Water Quality Monitoring and Assessment – Proposed Drainage District #88
Town of Burnett, Dodge County

Report to the Dodge County Circuit Court

By the
Board of Commissioners
Lake Sinissippi Improvement District
Hustisford, WI
March 10, 2011

Introduction

The Dodge County Drainage Board proposes to establish a drainage district within the Town of Burnett and use Spring Brook creek, a tributary of the Rock River, as the receiving water for agricultural field runoff and tile drain water. The drainage board on August 10, 2010 filed a report with Dodge County Circuit Court of a petition by landowners within the township to establish a district. The proposed Drainage District #88 would comprise over 600 acres of agricultural land that include field crops of corn and soybeans and a dairy livestock operation.

The drainage board intends to improve a number of existing field surface drains and ditches, adjust elevations of existing road culverts, create new grass waterways and install new field drain tiles to increase the flow of both surface water from field runoff and subsurface water from the root zone of crop acreage.

Unfortunately, the drainage board has designed the proposed district drains so as to channel the increased flow of field runoff and subsurface drainage water directly to the headwaters of Spring Brook, a perennial stream that is a tributary of the Rock River and, thus, a water source of Lake Sinissippi. The increased flow of combined drain water through district drains has the potential of conveying large quantities of pollutants to the receiving waters of the Rock River, especially during periods of snow melt and heavy rain events. Pollutants will likely include nutrients (phosphorus and nitrogen compounds), sediment, pesticides and herbicides, bacterial contaminants, organic matter and other waste products typically found in field runoff and tile drain water in row crop fields and lands used for spreading manure from livestock operations.

The purpose of this monitoring project is to assess the potential for pollution of surface waters from operation of the proposed district drain.

Summary

Water samples were taken from a number of sites within the proposed district and from Spring Brook headwaters during July 2010 and analyzed for contaminants. Test results indicate that field runoff and drain water in the district drains are polluted, with elevated levels of nitrogen and phosphorus compounds, suspended solids and fecal coliform bacteria. The water quality of Spring Brook is negatively impacted by the nonpoint source of pollution from the existing agricultural drainage system. Fish habitat and wildlife habitat have been materially impaired. Establishment of a drainage district will increase the flow of contaminated drain water to the headwaters of Spring

Brook and downstream to the Horicon Marsh, Rock River and Lake Sinissippi. Surface water resources downstream from the proposed drainage system will be further impaired, with levels of pollutants exceeding federal and state water quality standards.

The Horicon Marsh, Rock River and Lake Sinissippi currently do not meet minimum water quality standards and appear on the federal EPA 303(d) list of impaired waters. They are under federal and state directives for action to halt further deterioration in quality and reduce loading of contaminants to the waters. Further, Lake Sinissippi is operating under a state-approved management plan to restore water quality. Allowing polluted waters from the proposed drainage district to flow into Spring Brook headwaters, and subsequently into the Horicon Marsh, Rock River and Lake Sinissippi, would be contrary to federal and state directives.

Existing field ditches within lands designated to be part of the proposed drainage district appear to be in violation of a number of state requirements, including §§ ATCP 48.24 and 48.30, that provide for buffers against land uses that may adversely affect water quality in district ditches.

Water Quality Standards

Water quality standards for surface waters have been established by state and federal authorities. Standards exist for nutrients, toxic substances, dissolved oxygen, temperature, pH, fecal bacteria, suspended solids and other substances that are harmful to human, animal, plant or aquatic life.

Federal

The US Environmental Protection Agency has developed ambient water quality criteria recommendations for rivers and streams in nutrient ecoregion VII. These criteria are based on 25th percentile data of actual reference conditions existing within sublevel ecoregion 53, Southeastern Wisconsin Till Plains, and include values for parameters of nitrogen compounds, phosphorus and turbidity.

Parameter	Reported Values		25th Percentile Reference Conditions
	Min	Max	
Total Kjeldahl Nitrogen mg/L	0.05	4.3	0.65
Nitrite + Nitrate Nitrogen mg/L	0.37	5.6	0.94
Total Nitrogen (calculated) mg/L	0.42	9.9	1.59
Phosphorus (Total as P) µg/L	5	1465	80
Turbidity (FTU)	0.49	28.78	2.74

Federal reference conditions for level III ecoregion 53, Ambient Water Quality Criteria Recommendations for Rivers and Streams in Nutrient Ecoregion VII. US Environmental Protection Agency, Washington, DC, EPA 822-B-00-018, December 2000.

