

DRAFT

Discussion of Groundwater Data Pertinent to the Proposed Village of Mukwonago High Capacity Well

November 11, 2004

The following is a synopsis of the discussion that took place.

Participants: Dr. Ken Bradbury, Wisconsin Geological and Natural History Survey; Robert Biebel, Chief Environmental Engineer, SEWRPC; Jeffrey Thornton, Lakes Specialist, SEWRPC; David Dubey, Mukwonago Town Chairman; David Linton, Past Chairman, Phantom Lakes Management District (PLMD); Dick Jenks, Past Commissioner, Phantom Lakes Management District; and Karen McNelly, Phantom Lakes Management District Waukesha County Representative and Mukwonago Town Plan Commissioner.

Ken Bradbury and Dave Linton were telephone participants for this discussion with the rest of the participants utilizing the SEWRPC “Waukesha” Conference Room at the SEWRPC office from approximately 4:30 to 6:00 PM on Thursday, November 11, 2004.

The goals of the discussion were as follows:

1. The group was to come up with suggestions and objectives regarding the well tests that the Village of Mukwonago is proposing to conduct in the near future at the Phantom Lakes YMCA Camp in Sec.32 of the Town of Mukwonago, and encourage scientifically-sound evaluation of the test data, while working with the Village of Mukwonago.
2. The group was to determine if a watershed model or tool should be developed and used to evaluate new wells that may be proposed for this area. As the discussion evolved, participants realized that the subject well is not the only well that will be needed by the Village of Mukwonago or other municipalities surrounding the watershed in the near future. The group consensus was to pursue development of a tool to measure the impacts of all potential high capacity wells in this watershed, minimally for the next ten years, and hopefully begin soon. A number of outstanding questions still exist: what neutral party could best provide the model, what would be in the model, what is already potentially done and where will the money come from?

Karen McNelly indicated that the Mukwonago Village well and East Troy well are only symptoms of future wells that will be needed to meet the growing needs of the population in the area.

0. *INSERTED NOTE: Lulu Lake is classified as an Outstanding Resource Water; the Mukwonago River is classified as an Exceptional Resource Water from Eagle Spring Lake to Upper Phantom Lake; Spring Lake south of Willow Spring Lake is classified as an Outstanding Resource Water; and Spring Creek, into which Willow Spring Lake discharges, is classified as an Exceptional Resource Water and Cold Water Creek with trout. To the east of the Town is the Vernon Marsh, a State Natural Area.

0. *INSERTED NOTE: Municipalities adjoining the Town of Mukwonago currently use high capacity deep aquifer wells for their municipal water supply. The water abstracted from these high capacity deep aquifer wells exceeds the radium standard for municipal drinking water. A likely source for radium-free water is the shallow aquifers. The shallow aquifers currently supply most homes, not served by public water supply systems, with well water. Rapidly growing populations will increase the demand for safe drinking water, placing increased pressures on all of the aquifers underlying Southeastern Wisconsin.

With regard to the Village of Mukwonago well, Dave Dubey indicated that, after talking recently with Jim Wagner, President of the Village of Mukwonago, the Village is ready to test the well if their Engineers tell them it is okay.

Dr. Ken Bradbury asked for further information on who was present at the meeting, who they represented, and their interest in the issue. The participants were introduced. Dick Jenks noted that he had been reviewing these issues with Bob Nauda of RSV Engineering, and had spoken with Ken on the phone about a month earlier. Dave Linton noted that he wanted to raise the awareness of this issue, but did not want this to become as divisive as in the Eagle area. Ken Bradbury consequently suggested we probably need to look at a more comprehensive plan for the entire watershed since there will be more wells needed in the future.

Bob Biebel indicated that he thought the Town seemed most interested in looking immediately at this particular well and site as the Village intends to be drilling by spring 2005. Dick Jenks specifically asked about looking at criteria to hire a hydrogeologist to advise the Phantom Lakes Management District on the Village well proposals.

Karen McNelly noted that the Village proposal had been the initial impetus for the discussion, but that it had quickly become apparent that the surrounding municipalities would soon be needing more water and that this larger scale issue may need to be addressed. Realizing that there are a number of future well proposals coming, with potential well sites around the Phantom Lakes and within the Fox and Mukwonago watershed, the group endorsed the larger-scale approach as an opportunity to avoid duplicating tests every time a new site was being considered, while, at the same time, providing a tool to address the immediate issue of the proposed site and well.

