Rosendale Dairy Project Environmental Impact Statement

Wisconsin Department of Natural Resource

December 2008

WPDES Permit File # S-2008-0406 and S-2008-0432

DECEMBER 2008
WISCONSIN DEPARTMENT OF NATURAL RESOURCES

ROSENDALE DAIRY PROJECT

ENVIRONMENTAL IMPACT STATEMENT

WPDES PERMIT File #: S-2008-0406 and S-2008-0432

Environmental Impact Statement for Rosendale Dairy

To the Reader

This environmental impact statement (EIS) fulfills part of the Wisconsin Department of Natural Resources (DNR) requirements under the Wisconsin Environmental Policy Act (WEPA), Wis. Stat. § 1.11, and Chapter NR150, Wis. Adm. Code. WEPA requires state agencies to consider environmental factors when making major decisions. The purpose of this EIS is to provide the decision makers, the public, and other stakeholders with an analysis of the economic, social, cultural, and environmental impacts that could result from the construction and operation of the new Rosendale Dairy facilities.

The Department conducted an issue identification process prior to completion of the EIS. The Department released an environmental assessment (EA) on September 16, 2008, and received public comments through October 14, 2008. On November 18, 2008, the Department notified interested agencies and parties of its determination to complete an EIS process and provided a timeline for public scoping comments. The Department used those comments and those submitted regarding the EA to help identify the scope and the significant issues that were analyzed in the analysis.

Comments received during the comment period will be used by the Department to make its final decisions on this project. You are encouraged to comment on this EIS. . The EIS is available on the Department web-site at: http://dnr.wi.gov/org/water/wm/ww/drafts/pubnot.htm.

The comment period on this EIS ends on February 4, 2009. Written comments should be addressed to:

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The Department will also issue a public notice regarding the EIS public informational hearing, where interested parties may provide verbal comments for the record. All comments received during the hearing and written comments received before the end of the comment period will be considered by the Department before issuance of a record of decision under s. NR 150.24, Wis. Adm. Code.

List of Contributors

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Table of contents

List of Tables

List of Figures

I. Project Description

I.A. Purpose, need & cost

Applicant Mr. James Ostrom is proposing construction and operation of the Rosendale Dairy, a large Concentrated Animal Feeding Operation (CAFO) in Fond du Lac County. The applicant currently owns and operates two other permitted CAFO's – Tidy View Dairy (Outagamie County) with 7000 dairy cows (9400 Animal Units) and Omro Dairy (Winnebago County) with 2500 dairy cows (3500 Animal Units)[1]. Mr. Ostrom would like to operate a third CAFO dairy.

The applicant has planned the project to occur in two phases. Phase I, which is the subject of a permit application before the Department, would include populating the site with 3500 milking cows, 500 dry cows and 150 beef steer for a total of 5,750 Animal Units. Phase II would include an additional 3500 milking cows, 500 dry cows and another 150 steers for an additional 5750 AUs. Upon completion of Phase II, the total number of AUs at the site would be 11,500. Phase II has been proposed to occur in the fall of 2010. There are currently no additional proposed expansions beyond Phase II.

The total project cost for the construction of Phase I and Phase II is estimated at $60,000,000 with forecasted annual expenses of $20,000,000 by the end of Phase I, and $40,000,000 by the end of Phase II.

The primary purpose of the Rosendale Dairy project is the production of milk.

I.B. Project sites

The animal production area for Rosendale Dairy is located approximately 4.5 miles northwest of Rosendale, WI and 6.5 miles east of Ripon, WI, near the intersection of County Hwy M and Triangle Road (see Figure 1, below). The site occupies approximately 100 acres on land formerly used for agricultural row crops and forage. The 5,631 acres of cropland to be used for land application of manure and process wastewater is generally located with a 10 mile radius of the animal production area.

[1] As defined by NR 243, Wis. Adm. Code, "Animal unit" means a unit of measure used to determine the total number of single animal types or combination of animal types…that are at an animal feeding operation." The measure is to compare differences of animal manures and the code defines the units by animal type. For this proposal, a cow is generally equivalent to 1.43 Animal Units and a beef steer is 1.0 Animal Units.