Wisconsin

Parameter	Wisconsin Water Quality Standard
Phosphorus (Total as P) µg/L	≤75
Total Suspended Solids mg/L	<20
Biochemical Oxygen Demand mg/L	≤ 5
Fecal Coliform CFU/100 ml	≤200

Wisconsin does not presently have a numeric standard for nitrogen compounds in surface waters.

Rule making for amending Chapters NR 102, 216 and 217, Wisconsin Administrative Code, was finalized in September 2010. The rules established numeric standards for phosphorus in surface waters of the state. Under these standards the limit of total phosphorus in Spring Brook, Rock River and Lake Sinissippi is 75 µg/L [§ NR 102.06(3)].

Administrative rule making also changed the performance standards and prohibitions in Chapter NR 151 to include use of a phosphorus index for agricultural nonpoint source management as well as other performance standards designed to reduce the amount of sediment and nutrients carried in agricultural runoff to surface waters. Additionally, Chapter NR 217 provides a basis for control of phosphorus runoff from animal feeding operations.

Wisconsin also has regulations for the following surface water criteria:

Standards for Fish and Aquatic Life – dissolved oxygen, temperature, pH, other substances
Standards for Recreational Use – bacteriological guidelines for fecal coliform to not exceed 200 CFU per 100-ml sample
Standards for Public Health and Welfare
Standards for Wildlife
Standards for Effluent Discharge to Intermediate Surface Waters – daily maximum for total suspended solids to be < 30 mg/L; monthly average < 20 mg/L
- maximum for biochemical oxygen demand (BOD) is 5 mg/L summer and 10 mg/L winter

Turbidity (federal reference condition) and total suspended solids (state standard) both provide a measure of the amount of solids suspended in the water; however, turbidity may miss solids with a high rate of settleability. TSS concentrations can be used to calculate total quantities of material within or entering a stream, while turbidity values cannot be used for calculation.

High concentrations of suspended particulate matter can cause increased sedimentation and siltation in a stream, which in turn can degrade important habitat areas for fish and other aquatic life. Suspended particles can also provide attachment places for other pollutants such as metals, chemicals and bacteria. High suspended solids can be used as indicators of other potential pollutants.

Assessment of the quality of waters within the proposed district drains, and the potential impact of the pollutants in drain waters to Spring Brook, Rock River and Lake Sinissippi, can be made by comparing the test results of water samples taken from the district drains with federal and state water quality standards.

Sampling Protocol and Methodology

Water samples were collected over a 12-day period from a number of sites within the proposed drainage district and from the headwaters of Spring Brook. Photographs were taken of existing drainage channels and of water flows within and out of the proposed district drain during a major rain event on July 22-23. Field measurements of water flow through the road culvert on Highway B were made during the rain event.

Weather Data

The weather data for precipitation, mean temperature and average humidity during this period and the two days prior to the commencement of sampling are given in the following table.

Date (July 2010)	7/18	7/19	7/20	7/21	7/22	7/23	7/24
Mean Temperature °F	77	74	75	75	70	77	75
Average Humidity %	81	85	84	75	96	90	87
Precipitation inch	0.00	**0.47**	0.00	0.00	**2.53**	**0.10**	**0.46**
Samples Taken			X		X	X	

Date (July 2010)	7/25	7/26	7/27	7/28	7/29	7/30	7/31
Mean Temperature °F	72	72	78	74	71	69	70
Average Humidity %	78	76	82	80	75	81	88
Precipitation inch	0.00	0.00	0.00	**0.21**	0.00	0.00	**0.01**
Samples Taken			X				X

Weather Data for Beaver Dam, WI 7/18-7/31/2010 Source: NWS Daily Summary

Analysis of samples taken following a period of zero to little precipitation provides data of general baseline conditions. Test data of samples taken during or immediately following periods of heavy precipitation offer a meaningful representation of the concentrations of pollutants within the proposed district drainage system resulting from surface field runoff and drain tile water flow.