It was noted that the Village Engineer is Ruckert and Mielke, with Jon Jansen currently serving as the Village hydrologist. Ruckert and Mielke also serves as the Town Engineer, and has been under contract to the PLMD providing a Sewer Service Facility Plan to the District in the late 1990s.

With respect to the proposed Village well, Bob Biebel indicated that there is likely to be a potential impact on the Lake, and that the well might “rob” some water from the lake. However, he reminded the group that Jon Jansen had talked about a “split” created by clay intrusions in the aquifer. Consequently, we just do not know yet how significant that impact will be without further information.

Ken Bradbury asked where the water in the Village Municipal water system was to be discharged? Bob Biebel indicated the water would go to the Village (easterly) and then be discharged as treated wastewater through a long pipe to the Fox River; it would not be discharged back into the Mukwonago River watershed. Ken therefore agreed with Bob’s earlier statement that there was likely to be an impact since you “do not get something with nothing in return”—referring to the interconnectedness of the surface and ground waters of the Mukwonago River Basin.

Dave Dubey thought that the Town and the Lake District are both looking for a way to measure any potential impacts. Ken Bradbury indicated that the best way to assess the potential impact of a high capacity well on the YMCA property would be through a ground water flow model with the lake simulated as well as the high capacity well. This could provide a pretty precise answer that could be field tested. The USGS Modflow Model© could be used for this purpose, but it is fairly complicated. However, this type of study could probably be done fairly accurately, although at some cost, and there may be some additional data that would need to be collected. Lake surface elevation records and depth data would be needed.

0. *INSERTED NOTE: Acquiring the available information needs to be pursued with Prof. Jean Bahr and Ms. Hillary Giddings of UW-Madison, the District, Village (dam records) and the WDNR – Meg Galloway and or Bill Sturtevant – Madison, or Mike Bruch – Waukesha to determine what may already be available.

Bob Biebel thought that Jon Jansen's initial plan was to put in two test monitoring wells within the vicinity. Ken Bradbury wanted to know where the specific site was located on the maps sent to him. The proposed well site was described as between the two easterly blue dots on the aerial map prepared by SEWRPC. Dick Jenks elaborated by noting that Aquifer Sciences was proposing to do volume testing with an 8" test well, sinking it to 160' deep and probably pumping it for less than 72 hours duration. This test would determine transmissivity, groundwater storage, and boundary conditions. The minimum things to be evaluated were the cone of depression and potential supply capabilities.

Ken Bradbury asked if the Village was willing to put any piezometers or monitoring wells in the lake itself. Dick Jenks indicated that they had not stated such an intent. Notwithstanding, Ken thought that such an approach would be a good idea to assist in determining any potential impacts to the lake, and suggested that the Town of District might consider cost-sharing such an activity. Questions also were raised about where the water would run during the test. Someone at the Village was reported to have indicated some time ago that the test pumping water could be run south along a ditch, then east under a bridge. This should be discussed further as discharging it back to the lake not be appropriate for accurately assessing potential lake level impacts.

Jeff Thornton noted that in addition to the lake level concerns there were some concerns about drying of the private wells within the community as most of the wells around the Lakes are shallow or point wells. Questions included the need to deepen these as one of the impacts of a high capacity well removing water from the shallow aquifer, as well as additional questions regarding concerns that these aquifers drain into exceptional resource waters that might be adversely affected by water losses to the high capacity wells. Karen McNelly indicated that some of the private wells on the Lakes are shallow points and noted that well records are available on CD from Waukesha County environmental division (Leslie Williams or Paul Telier).

Ken Bradbury indicated that he did not think there would be much impact on the private wells, but felt that this should be evaluated more carefully. He did not

foresee widespread lowering of the aquifer unless the lake level is lowered quite a bit. Ken encouraged the utilization of mini-piezometers to measure these effects. He had suggested a similar approach at Lake Beulah and the tests did show the effects of pumping on the lake.

Bob Biebel mentioned that Bob Nauda was recommending just such an approach, with piezometers being placed along the shoreline and at additional places if there was a sensitive site. The tests should be conducted for 72 hours or more—until the monitoring points reached a steady state. It was thought that maybe they shut the test down too soon at Lake Beulah, before a steady state had been reached. Ken Bradbury strongly encouraged the longer tests for better information. The WinFLOW or GFLOW Model® tests this type of hypothesis and could provide more accurate information prior to the field test. This should be encouraged.

With regard to permitting, Dick Jenks indicated that a WDNR permit is not required unless there more than 72 hours of testing. Thus far, it does not appear that the new groundwater legislation will have any bearing on this process.