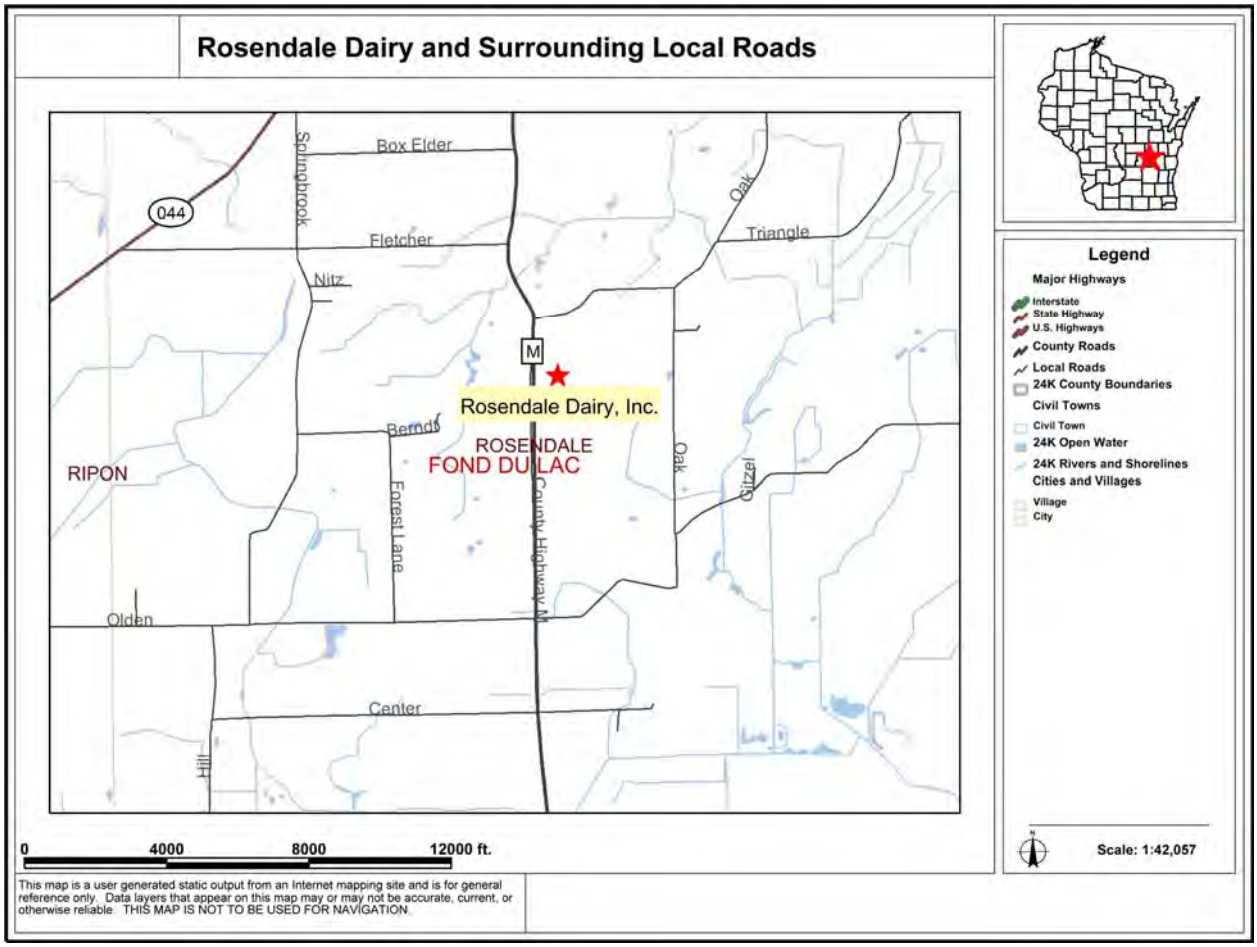


Figure 1 - Rosendale Dairy & Surrounding Local Roads

I.C. Constructed facilities

Figure 2, below, shows the proposed layout for the production site which will include: several buildings; manure storage and management facilities; feed storage and handling facilities; leachate and run-off collection systems; stormwater management ponds and conveyances; roads; wells; and lighting.

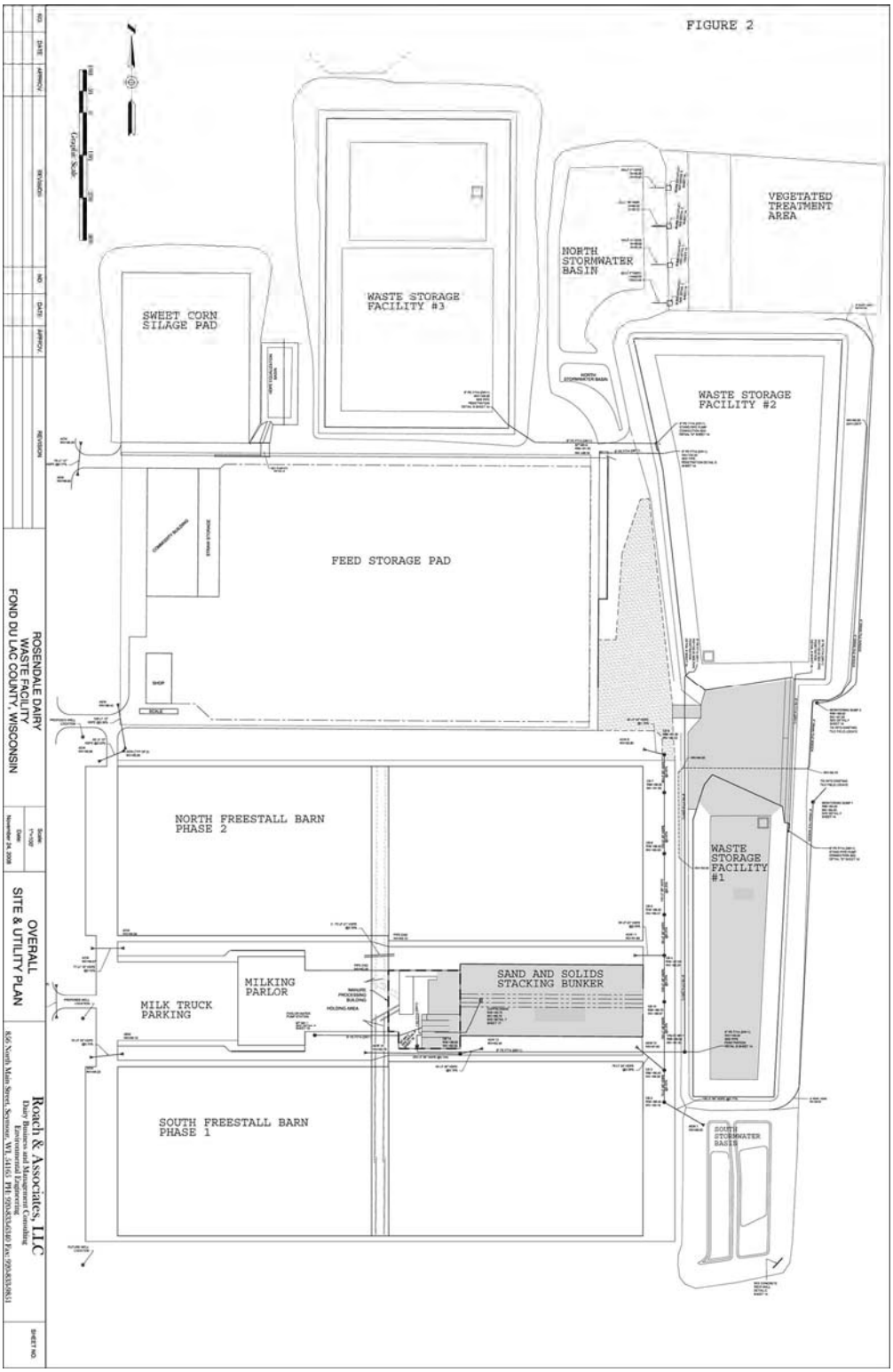


Figure 2 - Production site layout

I.C.1. Buildings

Rough grading at the site has been completed for all proposed structures at the production site. For Phase I, the majority of the structures have already been constructed including the South Freestall barn and one milking parlor containing one 80-cow milking carousel.

Phase II would include construction of a second freestall barn (the North Freestall) and a second 80-cow milking carousel to the milking parlor

I.C.2. Manure management structures

For Phase I, the majority of the structures have already been constructed. They include a sand and solids stacking bunker, a manure handling system, three reinforced concrete manure storage facilities (WSF #1-10.8 million gallons, WSF #2 – 27.2 million gallons, and WSF #3-25.8 million gallons), and five solid manure storage tanks (combined capacity of approximately 507,000 gallons). The concrete lined waste storage facilities provide 275 days of storage of manure, leachate, and runoff from the feed storage pad and sweet corn silage pad. The applicant has not proposed additional manure management facilities for Phase II .

I.C.3. Other production operation structures

For Phase I, the majority of the structures have already been constructed. They include a sand separator, two sweet corn silage feed bunkers, a feed storage pad for the corn silage and haylage, a sweet corn storage pad, leachate/runoff collection for the feed storage pads, and two stormwater management basins. The concrete lined waste storage facilities provide 275 days of storage of manure, leachate and runoff from the feed storage pad and sweet corn silage pad. The applicant has not proposed additional manure management facilities for Phase II.

Corn silage, haylage and sweet corn silage are stored in the feed bunkers to the north of the freestall barns. A leachate collection system is utilized to collect and treat the leachate and runoff coming from the feed bunkers. Both the feed storage pad and the sweet corn storage pad have individual leachate collection systems. Designs indicate that the sweet corn pad has a below grade tile drainage system to further protect groundwater. Drain lines are installed around the perimeter and beneath the concrete slab. The drain tile lines lie on top of a 1.5-foot thick clay base. The clay layer will impede vertical movement of any leachate that seeps through the concrete. Any liquids will flow into the tile lines and gravity flow to a pump sump and be transferred into WSF 3 for storage.