Design storms for 24-hour rain events for Dodge County are 2.3 inches (1 year), 2.8 inches (2 year) and 3.5 inches (5 year). Thus, a 24-hour rain event with 2.53 inches of precipitation, as occurred on July 22nd, has a high probability of occurring every year.
Source: Dodge County Land Use Code 7.9.7.A.1 and Burse Surveying and Engineering, Inc.

Sampling Methodologies

Methodologies for water sampling are based on Volunteer Stream Monitoring: A Methods Manual, US Environmental Protection Agency, Office of Water, EPA 841-B-97-003, November 1997, and were reviewed earlier with Wisconsin Department of Natural Resources-Horicon Office.

Analyses of Water Samples

Water samples were tested for the following analytes:

Phosphorus (Total as P)
Total Suspended Solids
Biochemical Oxygen Demand (5 day)
Fecal Coliform
Total Kjeldahl Nitrogen
Ammonia Nitrogen
Nitrite + Nitrate Nitrogen
Total Nitrogen (by calculation)

Analyses of pesticides, herbicides and other toxicants in waters of the proposed district drains were not performed.

The state-certified analytical laboratory for analyses of water samples is TestAmerica, Inc., 602 Commerce Drive, Watertown, WI 53094.

Results

Analytical results are reported in summary form for samples collected at various sites and at various dates within the proposed drainage district, from the spring source water for the headwaters of Spring Brook and from the Spring Brook ponds. (Laboratory analytical reports in appendix)

Test results that exceed established state standards and/or federal reference conditions are shown in **bold.** The location of each sampling site is indicated on the attached map. (See appendix)

Sampling Sites 1 – 6

Sampling sites 1 – 6 are located within the proposed drainage district, with site 1 of Butternut Road located at the westernmost public access site and moving down gradient towards the east and north. Site 6 is located at the northernmost boundary of the proposed drainage district at West Gate to Spring Brook Farm. Samples collected from these sites represent the condition of water and concentration of pollutants in district ditches from both field surface runoff and subsurface water in tile drains. The drain water eventually empties into spring-fed ponds at the headwaters of Spring Brook.

Site 1. Butternut Road Culvert

Parameter		Test Results	State	Federal
Ammonia Nitrogen	mg/L	< 1.0	-	-
Total Kjeldahl Nitrogen	mg/L	**1.6**	-	0.65
Nitrite + Nitrate Nitrogen	mg/L	**2.4**	-	0.94
Total Nitrogen (by calculation)	mg/L	**4.0**	-	1.59
Phosphorus (Total as P)	µg/L	**830**	75	80
Total Suspended Solids	mg/L	**20**	<20	2.74

Nitrogen standards have not yet been established for Wisconsin. Federal reference condition for total suspended solids is given as turbidity (Formazin Turbidity Units).

Comment: High concentrations of nitrogen compounds, phosphorus and total suspended solids were found in field runoff water at the Butternut Road culvert. Figure 1 shows that corn was planted directly in the field ditch that is to be part of the drain system of the proposed drainage district. This practice is in violation of state requirements for a drainage district, specifically §§ ATCP 48.24 and 48.30, that provide for minimum vegetative buffer corridors, prohibit row cropping in corridors and mandate measures to control erosion and runoff of suspended solids into district drains.

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Figure 1. Field ditch at Butternut Road culvert, looking east. Corn is planted directly in the ditch that is to become part of the proposed drainage district drain system, a violation of state requirements as given in §§ ATCP 48.24 and 48.30.

Site 2. Road I Culvert Drain

Parameter		Test Results	State	Federal
Ammonia Nitrogen	mg/L	< 1.0	-	-
Total Kjeldahl Nitrogen	mg/L	**1.7**	-	0.65
Nitrite + Nitrate Nitrogen	mg/L	**2.5**	-	0.94
Total Nitrogen (by calculation)	mg/L	**4.2**	-	1.59
Phosphorus (Total as P)	µg/L	**200**	75	80
Total Suspended Solids	mg/L	**62**	<20	2.74
Biochemical Oxygen Demand	mg/L	**5.3**	<5	-
Fecal Coliform	CFU per 100 ml	**> 300**	<200	-

Nitrogen standards have not yet been established for Wisconsin. Federal reference condition for total suspended solids is given as turbidity (Formazin Turbidity Units).