Dave Dubey asked how do we encourage the Village to do these tests? Ken Bradbury thought that running the tests longer could be done for a minimal cost. The big cost is putting in the wells, the pump and disposing of the water from the tests. Therefore, he suggested that the Town or District might offer to pay for the incremental cost of running the pump for a few more days and someone to measure the water depths in the wells. The additional data gained would be much more accurate and valuable and well worth the expenditure. The piezometer wells would be easy to install and this definitely should be done. He indicated that it would be reasonable to have the Lake District and Town suggest these additional steps and, if necessary, offer to pay for them or split the costs rather than pay for a separate hydrologist and testing.

To this end, Dick Jenks indicated his impression that that the Village and Ruckert and Mielke were concerned about potential disagreements over the results of these additional tests. Ken Bradbury suggested that he or his colleagues could provide a neutral review of the test results. He explained that the Wisconsin Geological and Natural History Survey is independent and a part of the University. They would not take sides. Hence, they could review the data and analyses, and give an expert opinion as to whether or not they are appropriate, whether the analysis was done correctly or not, and interpret the results. Everyone agreed that this would be very helpful. The group agreed that the correct evaluation work is essential.

The group also was enthused about WGNHS assisting with the determination of the correct testing protocol, as they had done with Lake Beulah. The group indicated that any evaluation of a proposed sampling strategy would have more credence coming from the Wisconsin Geological and Natural History Survey. It was suggested that the District and Town make this request of the Village. They could indicate that they talked with the State Survey and the consultant (if and when the Town and District hire a hydrogeologist, either jointly or separately), and indicate that the proposed additional tests would supply everyone with the best information available to determine any potential impacts of the Village drawing water from the proposed well site that they are considering adjacent to Upper Phantom Lake. Given that this is not such a big cost, it was considered likely that the Village would respond positively.

Dave Linton suggested that this might be a way to have a common language developed between all of the parties concerned, by having the State Geological and Natural History Survey not only review the test protocol but also provide a review of the data and analysis as a neutral party.

Ken Bradbury stated that this was part of their job at the Wisconsin Geological and Natural History Survey. He asked that a letter be prepared requesting their services, reiterating that they had to be a neutral party. He further suggested that it would be best to have all of the parties work together and submit the request from the Village, Town and PLMD.

Dick Jenks asked about having UWEX assist with groundwater education. This has been discussed for a number of years. A groundwater workshop could be held in conjunction with the Southeastern Wisconsin Lakes Meeting in February or as a separate meeting as an all day session. It undoubtedly would draw a large group if done on a weekend. Ken Bradbury noted that he had had a discussion with Chuck Dunning of the USGS recently on this topic, as it seems as if all of Waukesha County has concerns and questions regarding groundwater and surface water issues. He thought we may want to be looking at a demonstration of the regional framework model as part of the presentation, as well as using the Mukwonago River Basin as a more detailed case study.

Ken Bradbury noted that Prof. Jean Bahr has a student, Hillary Giddings, already working on some of this modeling for ground and surface waters around Lulu and Eagle Spring Lakes and the Mukwonago River between Eagle Spring and Lower Phantom Lakes. Ken will contact Jean to find more about this research and try to determine whether or not any of the work already completed would be helpful for this project.

Dick Jenks then asked what data needs to be collected for a model or inset model within the regional framework model, and how this would relate to future wells being needed by the Village or other surrounding municipalities? Ken suggested it might be more practical to model the whole watershed, by developing a large inset model. He noted that the Regional Model was too coarse for this application and would need to be refined; however, it provides a foundation for building the more detailed models. For example, the clay layers reported by Ruekert and Mielke may be very significant in determining groundwater flows, and this information needs to be pursued. Detailed information such as this may not be available everywhere in the Basin, and a series of models or a couple of inset models may be needed to address some of these site-specific problems and variables, which are not addressed as of yet in the Regional model. This may be a project that SEWRPC could address somehow, maybe in conjunction with the expert modelers of the USGS. This would be a larger project that that needed to address the Upper Phantom Lake situation.

Ken Bradbury noted that Prof. Jean Bahr may have a refined model for the Watershed. This was about a \$45,000 project that she and Hillary Giddings started with the Eagle Spring Lake. She may have a useful tool. Karen McNelly indicated that the Phantom Lakes Management District agreed to pay for some additional testing between the Lakes due to a potential impact on Lower Phantom Lake of a proposed dredging project and drawdown on Eagle Spring Lake.