I.C.4. Roads

The facility will include gravel roads and parking and traffic areas. The applicant plans to asphalt pave these roads and traffic areas in Phase II. Gravel topping for roads will be sourced from permitted commercial gravel pit sites.

I.C.5. Wells

The proposed facility will require high capacity wells to supply an estimated 52.5 million gallons of water per day. Water use at the dairy is estimated at 44 million gallons per year for watering and cleaning for Phase I, plus another 8.5 million gallons per year will be needed for evaporative cooling of the South Freestall barn and drinking water for employees. When Phase II is complete, four high capacity wells will be constructed onsite, each designed with a capacity of 250 gpm. There is no information available on how much water will be needed when Phase II is complete.

Two high capacity wells have been permitted and constructed at the site (see Figure 3, below). Both wells (WN180 and WL980) are 567 feet deep but have slightly different geology. The wells are cased to 315 feet and draw water from the Cambrian Sandstone. Construction of the first well (WL980) was completed June 9, 2008. After pumping the well for two hours at full capacity (250 gpm), the water level was 250 feet below the ground surface, a specific capacity of 1.4 gpm/ft. The DNR required that a pump test be done to determine the proper spacing of the wells to avoid well interference. The pump test results indicated a better specific capacity than previously determined. The results still indicated that the wells should be located farther apart than originally planned based on this information. The second well, WN180 is located over 500 feet from the first well. The DNR is recommending additional pumping tests to determine the storage coefficient of the aquifer prior to constructing any additional wells to insure that the proposed wells can provide the water required by the dairy. A report on file at the DNR by Crispell-Snyder Inc. has a site map showing the locations of the two existing wells and one of the proposed high capacity wells.

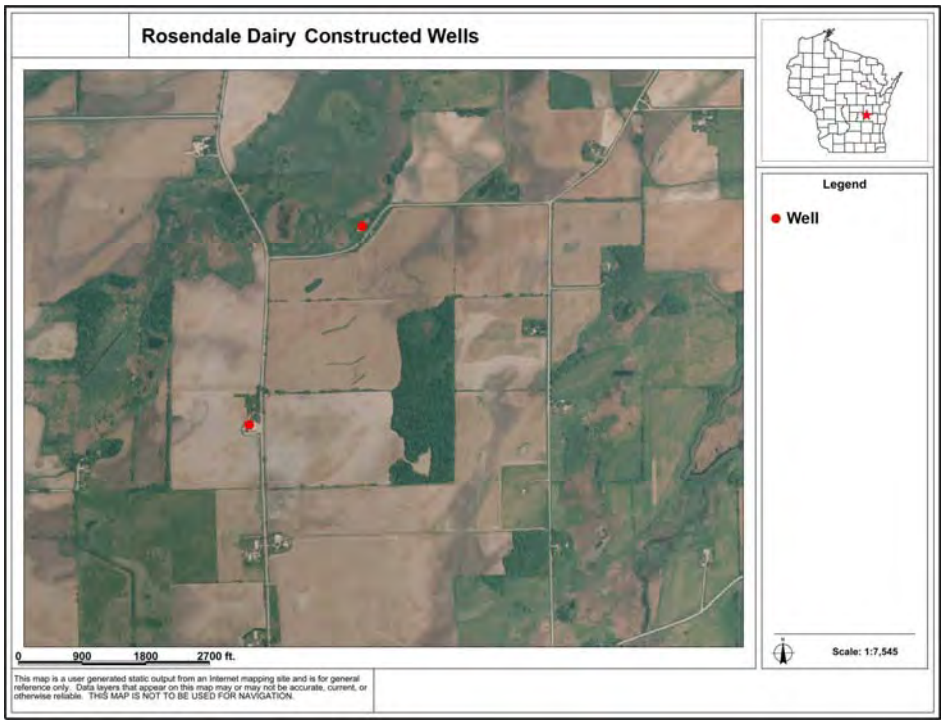


Figure 3 - Rosendale Dairy Constructed Wells

Naturally occurring arsenic is a concern in this area of Fond du Lac County. Both wells have been cased through the St. Peter Sandstone which can be source of arsenic. Any additional wells will also be constructed to avoid drawing water from the St. Peter. Appropriate drilling methods should be used so that arsenic is not released from the St. Peter formation.

Both well WL980 and WN180 had negative sample analytical results for bacteria. No other sample analytical results were provided for wells in this area. DNR recommends testing annually for bacteria and nitrate and additional sampling whenever there is a change in the taste or smell of the drinking water. It is also desirable to sample for arsenic in this area of the state

I.C.6. Stormwater structures

Storm water discharges from the Rosendale Dairy construction site is regulated under ch. 283, Wis. Stats, ch. NR 216, Wis. Adm. Code, and in accordance with WPDES General Permit No. WI-S067831-3, Construction Site Storm Water Runoff. Permit coverage under WPDES General Permit No. WI-S067831-3 was granted on February 5, 2008. Rosendale Dairy is an active construction site that must be operated, inspected and maintained in accordance with Construction Site Storm Water Runoff general permit requirements, and until permit coverage is terminated.

Storm water best management practices were designed to control runoff quantity and quality. Wet detention basins have been designed and constructed to reduce developed stormwater peak flow values to values equal to or less than the pre-development condition runoff rates for the 2-year, 10-year and 100-year design storm events.

The two wet detention basins are also designed to remove 80% of Total Suspended Solids (TSS) from the developed site on an annual average basis. The barn pond, or “south wet detention basin”, treats runoff from the 44.37 acre barn pond watershed. The barn pond has a 1.28 acre permanent pool surface and is equipped with multiple outlets and an emergency spillway. The feed pad pond, or “north wet detention basin”, treats runoff from the 26.5 acre feed pad watershed. The feed pad pond has a 2.77 acre permanent pool water surface and is equipped with multiple outlets and an emergency spillway. Impervious areas constructed on site are treated by the proposed ponds. There are 22 acres of the site that do not create runoff in the developed condition, including the sweet corn storage pad and the manure storage facilities. Three areas which do not contain impervious surfaces are bypassed, the 8.71 acre east watershed, the 9.91 acre northwest watershed and the 4.23 acre southwest watershed. These three, peripheral bypass areas contain swales and are vegetated to reduce peak flows, but are not routed to the wet detention basins for treatment. All treated and bypassed runoff from the construction site drains to an unnamed tributary to the Fond du Lac River. The proposed stormwater wet detention basins have the design capacity to treat runoff assuming Phase II build out conditions. The feed pad pond and the barn pond have been placed into service.

Stormwater structures are shown in Figure 4, below.