Comment: Elevated levels of nitrogen compounds, phosphorus, suspended solids, biochemical oxygen demand and fecal coliform were found at this sampling site. The high fecal coliform level may be a consequence of manure spreading by a dairy livestock operation west of this site. See Figures 2 and 3.

Figure 2. Existing field ditch at Road I culvert looking west. Agricultural field runoff from lands to the west, including those of the dairy livestock operation on Butternut Road, flows east in the drain ditch, through the culvert and then to the Dodge County Antique Power Club. This ditch is to become part of the district drain for the proposed Drainage District #88. The ditch appears to be in violation of state requirements given in §§ ATCP 48.24 and 48.30 that establish minimum 20-ft wide vegetative corridors on each side of a district drain, prohibit row cropping within ditch corridors and mandate erosion control measures to buffer against land uses that may adversely affect water quality in the ditch.

Figure 3. Dairy livestock operation located on Butternut Road, west of the sampling site at Road I. Photograph taken in the morning of July 22 prior to a major rain event.

Site 3. Dodge County Antique Power Club

Parameter		Test Results	State	Federal
Ammonia Nitrogen	mg/L	< 1.0	-	-
Total Kjeldahl Nitrogen	mg/L	**2.1**	-	0.65
Nitrite + Nitrate Nitrogen	mg/L	**5.9**	-	0.94
Total Nitrogen (by calculation)	mg/L	**8.0**	-	1.59
Phosphorus (Total as P)	µg/L	**260**	75	80
Total Suspended Solids	mg/L	**24**	<20	2.74

Nitrogen standards have not yet been established for Wisconsin. Federal reference condition for total suspended solids is given as turbidity (Formazin Turbidity Units).

Comment: Soil survey records and aerial photographs from Dodge County Land Conservation Department and USDA Natural Resources Conservation Service indicate that

this area at one time comprised wetlands and hydric soil fields to the west of the club grounds and well-drained sand and gravel substratum to the east. As such, it would have served as a retention basin for surface runoff flowing from the west and allowed the surface water to infiltrate into the ground; in practical terms, the area was likely an internally-drained subwatershed.

However, subsequent land filling during the late 1990s has rendered this area incapable of functioning as an infiltration basin, while ditching and tiling of farm fields to the west have increased the quantity of water flowing to the area during rain and snow melt events. Consequently, the subwatershed has become externally drained, with water from the drainage system moving overland and then channeled to pass through the road culvert at Highway B and into the soybean field to the north (see Figure 4). Pollutants in the drain water that exceed federal and state standards include nitrogen compounds, phosphorus and suspended solids.

Figure 4. Looking southwest across land owned by the Dodge County Antique Power Club. Agricultural field drain water flows onto this land from the west, then across the grassed area to become channeled and pass north through a road culvert at Highway B and into the Meylink soybean field. Photograph taken July 23, 2010.

Site 4. Highway B Culvert to Meylink Soybean Field

Parameter		Test Results	State	Federal
Ammonia Nitrogen	mg/L	< 1.0	-	-
Total Kjeldahl Nitrogen	mg/L	**2.8**	-	0.65
Nitrite + Nitrate Nitrogen	mg/L	**8.3**	-	0.94
Total Nitrogen (by calculation)	mg/L	**11.1**	-	1.59
Phosphorus (Total as P)	µg/L	**440**	75	80
Total Suspended Solids	mg/L	13	<20	2.74

Nitrogen standards have not yet been established for Wisconsin. Federal reference condition for total suspended solids is given as turbidity (Formazin Turbidity Units).

Comment: Field runoff from the Dodge County Antique Power Club flows to the north through a 42-inch culvert under Highway B into the Meylink soybean field. The drain water flow from the culvert is joined with drain water from the Wrock field to the west, and then continues through the field to the west gate of Spring Brook Farm where it empties into the first spring-fed pond at the headwaters of Spring Brook. The drain water at the Highway B culvert was tested on July 23 just after the peak flow resulting from a rain event. High values of nitrogen compounds and phosphorus that exceed federal and state standards were recorded.

Field measurements and an estimate of drain water flow through the 42-inch culvert were made at 10:00 AM on July 23. Water flow covered about 60 % of the cross-sectional area of the culvert and the velocity of flow was estimated at 3 feet per second. $Q = V \times A$, where Q represents volumetric flow rate, V is average water velocity and A is cross-sectional area. Volumetric flow rate, Q, was about 20 cubic feet per second. This equates to an hourly flow rate of 72,000 ft^3/hr, which is over 500,000 gallons of drain water per hour. A photograph of water flow through the culvert is shown in Figure 5.