0. *INSERTED NOTE: Tom Day, Eagle Spring Lake Management District Chairman—per Saturday’s phone conversation—indicated that he is doing the testing between Upper and Lower Phantom Lakes and it is minimal. Tom will provide the data collected to date.

Jeff Thornton further indicated that he had spoken with Jean Bahr that day as she was leaving Colorado. She indicated that this study was at the boundary of the model her student had developed and noted that she thought there may be some concerns regarding the assumptions of that model and this needs to be revisited. It is worth being pursued and Ken Bradbury indicated that he would follow up next week with Jean and Hillary Giddings.

Bob Biebel noted the larger scale model would possibly take about 18 months to complete, and that all of the Agencies would need to work together to fund such a project. However, he stated that the immediate challenge was the “Y” well. Should an inset model be used? Ken Bradbury said he would have to see the test results first, because if the tests showed there was little or no impact you would not need to do an inset model. If the tests showed an impact, however, you

would definitely want to do the model. Ken further suggested a two step process: one, where they do the test and evaluate it with the lake owners to decide if the model is needed due to the amount of impact, and, two, where you do the more detailed modeling.

Karen McNelly asked if Ken Bradbury was aware that the Upper Lake was totally groundwater fed? Dave Linton indicated that some quantitative information came from the third of the DNR Lake Studies completed in 1982, and that Jon Jansen had indicated that when he did the initial water search he was not aware of this information. According to the Study, the Upper Lake only receives 300 gpm and flushes once every year to year and a half. That is very slow.

Ken Bradbury talked more about the GFLOW and WinFLOW models. He explained that these models are two dimensional and fairly easy to develop. They would allow a “first cut” at an assessment that could support more detailed evaluations as part of the proposed pump test. The group agreed that a two dimensional model was desirable and that Jon Jansen could develop it.

Dave Linton then suggested that the Lake District and Town send out letters immediately suggesting these procedures be included in the testing protocol and recommending that the Wisconsin Geological and Natural History Survey be engaged as a neutral party to evaluate these. In this way, the testing standards could be mutually agreed upon and evaluated by a neutral party. The Village hopefully would receive the suggested process in good faith and be co-operative.

Ken Bradbury asked if the PLMD had hired Bob Nauda. The answer was no; however, he had generously provided Dick Jenks with information and a scope of services.

Karen McNelly reported that the PLMD Chairman, Steve Barber, had spoken with and received information from a number of potential hydrologists including Bob Nauda of RSV, Doug Cherkauer of UW-Milwaukee (who is working on the Richfield project, the results of which were to be available about December 15th), Layne Engineering, GZA and others. Karen also indicated that she thought that Jon Jansen and Ruekert and Mielke are hoping to work cooperatively with all parties. The potential exists for 3 to 5 or more wells in this area. Thus, the groundwater south of this area is of prime interest to the Village as well as to the Town and PLMD.

Dave Dubey asked if these additional test requests should come from Ken

Bradbury or from a consultant? Ken indicated that he had to remain totally neutral and cannot come up with the testing plan. As a neutral party, it would not be appropriate for him to both develop and review the plan and analysis. The group agreed with this assessment, and suggested that the consultants could develop the testing plan in partnership with all parties.

At this point, the group thanked Ken Bradbury and Dave Linton and said good night. Bob Biebel and Ken would talk more next week.

Dick Jenks asked if we had accomplished what we wanted? Dave Dubey replied that he understood the issue better. Karen McNelly stated that she felt that with the Town and PLMD working with the Village could accomplish a lot more, and noted that it would be important for the Town Chairman and PLMD Chairman work with the Village President directly. A lot of input from others would only cause confusion within the Village.

Dave Dubey and Dick Jenks then talked about the possibility of the PLMD hiring Bob Nauda for \$1500, seeing as how he has completed a portion of the initial work necessary to establish a protocol for doing the tests. Dave Dubey said that he would be out of Town, but he would think this over and talk with the Town Board when he returns. In the interim, Dave said that the Town and District should send a letter to the Village with the attachment from Bob Nauda stating that these are the tests we feel need to be performed to assist in determining impact to the area, and that we would recommend a neutral third party review by Ken Bradbury and the State Geological and Natural History Survey.

Ken Bradbury, Bob Biebel, Jeff Thornton, Dave Linton, Dick Jenks and Dave Dubey were thanked for their time and input.

Karen J. McNelly