MEMORANDUM

TO: TOPSFIELD PLANNING BOARD

FROM: GREG KROM, WATER SUPERINTENDENT

SUBJECT: KLOCK PARK SPECIAL PERMIT APPLICATION

DATE: JUNE 9, 2023

CC: KEVIN HARUTUNIAN, TOWN ADMINISTRATOR

Efforts to improve the turf conditions at Klock Park have been underway for many years. The field was watered using rain cannons, it is regularly aerated and slice seeded and at times been chemically treated. Recently, a special permit application was submitted to apply a variety of organic and/or synthetic products to help improve the quality of the grass playing surface.

Klock Park is almost entirely contained in the Town's Groundwater Protection District. This district is the Zone II for the Town's two water sources that withdraw water from a single shallow, unconfined sand and gravel aquifer. Commonly referred to as a water table aquifer, there is no confining layer, such as a layer of clay, separating the water bearing strata from the ground surface making it particularly vulnerable to contamination from land use, infiltration systems, chemical spills and leaking underground storage tanks.

Flowing groundwater typically has a fairly shallow gradient and moves slowly, measured in feet per day. The groundwater flow near our wellfields follows the nearby streams, which flow from the northwest to the southeast. A pumping well distorts the natural groundwater gradient by creating a cone of depression near the well. This can be visualized as a 3-dimensional inverted cone where the groundwater level falls below the natural gradient due to the water withdrawal. Groundwater flow can be reversed under certain pumping rates and aquifer characteristics.

The cone is clearly evident in the attached 2-dimentional groundwater profile taken on a single day along the streams near our wells. The slope of the cone is steepest near the North Street wellfield (OW-3) and gradually returns to the natural gradient further away from the well (CDM-5). Based on this profile, it appears that on this particular day North Street lowered the natural groundwater gradient by about 12 feet and the downstream gradient returned to its normal slope somewhere between Country Motors and Brookside Road. The cone extends laterally until it reaches an impermeable soil such as Great Hill's glacial till or the combination of distance and soil type changes allow the groundwater slope to return to normal. In Topsfield's case the Zone II covers a great deal of area.

The Groundwater Protection Bylaw requires the Planning Board to review any non-residential application of fertilizers, pesticides and herbicides but does not prohibit the use of any individual products or class of products. Discussions about which chemicals to use, organic vs synthetic, etc. often hinge on what is considered "safe". Safe is often construed as an absolute but it can change over time. What is considered safe today may not be considered so in the future.

Drinking water regulations regarding lead, manganese and PFAS have gotten stricter over time as more research is conducted. The USEPA and MassDEP regularly develop new drinking water standards as health concerns become apparent.

Risk is perhaps a more appropriate reference when reviewing the special application. There are a number of things to consider when evaluating risk in regards to groundwater protection, such as:

1. Which products will be used?
2. How much will be applied per acre?
3. How often will the product be applied?
4. How many acres will be treated?
5. Does the compound breakdown or does it maintain its original chemical structure?
6. How much of the compound will be consumed on or near the surface of the ground?
7. Where does the excess material or its derivatives go?
8. Under what conditions must the item be applied and how long must those conditions exist?
9. What happens if the chemical is applied and conditions turn unfavorable?

At the core of the issue is what is the risk of excess material leaving the site, what form it could take and where will it go? It stands to reason that the risk of contamination increases with the amount of area treated, the frequency of application, and when it is applied. Risk of contamination is likely lower If a small area is treated infrequently with a minimal amount of product under the correct weather conditions as compared to a higher risk situation where too much product is applied over a large area during uncooperative weather conditions.

Evaluating the risk of organic versus synthetic options is more difficult. Both involve the application of foreign compounds with the intent of generating a certain biological response. One would hope that organic solutions are less mobile and pose less risk than synthetic ones but it should not be assumed to be the case. Too much of anything could lead to problems.

Synthetic products have been applied to Klock Park in the past, possibly over many years, and it remains unclear which products were used, how much was applied, how often they were applied and over what area. Water testing to date hasn't shown any deleterious effects but knowing more about past practices would aid in evaluating future plans.

Recommendation

The Town relies on one aquifer to supply water to numerous businesses, three schools, and 80% of Topsfield's residents. It is an incredibly valuable resource and its protection, in my opinion, far outweighs the benefits of chemically improving Klock Park because the consequences are severe if chemical application is not done properly or risk assessments are proven inaccurate.

However, Klock Park is a valuable resource and many people, myself included, played soccer there as a child. The effort to improve the field conditions is certainly warranted but must be balanced with the need to protect the Town's water supply.