The channelized flow exiting the culvert passes into the soybean field where it joins drain water from the Woock field drain and culvert, then exits the soybean field at the northern edge of the proposed drainage district and moves overland across a grassed area to empty into the spring-fed ponds and Spring Brook headwaters (see Figure 6).

Figure 5. Culvert underneath Highway B, carrying drain water from the Dodge County Antique Power Club north to the Meylink soybean field. The culvert is 42 inches in diameter with a cross-sectional area of 9.62 ft^2. At the time of measurement the water flow through the culvert was estimated at 20 ft^3/s, equivalent to more than 500,000 gallons per hour. Photograph taken July 23, 2010.

Site 5. Woock Field Drain – Agricultural Field Runoff to Road Culvert to Meylink Soybean Field

Parameter		Test Results	State	Federal
Ammonia Nitrogen	mg/L	< 1.0	-	-
Total Kjeldahl Nitrogen	mg/L	0.5	-	0.65
Nitrite + Nitrate Nitrogen	mg/L	0.02	-	0.94
Total Nitrogen (by calculation)	mg/L	0.52	-	1.59
Phosphorus (Total as P)	µg/L	**200**	75	80
Total Suspended Solids	mg/L	**39**	<20	2.74

Nitrogen standards have not yet been established for Wisconsin. Federal reference condition for total suspended solids is given as turbidity (Formazin Turbidity Units).

Comment: Runoff from the Woock corn field drains to a road culvert that passes under Road I north of Highway B. The drain water then flows onto the Meylink soybean field and merges with drain water flowing north through a 42-inch culvert under Highway B. The combined field runoff and drain water flows north to the west gate of Spring Brook Farm where it continues overland to empty into the first of several spring-fed ponds. The water of the Woock field drain has elevated concentrations of phosphorus and total suspended solids.

Site 6. West Gate to Spring Brook Farm – Overland Flow of Agricultural Field Runoff and Drain Water

Parameter		Test Results	State	Federal
Ammonia Nitrogen	mg/L	< 1.0	-	-
Total Kjeldahl Nitrogen	mg/L	**1.6**	-	0.65
Nitrite + Nitrate Nitrogen	mg/L	**6.3**	-	0.94
Total Nitrogen (by calculation)	mg/L	**7.9**	-	1.59
Phosphorus (Total as P)	µg/L	**410**	75	80
Total Suspended Solids	mg/L	**25**	<20	2.74

Nitrogen standards have not yet been established for Wisconsin. Federal reference condition for total suspended solids is given as turbidity (Formazin Turbidity Units).

Comment: These samples were taken from the overland water flow across the grassed area shown in Figure 6 on July 23, 2010, at the end of a major rain event. Values for nitrogen, phosphorus and total suspended solids exceed federal reference conditions and state standards for these parameters. This overland flow of field runoff and drain water from the Meylink soybean field goes directly to the first of several spring-fed ponds that are the headwaters of Spring Brook creek (see Figure 7).

Figure 6. Looking south from the west gate of Spring Brook Farm to the Meylink soybean field that lies on the northern edge of the proposed drainage district. Agricultural field runoff and drain water is flowing from the soybean field over a mowed grass area to the vegetated section at the left of the photograph, then into the first of several spring-fed ponds that comprise the headwaters of Spring Brook. Photograph taken the morning of July 23, 2010, near the end of a rain event that recorded 2.53 inches of rainfall.

Figure 7. The first of the spring ponds that receives sediment and other pollutants from the agricultural field runoff flowing from the soybean field located within the proposed drainage district. Photograph taken early July 23, 2010 during a rain event.

Based on measurements taken by the farm owners, water depth of the ponds has decreased about 2 feet over the past decade due to sedimentation of silt and clay particles and organic solids washed into the ponds from the surface runoff from the agricultural fields.

Sampling Site 7

Sampling site 7 is located at the natural springs and ponds of Spring Brook Farm. Site 7a is located at the outflow of one of the natural springs, which is the water source for the ponds and the headwaters of Spring Brook creek. Samples were also taken from the ponds and are included in results for site 7b.

