Appendix E

Ramsey Soil & Water Conservation District
Response to Request for District Assistance
By: Tom Petersen, Manager Ramsey SWCD
January 11, 1993

RAMSEY SOIL & WATER CONSERVATION DISTRICT

January 11, 1993

Ms. Joan Brainerd
14 East Oaks Rd.
North Oaks, MN 55127

Dear Ms. Brainerd:

This letter is in response to your request for District assistance. We are happy you contacted us. The District encourages and appreciates the general public's utilization of our services.

Our assistance regards discerning reasons for decreased water elevations in Teal Pond and directly adjacent ponds, assessment of potential impacts that ground water pumping at the Highway 96 Dump site might have on the North Oaks ponds, and recommendations for restoring open water pond(s) within the confines of the natural hydrologic system. Our conclusions are the result of examination and interpretation of existing data, new data, and several reports acquired by District staff.

It is our opinion the ponds are in the process of reverting to their natural conditions (pre well water augmentation). Without the artificial and unnatural infusion of water (addition of well water) into their hydrologic system, the ponds are simply reflecting the **natural hydrologic conditions for this period of time.** It is unlikely the pumping at the Highway 96 Dump site is effecting the natural hydrology of the ponds. In their natural condition, the ponds are either a reflection of the regional ground-water table or a localized perched water condition.

Assessment of Ground Water Pumping at the Highway 96 Dump Site

After reviewing the data concerning the geologic and hydrologic characteristics of the ponds and the Highway 96 Dump site, it is the opinion of District staff that **it is unlikely that the extraction of contaminated ground-water at the Highway 96 Dump site is having an effect on the elevations of the ponds.**

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According to the report completed by Professional Engineering Consultants (PEC), clayey soil conditions (as much as 10 feet or more) predominate around the bottom and silty sands around the perimeter of Teal Pond. We believe the origin of at least the upper layers of this soil material is eroded dredge material.

According to the North Oaks Company, the original Teal Pond was dredged around 1950. The dredge material was side broadcast and much of this material has either eroded or slumped back into the pond.

The soil conditions referenced in the PEC report usually preclude significant water seepage from the bottom of ponds. However, the report does indicate that soil conditions could allow small amounts of lateral water seepage, i.e., seepage from pond sidewalls. If this condition exists, there may be a possible connection to the localized water table system. It should be noted, this has not been verified and is only speculation. **In general, the aforementioned conditions lead us to believe the ponds are probably not connected to a deeper portion of the aquifer system being pumped at the Highway 96 Dump site.**

The ponds are likely connected to the regional water table system. Therefore, it is possible the pond levels are declining as they return to their natural hydrologic equilibrium with the elevation of the regional ground-water table system.

Three distinct aquifer types are present at the Highway 96 Dump site. They include: perched, Lower Sand, and St. Peter Sandstone. At the Dump site, an extraction well is pumping contaminated ground water from the Lower Sand aquifer and perhaps some of the St. Peter aquifer. These two aquifers are hydrologically connected because no geologic confining layer separates them. It appears a silty clay layer, within unconsolidated glacial deposits, hydrologically separates the Lower Sand and St. Peter aquifers from the overlying localized perched ground water and from both the ponds at the Highway 96 Dump site. It is possible that the silty clay layer identified at the Dump site is similar to the materials present beneath the ponds in North Oaks.

The hydrologic separation of aquifer systems is best evidenced by the distinct difference in water level elevations of the ponds and the aquifer from which the extraction well is pumping. According to the CRA report, water elevations, at John and Teal Ponds in August 1990, are 912.5 and 909 ft. respectively. The average elevation of the Lower Sand and St. Peter aquifers is 892 ft. This represents between a 17-20 ft. difference in elevation and indicates a separation of that portion of the hydrologic systems which serve the recovery well and the ponds.

The Highway 96 Dump site extraction well draws its water from only a limited portion of the Lower Sand/St. Peter aquifer. **From the information provided in the report, it appears the capture zone/cone of depression of the pumping well does not extend into the hydrologic regime of the North Oaks ponds or the perched ground water at the Highway 96 Dump site.** The drawdown in groundwater elevations during pumping indicate that most of the water withdrawn during pumping comes directly from around the well site (indicated by the depressional contours around EW1, Figure 3, CRA report). A limited amount of water is intercepted from the upgradient direction of ground-water flow (east of the pumping well) which is in the opposite direction from which the North Oaks ponds are located (outermost contour boundary on Figure 3, CRA report). **The drawdown effects of the pumping are very localized and it is likely they do not extend into the North Oaks pond areas.** Water elevations of monitoring wells 12B, 12D, 13B, and 13D, which are drilled to the approximate depth of the pumping well, may confirm this, since they have remained relatively unaffected by the pumping.