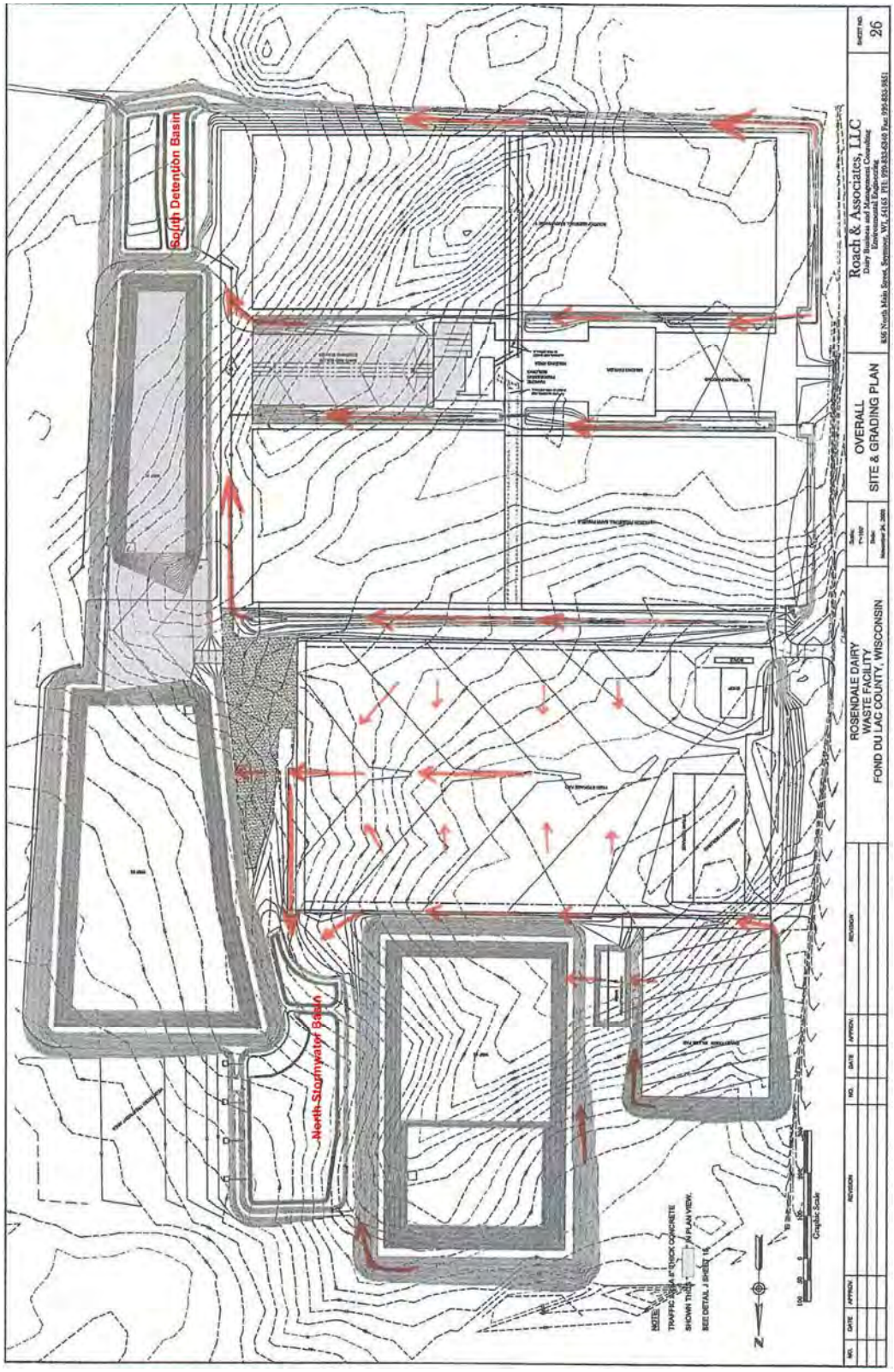


Figure 4 - Stormwater Structures & Flow Pattern

I.C.7. Domestic wastewater system structures

A private on-site domestic sewage system is designed to serve the 50 or so employees at Rosendale Dairy. Rosendale Dairy has indicated that domestic wastewater will be handled one of the following ways: sanitary holding tank or engineered mound system (Fond du Lac County does not allow the construction of conventional mound septic systems on disturbed sites). Fond du Lac County currently does not issue permits for holding tanks for the amount of sanitary wastes to be produced by Rosendale Dairy. Rosendale Dairy has applied for a variance from Fond du Lac County to allow them to use sanitary holding tanks at the site. In the interim, the operation plans to provide portable toilets for on-site human waste disposal. Rosendale Dairy has indicated that the decision on which system will be used (holding tank or engineered mound system) will be made during the next 60 days. In either case, state and county licensed engineers and installers will be used.

I.C.8. Lighting

Interior lighting at the facility will be on 24 hours a day. The freestall barn, parlor/holding pen, shop and commodity shed will run 320 watt Pulse Start Low Bay interior lights.

Exterior lighting at the facility will be controlled by photosensors and will automatically turn on and off at dusk and dawn. For Phase I, exterior lighting is planned as follows:

- Freestall barn: eight 175 watt metal halide wall-mounted fixtures (four at each end of the barn);
- Parlor/holding pen: twenty-five metal halide wall-mounted fixtures, some at 75 and some at 175 watts;
- Shop: four 175 watt metal halide wall-mounted fixtures;
- Commodity shed: no exterior lighting.

As currently planned, the Phase II freestall barn would have exterior fixtures identical to the Phase I freestall barn and lighting at the parlor/holding pen would almost double.

I.D. Environmental control & monitoring structures & equipment

I.D.1. Air emission control & monitoring structures & equipment

Rosendale Dairy has no plans to perform formal environmental monitoring of odors or air emissions at the site of the dairy and none are required by law. WDNR has odor response regulatory authority in NR 429. The waste storage facilities are located as far from the roadways and off site buildings as practical. Rosendale Dairy has developed an Odor Management Plan according to the criteria contained in Wisconsin Administrative Code ATCP 51. Rosendale Dairy will implement this plan to reduce odors and air emissions from the dairy and will respond

to any odor complaints. Land applied manure odor issues will be short lived because of required incorporation timing, or applications to actively growing crops.

Dust from gravel driveways may be generated during periods of high traffic during Phase I, until II construction when all driveways will be asphalted. During Phase I, Rosendale Dairy will water the driveway daily during periods of high use. High use is defined as more than 7 loads per hour. Typically, that will only occur during harvest and nutrient application. In that event, Rosendale Dairy will apply ¼ inch of water to high traffic gravel areas at least 2-3x per day in high use areas, using their own water tanker.

The Commodity Building for feed mixing was designed and built specifically to eliminate the possibility of windblown dust. The southern exposure prevents against prevailing westerly winds. Feed will be mixed inside the Commodity Building, out of direct wind to eliminate the risk of wind and weather affecting the feed mixing. Occasionally, water will be added to rations that are considered excessively dry.

I.D.2. Groundwater monitoring structures & equipment

There is no groundwater monitoring planned at the site. Under NR 243, groundwater monitoring could be required for the manure storage lagoons and the spreading sites. No soil borings were available to determine depth to groundwater or bedrock at the site prior to construction of the storage lagoons. Borings would show if the finished elevation of the bottom of the storage lagoon is 3 feet from the water table as required in NRCS 313.