Site 7a. Natural Spring – Water Source for Ponds and Headwaters of Spring Brook Creek

Parameter		Test Results	State	Federal
Ammonia Nitrogen	mg/L	< 0.4	-	-
Total Kjeldahl Nitrogen	mg/L	< 0.25	-	0.65
Phosphorus (Total as P)	µg/L	< 100	75	80
Total Suspended Solids	mg/L	< 1.0	<20	2.74
Biochemical Oxygen Demand	mg/L	< 2.0	<5	-
Fecal Coliform	CFU/100 ml	< 1.0	<200	-

Nitrogen standards have not yet been established for Wisconsin. Federal reference condition for total suspended solids is given as turbidity (Formazin Turbidity Units).

Determinations were made of dissolved oxygen content and temperature of the spring source water.

Parameter		Test Results
Dissolved Oxygen	mg/L	6.0
Temperature	°C (°F)	10.0 (50.0)

Determinations were made in situ with a DO/temperature electronic meter on October 28, 2010. The ambient air temperature was 7.2°C (45.0°F).

Site 7b. Spring Brook Farm Ponds

Parameter		Test Results	State	Federal
Ammonia Nitrogen	mg/L	< 0.4	-	-
Total Kjeldahl Nitrogen	mg/L	**1.6**	-	0.65
Nitrite + Nitrate Nitrogen	mg/L	**2.9**	-	0.94
Total Nitrogen (by calculation)	mg/L	**4.5**	-	1.59
Phosphorus (Total as P)	µg/L	**200**	75	80
Total Suspended Solids	mg/L	**17**	<20	2.74
Biochemical Oxygen Demand	mg/L	**4.7**	<5	-
Fecal Coliform	CFU/100 ml	130	<200	-

Nitrogen standards have not yet been established for Wisconsin. Federal reference condition for total suspended solids is given as turbidity (Formazin Turbidity Units).

Comment: Cold water fish and aquatic life require dissolved oxygen concentrations not less than 6 mg/L; warm water aquatic life requires not less than 5 mg/L, which is the state standard. If the ponds were physically isolated from the polluted agricultural runoff, then

they would likely be capable of natural cleansing and rejuvenation and once again support cold water aquatic life.

The natural spring water is exceptionally clear and clean with sufficient dissolved oxygen to support cold water fish and aquatic life. As this is the water source of the ponds and headwaters of Spring Brook creek, the quality of the stream as it flows towards the Rock River should be very good. Unfortunately, the actual quality of the ponds and Spring Brook is degraded due to nonpoint source pollution. High concentrations of dissolved and suspended solids, nutrients and organic wastes dramatically decrease the carrying capacity of oxygen in water. Inflow of warm water from the agricultural fields increases the temperature of the pond water and decreases the dissolved oxygen content.

Spring Brook Farm ponds comprise the headwaters of Spring Brook creek. At one time these spring-fed ponds provided cold-water habitat for game fish, including trout. According to the owners of Spring Brook Farm, trout was last stocked in the ponds in 1992 under permit issued by the WDNR, and an aeration system was installed in 2003. However, the trout did not survive due to deterioration in water quality. Warm-water fish species, including catfish, were stocked in 2005, but within several years those fish also died, undoubtedly as a result of the decline in water quality.

Elevated levels of phosphorus and nitrogen compounds in the ponds contribute to summer algae blooms, which were quite evident during the sampling trips the end of July. High algae concentrations often result in a significant decrease in dissolved oxygen content during over-night respiration, and when the algae die and decompose, oxygen in the water is depleted (see Figure 8).

Figure 8. Algae growth on surface of a spring-fed pond located at Spring Brook Farm. The concrete channel at the lower right of the picture conveys spring source water to the pond. Photograph taken May 24, 2010.

