near groundwater divides (younger water) and lower concentrations occurring low in the landscape near surface water features (older water). Proxy estimates of historical nitrogen loading to the shallow aquifer correspond remarkably well with historical nitrogen fertilizer use, suggesting leaching of agricultural nitrogen sources is primarily responsible for nitrate contamination at the county-wide scale. In contrast, areas of intensive residential development do not appear to exert a significant influence on local nitrate concentrations. This does not imply that septic systems or other point sources cannot be significant sources of nitrate to individual wells, however.

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The database developed in this study represents a uniquely comprehensive collection of well water nitrate records which allows previously unidentified patterns and trends to be identified. As such, we recommend that the database be periodically (e.g., every 5 years) updated so that future changes can be continuously tracked and analyzed. A similar approach to data compilation