Waste Storage Facilities – It is presumed that the groundwater separation distances for all of the waste storage facilities (WSF 1, WSF 2 and WSF 3) meet or exceed the requirements contained in NRCS Practice Standard, Code 313 Waste Storage Facility. All of the waste storage facilities are designed with water tight concrete liners and meet the requirements of NR 243.15.

While all of the required separation distances are satisfied, a perimeter drain around the eastern footprint of WSF 1 and WSF 2 has also been designed. A 4-inch tile line will serve as a monitoring system for those cells, intercepting any leakage that may occur from either cell. The tile lines go through a manhole that includes a tee, shutoff valve and a sampling port. These fittings will allow inspection of the flow from the tile lines and observation of any contaminated discharge. If a leakage is detected, the discharge will be stopped by closing a valve located in the manhole. The contaminated flow can then be diverted into a tanker until repairs to the waste storage facility can be made. The Operations and Maintenance plan details the monitoring frequency for these waste storage facilities and the leakage monitoring system.

Feed Storage Structures – As mentioned above, both the feed storage pad and the sweet corn storage pad have individual leachate collection and transfer systems to minimize potential impacts to the environment.

The feed pad leachate collection system is designed to collect runoff from the feed and convey it to WSF 2. Small or short duration rainfalls will produce a rate of runoff that is less than the capacity of the transfer pump. During these limited rainfalls, the transfer pump will be able to

transfer the entire volume of runoff to WSF 2. Larger storms will produce a runoff rate that exceeds the capacity of the transfer pump. As the rate of runoff exceeds the pumping capacity, the level in the transfer pump sump will rise until liquids back-up into the 20 ft wide collection channel. The channel will direct the runoff to gravity flow to the concrete lined detention basin and on to a vegetated treatment area that is 3.2 acres in size.

The sweet corn silage pad leachate collection system has been designed with a concrete floor and 12 foot high precast concrete walls. The concrete will be protected using a high quality cure designed to protect against low pH products. All joints are sealed to prevent exfiltration of leachate. In addition, the sweet corn pad has a below grade tile drainage system to further protect groundwater. Drain lines are installed around the perimeter and beneath the concrete slab. The drain tile lines lie on top of a 1.5-foot thick clay base. The clay exceeds the minimum requirements set forth in NR 213.10 and NR 213.11. The clay layer will impede vertical movement of any leachate that seeps through the concrete. Any liquids will flow into the tile lines and gravity flow to the HDPE pump sump and be transferred into WSF 3 for storage. All runoff from the sweet corn silage pad will be collected and conveyed to WSF 3. When the rate of runoff exceeds the pumping capacity of the transfer pump, the level in the transfer structure will rise until the overflow is reached. The overflow will discharge runoff to the HDPE lined equalization basin by gravity.

The Operations and Maintenance plans details the monitoring and inspection frequency for these feed storage structures and the respective leachate collection systems.

I.E. Operation

I.E.1. Production management

I.E.1.a. Animals

This project is planned to occur in two phases. Phase I would include populating the site with 3500 milking cows, 500 dry cows and 150 beef steer for a total of 5,750 AUs. Phase II would include an additional 3500 milking cows, 500 dry cows and another 150 steers for an additional 5750 AUs. Upon completion of Phase II, the total number of AUs at the site would be 11,500. There are currently no additional proposed expansions beyond Phase II.

I.E.1.b. Animal housing & bedding

Phase I of the Rosendale Dairy project includes a large freestall barn (Southern Freestall) for 4150 head of animals located at the southern edge of the operation. The barn is covered thus minimizing exposure to precipitation and potential runoff or run on to the manure produced by animals at the site. The barn has a concrete floor which facilitates cleaning and transfer of manure to the waste storage facilities at the site and minimizes potential migration of manure pollutants to groundwater. The Northern Freestall proposed to be constructed just north of the Southern Freestall barn as part of Phase II will have similar design and house identical animal numbers as the Southern Freestall.

Sand for bedding for the operation is being purchased from Michels Materials – Meyer Pit located in Sections 35 & 36 in the town of Oasis, Waushara County (WPDES General Permit 0046515). The Michels sites are shown in Figure 5, below.