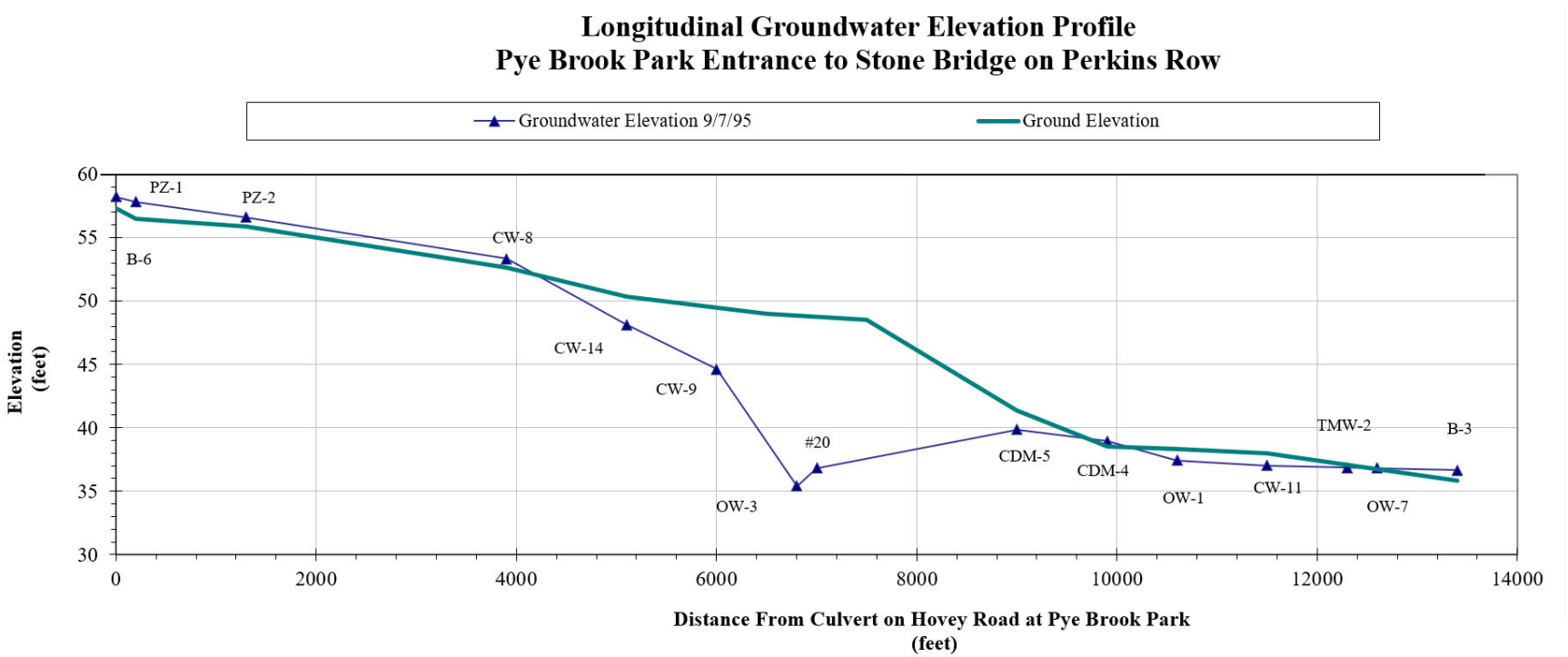
My education and experience, applicable to the water supply portion of this issue, does not include any training in field management such as which soil amendments to use or determining the appropriate dose. Also, most of the information needed to properly evaluate the risk is unavailable at this time and application of any chemicals would be in addition to what is already being applied to the residential lots in the district.

In the short-term, the applicant should limit the use of fertilizers, pesticides and herbicides to one or two playing fields totaling no more than three acres and permission to use these products should not extend beyond two years. This allows for some improvement to the field conditions, time to evaluate the treatment methods and for the development of a long-range plan. The risk of contamination is relatively low if the treated area is small, dosage rates are low, application is infrequent and done under the proper conditions. The Water Department should be notified prior to any application and detailed records should be kept as to the materials used, the amount used and the area treated.

Field conditions may improve following chemical application but organic and synthetic soil amendments should not be used as a long-term correction for poor soil conditions and lack of water resources. A more detailed plan is needed if the applicant wishes to continue or expand the use of soil amendments beyond the initial two-year period.

The plan needs to minimize the reliance on synthetic or organic chemicals and should provide answers to the nine questions outlined earlier. It should include soil testing results and describe specific steps needed to develop a deep, healthy grass root structure which may include topsoil replenishment and specific chemical application needed to address nutrient deficiencies and pest control. The plan should include field management policies that will balance field use among other facilities thereby providing time for the Klock Park fields to rest and recover.

Investigations into potential irrigation sources should be conducted and a water budget developed. If irrigated, the park will need an underground irrigation system, preferably with a smart irrigation controller that optimizes water use since it will likely draw from the same aquifer as the public water supply. The plan should also include installation of a series of groundwater observation wells capable of obtaining water samples at various depths up to 50 feet deep and a sampling plan so the migration of any chemicals offsite can be detected before reaching the Town's wells.



Locations:

B-6 Pye Brook Park culvert on Route 97 entrance, surface water elevation
PZ-1 Piezometer, groundwater elevation near culvert
PZ-2 Piezometer, groundwater elevation along Pye Brook between Wilmore Road and Pye Brook Park
CW-8 Checkwell located along Pye Brook near Woodside Road circle, groundwater elevation
CW-14 Checkwell, located along Pye Brook behind Mansion Drive, groundwater elevation
CW-9 Checkwell, located along Pye Brook, behind Mansion Drive, groundwater elevation
OW-3 Observation well near entrance to the North Street pumping Station, groundwater elevation
#20 North Street production well #20 converted to observation well, groundwater elevation
CDM-5 Observation well off of Ipswich Road across from Country Motors, groundwater elevation
CDM-4 Observation well on Brookside Road near the Mile Brook culvert, groundwater elevation
OW-1 Observation well along Mile Brook between the brook and Brookside Road, groundwater elevation
CW-11 Checkwell, located along the edge of wetland between Winsor Lane and Mile Brook, groundwater elevation
TMW-2 Observation well located on the northern edge of the Perkins Row wellfield, groundwater elevation
OW-7 Observation well located inside Perkins Row station, groundwater elevation
B-3 Stone Bridge on Perkins Row, surface water elevation