An examination of the water elevations in the Lower Sand, St. Peter and perched aquifers over a five year period (Table 2, CRA report), indicate that, except for the area directly around the extraction well (EW1), pumping has not significantly altered the elevations of any of these aquifers nor of the surface water resources at the Dump site. In fact, some water elevations in the monitoring wells have either remained fairly consistent or increased in elevation. Since the elevations of North Pond, and the perched and Lower Sand aquifers are relatively unaffected at the Dump site, it is **unlikely that the pond and aquifer levels in North Oaks would be significantly influenced by the pumping effects of the extraction well.**

A review of District office records indicates that homeowner ground-water pumping within the North Oaks pond area is from much deeper aquifers and probably has no effect upon pond elevations. Other than single family domestic supply, there seems to be no other significant sources of ground-water pumpage within the immediate area. **In short, the well installed by CRA is likely pumping from a different portion of the ground-water system than which the North Oaks ponds are connected and is apparently not the cause of the decrease in pond elevations.**

Wetland Ecosystem Assessment

Based on aerial photos and other sources of information, it is very clear the ponds in question were altered significantly from their natural condition by dredging in 1950 and well water augmentation (from approximately 1951 to 1989).

The natural wetlands were altered to create an artificial and unnatural deep water pond condition that can only be sustained by the infusion of large amounts of water from outside the natural hydrologic system and periodic dredging.

Prior to dredging and well water augmentation, Teal Pond could best be characterized as a shallow, type III/IV wetland complex. This is evidenced by the 1940 and 1945 aerial photos and 1949 Milner Carley topographic map. The 1949 elevation of Teal Pond was around 908 ft. The current (1/4/93) elevation of the pond is 907.76 ft.

The ponds have small surface water drainage areas relative to their size and , as stated earlier, probably connected to the ground-water table.

Interpretation of graphic information provided by the North Oaks Home Owners Association (North Oaks East Pond's Augmentation Well Annual Gallons Pumped vs. Rainfall), reveals that the ponds are unable to maintain their artificially high elevations and open water conditions without substantial augmentation. This is true even under a sustained period (several years) of above normal precipitation.

It is assumed that normal precipitation for this area is between 27 and 28 inches annually. On the average, you can expect 37 to 38 inches per year of evapo-transpiration. This leaves at least a 10 inch per year water deficit. Without sufficient surface water drainage into the pond(s) or other water sources, e.g., well augmentation, the ponds can not hold surface water elevations above the natural ground-water table elevation. This fact is emphasized in the 1950 Toltz, King and Day report.

Conclusions and Recommendations

Given time, the ponds will revert (be restored) to their natural wetland condition as pictured in the 1940 and 1945 aerial photos. Based on the information provided in the CRA report and interpretation of other relevant hydrogeologic data available at present, there does not appear to be anything affecting the ground-water table near the ponds.

To return the pond(s) to an unnatural deep water condition by well water augmentation would be ecologically unsound and environmentally irresponsible. Our supply of quality potable ground water is limited. Furthermore, utilizing our precious ground water resources to, in effect, "fight nature" for reasons other than to benefit or protect the public's health/safety and welfare is an unwise choice.

A natural resource steward and conservationist would manage the pond(s) within the inherent limitations of the natural hydrologic system. When managed properly, types III and IV wetlands can be very beneficial to wildlife.

If the affected homeowners desire a wetland that is primarily deep open water, dredging to expose more of the ground-water table could be a viable solution as suggested in the PEC report. To extend the "open water life of the pond" dredge spoils must be removed from the site. Also, before dredging is started, intense site specific soil boring should be done to eliminate the slight possibility that the pond(s) are a perched water condition. If the pond(s) are perched, dredging could puncture the soils that retain the water.

Another option to explore if an unnatural deep open water pond condition is desired would be to introduce additional water into the pond's hydrologic systems from a surface water source. For example, enlarging the surface water drainage area and/or increasing runoff within the current surface water drainage area. However, this option may come with water quality threats to the pond.

Please call the District office if you have any questions or if we can be of any additional assistance.

Sincerely,

Thomas P. Petersen

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Ramsey SWCD

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