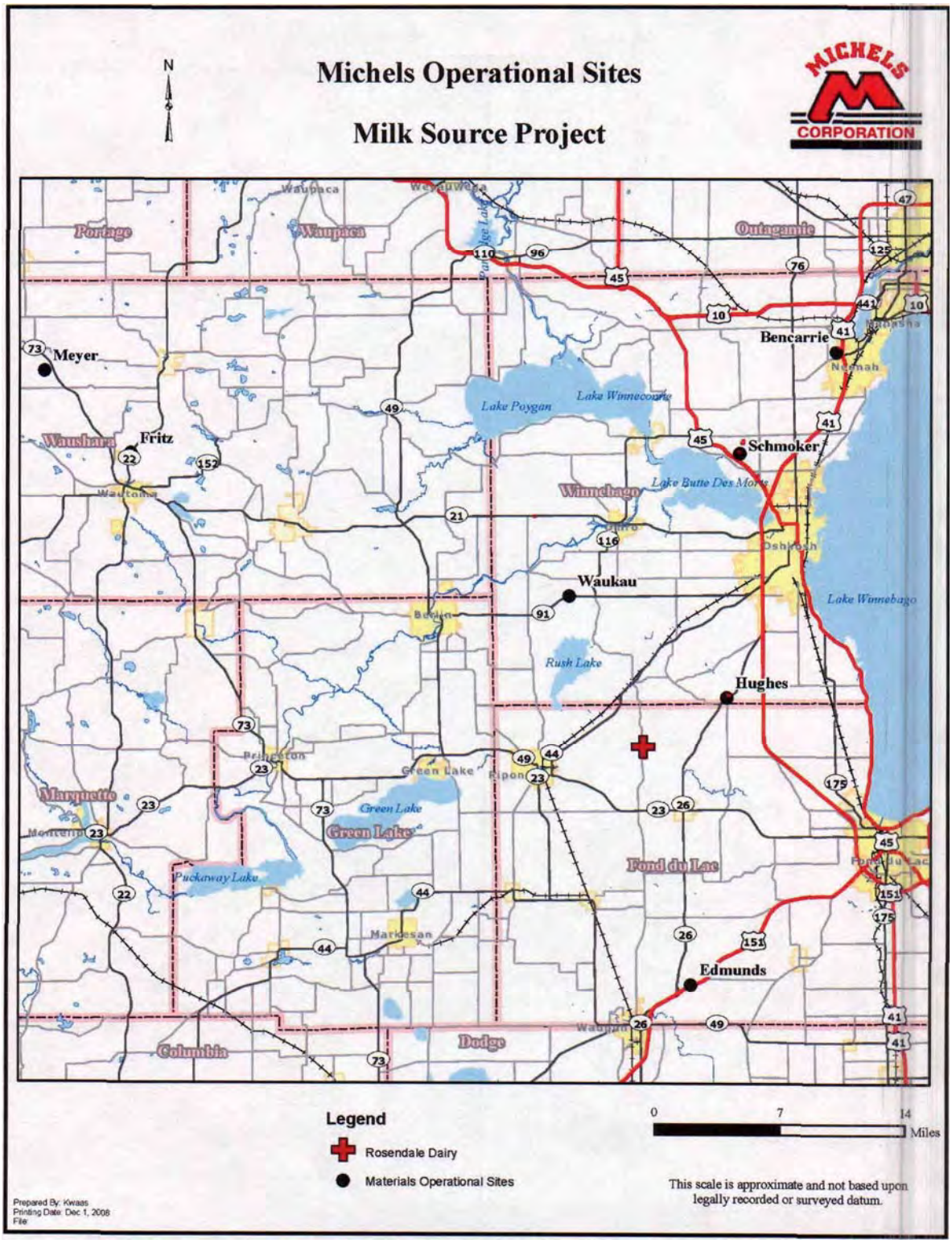


Figure 5 - Michels Operational Sites

Initially the operation will purchase 48,000 yards of specially graded sand – i.e., 24,000 yards in Phase I and 24,000 in Phase II. Thereafter and with sand separation technology, they expect to purchase approximately 8000 yards annually – i.e., 4,000 yards for Phase I and 4,000 yards for Phase II. All sand will be purchased from DNR approved and licensed facilities.

I.E.1.c. Animal feed, drugs & health

The steers at the site would allow the farm to minimize the amount of waste feed. While the cows must be fed a diet consisting of a particular mix of feed and protein additives for optimum milk production, the steers are able to consume the feed left over from the cows. This will eliminate the need to land spread approximately 650,000 pounds of feed per month and reduces fuel usage associated with the land application activities.

No hormones or antibiotics are used on animals prophylactically. Animals that are sick will be treated as needed, including the use of antibiotics.

I.E.1.d. Products

Rosendale Dairy estimates that the 3500 milking cows included as part of Phase I of the project will produce 300,000 lbs. of milk per day. The additional 3500 milking cows planned as part of Phase II will produce an additional 300,000 lbs. of milk per day. It is expected that most of this milk will be sold and used for fluid milk. For Phase I, there will be a continuous cycling of 150 beef steers at the site as the operation raises the animals from six months to approximately 16 months and then selling them for beef production. For Phase II, an additional 150 beef steers will be continuously cycled through the operation.

All milk products are tested to confirm the absence of antibiotics using the Charm SL Test and the Disc Assay Test for milk prior to processing. Milk from antibiotic treated animals is intercepted separately and discarded.

Laws exist to protect consumers from the presence of unacceptable levels of drugs in milk and meat. For example, see Wis. Stat. Chps. 97 and 98; Wis. Admin. Code Chps. ATCP 55-88. See also, US Code Title 9, Parts 300-599. Further, meat is inspected by state and federal inspectors during the slaughter process.

I.E.2. Manure & other animal waste management & monitoring

I.E.2.a. Manure collection system

Animal housing facilities (freestall barns) will be cleaned frequently to help reduce the amounts of odors generated from these facilities and prevent the build up of manure in the corners of the litter alleys. All litter alleys and travel lanes will be scraped at least 3 times per day to transfer manure and manure contaminated bedding from animal housing facilities to the sand separation area. Wastes from the milking parlor will also be directed to the sand separation area. Liquids from the sand separation area will be directed to Waste Storage Facility (WSF) 1. Separated sand

will be deposited onto a sloped watertight concrete slab. Liquids that dewater from the sand will drain to the chambered reception tank. Sand will be transferred to the sand and solids storage bunker with a loader for further dewatering and storage and ultimate reuse as bedding. The sand separation system allows 90% of the sand to be reclaimed and reused as bedding.

For Phase I, Rosendale Dairy will produce approximately 46 million gallons of liquid waste annually, consisting primarily of liquid manure, that will be handled and stored in this manner prior to land application. It is estimated that an additional 46 million gallons of manure would be produced every year from Phase II.

I.E.2.b. Manure storage & treatment system

Wastes contained in WSF 1 will be transferred WSF 2 by gravity. WSF 1 will normally operate as full. The gravity transfer system is designed to flow waste through a concrete flume channel at approximately the Maximum Operating Level (MOL) of WSF 1. This will reduce the transfer of residual sand from WSF 1 to WSF 2. Wastes will be transferred from WSF 2 to WSF 3 (once constructed) by a below grade 6 inch PVC Pipe.

When it is time to empty these storage facilities, the liquids will be aggressively agitated with mechanical prop-type agitators. The solids level in WSF 3 will be lower than either of the other facilities and is likely to be lower than 2%. This will minimize the level of agitation require for WSF 3. When possible, manure will be pumped by hose to adjacent cropland where it will be injected into the soil. For distant cropland, the manure shall be loaded into tankers and surface applied onto cropland. All manure applied onto cropland will be done according to the current Nutrient Management Plan (NMP).

WSF 1 and WSF 2 have concrete ramps into the bottom so that in the event that sand or manure solids build up in the bottom, equipment can be used to remove the sand or solids. Any sand or solids will be applied onto cropland according to the current NMP. The floor in WSF1 has been designed to facilitate heavy equipment. Equipment size into the bottom of WSF 2 will be limited to skidsteers and small tractors and spreaders.

Other than the use of sand separation technology, the operation has not proposed additional treatment of the manure and process wastewater either via anaerobic digestion or other possible methods of treatment (e.g., membrane filtration) as part of Phase I of the operation. The operation has indicated it is evaluating a number of potential treatment options as part of Phase II of the project which are discussed in the “Alternatives” section (section VI) of this EIS.

The application includes a detailed Operations and Maintenance plan for manure storage structures detailing the monitoring and inspection frequency for these collection systems.