Spring Brook Creek – Natural Heritage Inventory ASNRI

Spring Brook creek begins at the outlet of the spring-fed ponds on Spring Brook Farm. The creek is designated by Wisconsin Department of Natural Resources as a natural waterbody for forage fisheries. It is listed on the Wisconsin Natural Heritage Inventory as an Area of Special Natural Resource Interest (ASNRI) for aquatic resources, including plant species Swamp Bedstraw (*Galium brevipes*) and two fish species, Banded Killifish (*Fundulus diaphanous*) and Redfin Shiner (*Lythrurus umbratillis*). Swamp Bedstraw and Banded Killifish are species of special concern, while Redfin Shiner is a threatened species. (See appendix)

The water quality of Spring Brook ponds and creek is negatively impacted by the nonpoint source of pollution from the existing agricultural drainage system. Establishment of the drainage district as proposed by the drainage board will increase the flow of contaminated drain water to the headwaters of Spring Brook and downstream to the creek. Fish habitat within the natural ponds has been materially impaired. Fish and wildlife habitat within the ASNRI creek will be materially injured and impaired as a result of an increased flow of contaminated drain water.

Spring Brook Creek – Fireman's Park, Burnett

In addition to the field runoff from the proposed drainage district, Spring Brook creek also receives runoff water from an agricultural drainage system that lies to the northwest of Burnett. The creek flows to the community of Burnett and through a 6 x 4-ft metal culvert located at Fireman's Park (see Figures 9 and 10). The photographs were taken on July 22, 2010 during a rain event. The creek was close to overtopping the culvert, which would have increased surface water flow to the community. At the July 13, 2010 public hearing held by the Dodge County Drainage Board, a representative of the Burnett Sanitary District testified that the sanitary district is concerned about increased water flow from the proposed drainage district and the heightened potential for flooding of the sanitary sewer system. (See appendix)

Figure 9. Photograph taken July 22, 2010 of Spring Brook flowing through a 6 x 4-ft culvert at Fireman's Park, Burnett, during a rain event. The water flow of the creek is within 10 inches of over-topping the culvert. On either side of the culvert and bolted to the concrete structure are metal channels for stop logs. The stoplog dam is designed to adjust water level and reduce flow downstream to the community. However, during high-water conditions, such as existed during this rain event, the dam is ineffective in controlling flow and flooding occurs, as is shown in Figure 10.

Figure 10. Photograph taken July 22, 2010 of Spring Brook flowing from the culvert at Fireman's Park, Burnett, during a rain event. In the region of turbulence just downstream of the culvert, the creek has overtopped the north bank. A representative of the Burnett Sanitary District testified at the drainage board public hearing on July 13, 2010 and expressed concern about the increased quantity of surface water flowing to the community if the proposed drainage district is established.

Conclusion

Water samples were taken from a number of sites within the proposed Drainage District #88 and from Spring Brook headwaters during July 2010 and analyzed for contaminants. Test results indicate that field runoff and drain water in the district drains are polluted, with elevated levels of nitrogen and phosphorus compounds, suspended solids, biochemical oxygen demand and fecal coliform bacteria. The water quality of Spring Brook ponds and creek is negatively impacted by the nonpoint source of pollution from the existing agricultural drainage system. Fish habitat and wildlife habitat have been materially impaired. Establishment of a drainage district will increase the flow of contaminated drain water to the headwaters of Spring Brook and downstream to the creek, Rock River and Lake Sinissippi. Surface water resources downstream from the proposed drainage system will be further impaired, with levels of pollutants exceeding federal and state water quality standards.

The Horicon Marsh is on the federal EPA 303(d) list of impaired waters for reasons of sediment, phosphorus, deterioration of habitat and low dissolved oxygen. The Rock River and Lake Sinissippi are on the 303(d) list for reasons of sediment, phosphorus and eutrophication. These three water bodies do not meet minimum water quality standards and are under federal and state directives for action to halt further deterioration in quality and reduce loading of pollutants to the waters. Further, Lake Sinissippi is operating under a state-approved management plan to restore water quality. Allowing polluted waters from the proposed drainage district to flow into Spring Brook headwaters, and subsequently into the Horicon Marsh, Rock River and Lake Sinissippi, is contrary to federal and state directives.

Existing agricultural field ditches within lands designated to be part of the proposed drainage district appear to be in violation of a number of state requirements, including §§ ATCP 48.24 and 48.30. These requirements are designed to provide a buffer against land uses that may adversely affect water quality in district drains and include vegetative corridors on each side of ditches, prohibit row cropping within corridors and establish measures to minimize soil erosion and runoff of suspended solids into ditches.

For the Board of Commissioners
Lake Sinissippi Improvement District

/s/ Gregory M. Farnham *March 10, 2011*

Gregory M. Farnham Date
Commissioner