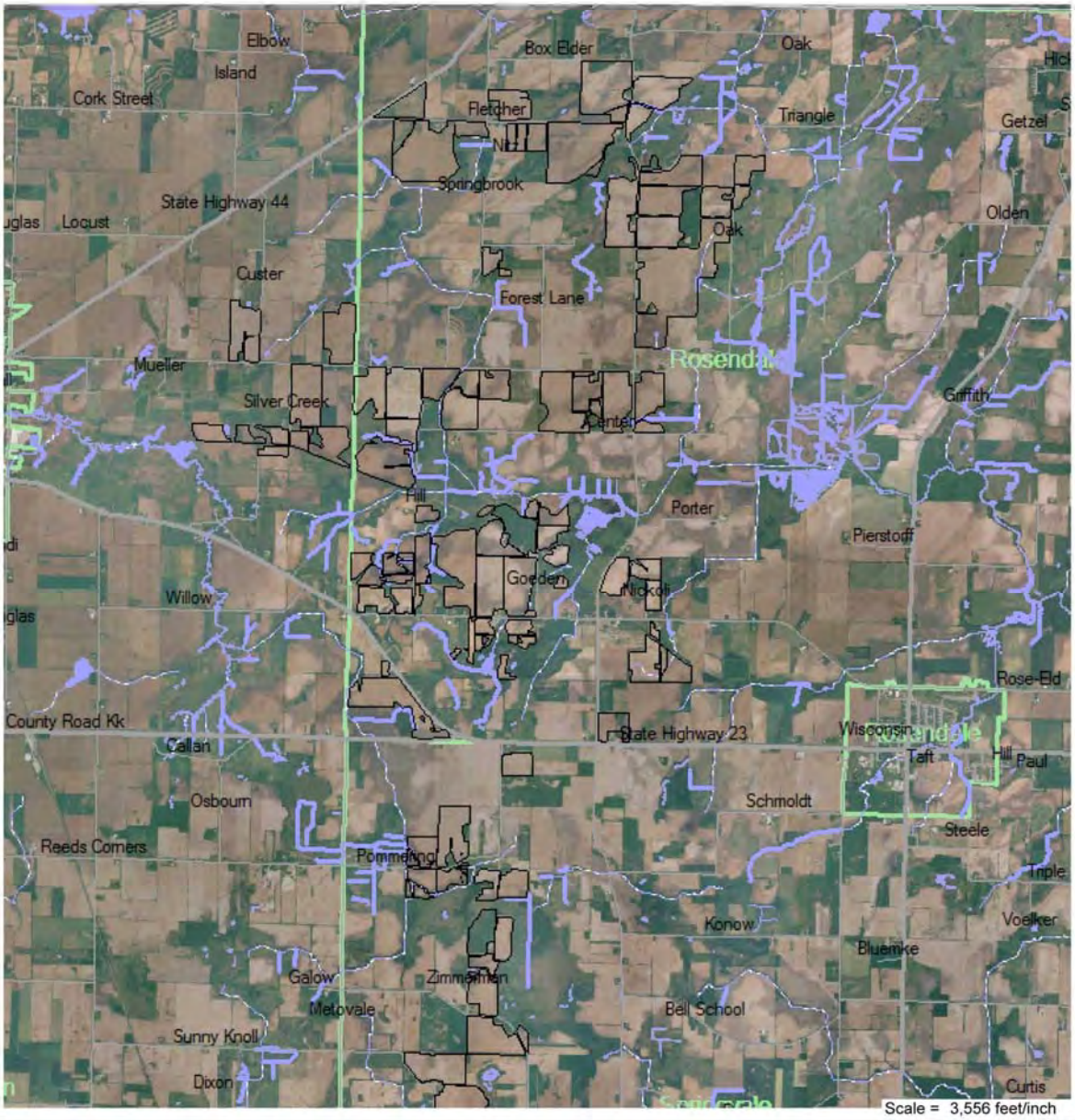
I.E.2.c. Manure spreading & disposal

Figures 6a, 6b, and 6c, below, show the location and distribution of the manure spreading sites for Phase I.

Rosendale Dairy Inc.

Farm Map

Prepared For: Rosendale Dairy Inc.	County: Fond Du Lac, WI
Farm: Rosendale Dairy Inc.	Twp Rng Sec:
Field:	Directions:
Crop Zone:	
Crop Year: Acres: 1,676.95	



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Page 1

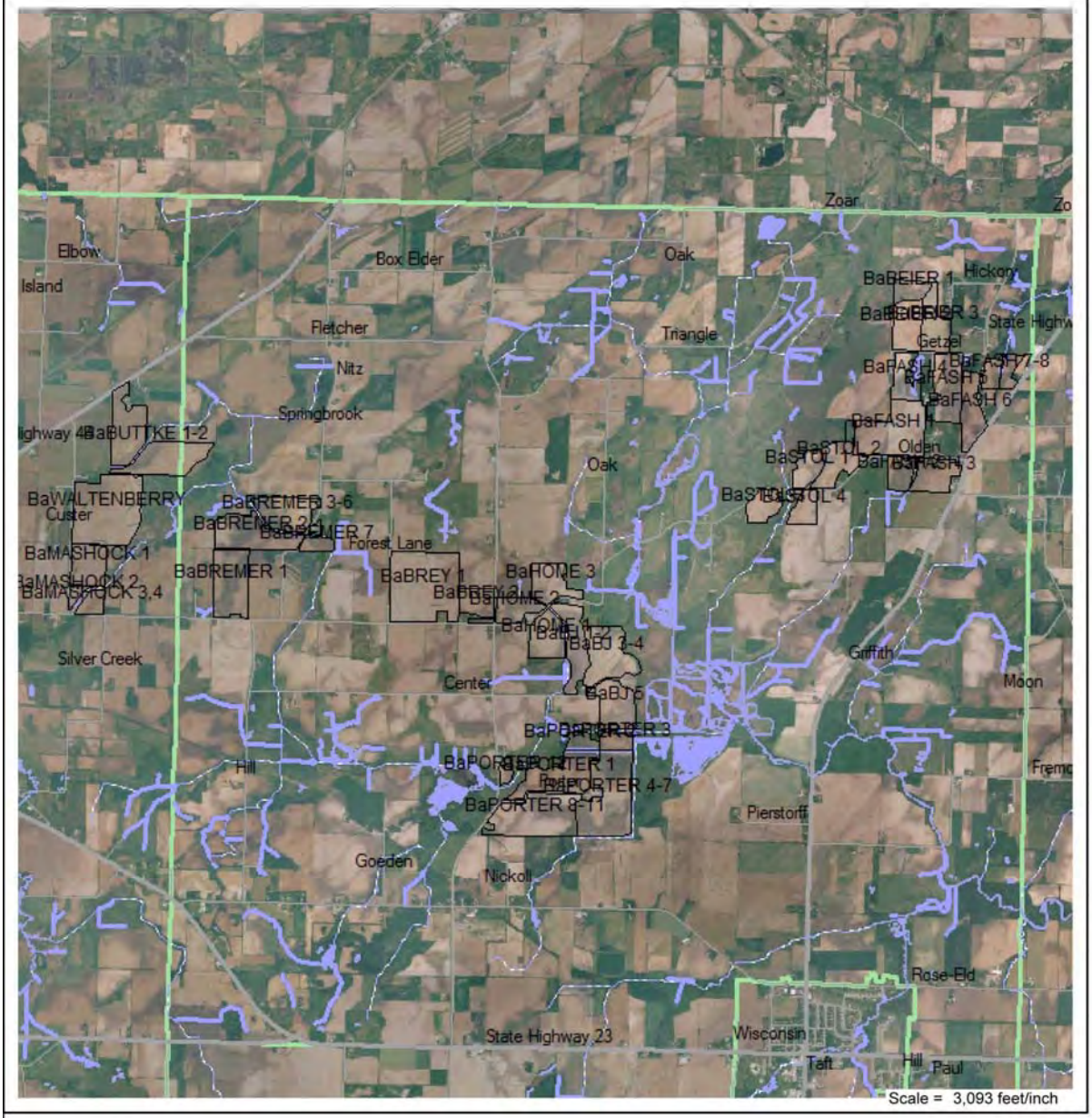
Sep 11, 2008

Figure 6a - Rosendale Manure Spreading Sites

Rosendale Dairy Inc.

Farm Map

Prepared For:	Rosendale Dairy Inc.	**County:**	Fond Du Lac, WI
Farm:	Bartz Farms	**Twp Rng Sec:**	
Field:		**Directions:**	
Crop Zone:			
Crop Year:	**Acres:** 2,008.27		



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Page 1

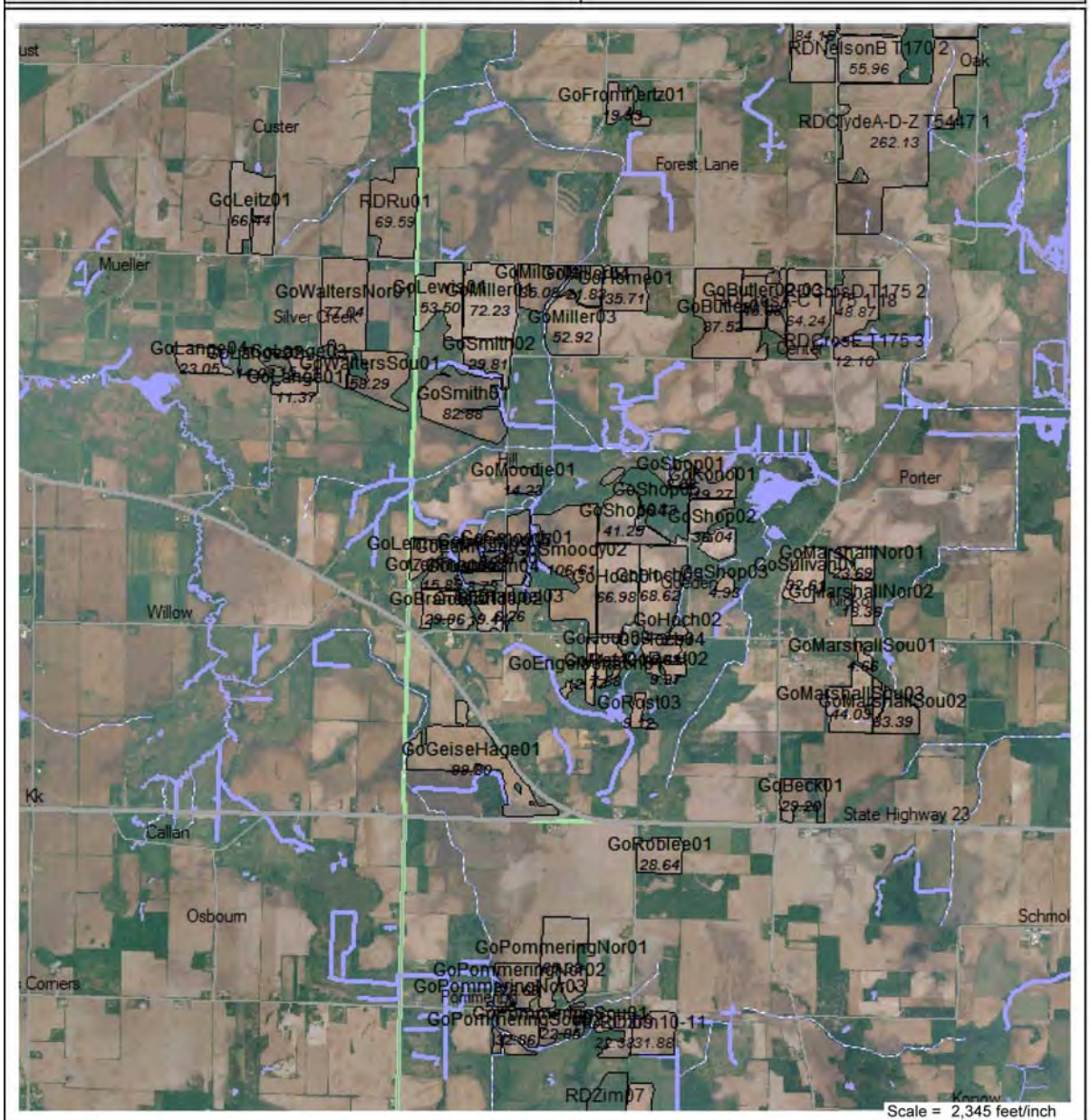
Sep 17, 2008

Figure 6b - Bartz Farms Manure Spreading Sites

Rosendale Dairy Inc.

Farm Map

Prepared For:	Rosendale Dairy Inc.	**County:**	Fond Du Lac, WI
Farm:	Goeden Farms	**Twp Rng Sec:**	
Field:		**Directions:**	
Crop Zone:			
Crop Year:	**Acres:** 1,912.91		



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Page 1

Sep 10, 2008

Figure 6c - Goeden Farms Manure Spreading Sites

Manure spreading & disposal will be completed according to the Rosendale Dairy Nutrient Management Plan (NMP) and WPDES permit. The applicant has developed the NMP for Phase I of the project, and the NMP must be amended over time, on at least an annual basis. The NMP must be amended to reflect Phase II of the project before the proposed Phase II herd size expansion could occur. All NMP amendments must be reviewed and approved by the Department.

Phase I reflects the following herd size and acreage: 4000 milking/dry cows, 150 steers (combined 5,750 Animal Units) and 5,631 spreadable acres. Rosendale Dairy currently owns 1831 acres and an additional 3800 acres are rented or have been included as formal agreements with other landowners.

Phase II, as provided by the applicant, shows the following total herd size and acreage: 8000 milking/dry cows and 300 steers (combined 11,200 Animal Units) and additional acres above existing land base (5,631 acres) will be obtained in year two of operation to support herd size expansion. To date the additional acres to accommodate Phase II have not been identified by the applicant

The NMP describes how liquid manure and process wastewater from the milking parlor will be pumped from storage lagoons into manure spreaders, and land applied. The applicant estimates manure applications will occur twice a month, for 3-4 day periods, in May, July, October and November. This spreading will occur in spring, before planting, and in fall, or after harvest of alfalfa, wheat or other crops. In fall and spring, liquid manure will be injected as much as possible, or incorporated using a disk till within 48 hours of application, whichever is safer. In the summer, liquid manure is top dressed on alfalfa, and applications will also occur on fields after wheat harvest.

The Department has reviewed the NMP for Phase I and determined it to be in compliance with applicable federal criteria of the USDA Natural Resources Conservation Service (NRCS 590), and state requirements in chapter NR 243.

The NMP addresses the application and budgeting of nutrients (e.g., manure and process wastewater) for plant production on field by field basis. The NMP describes, in specific detail, crops, tillage, nutrient application rates, locations, and methods implemented in order to protect surface water and ground water resources while maintaining the physical, chemical and biological condition of the soil.

The NMP accounts for all nutrient sources, including soil reserves, commercial fertilizer, manure, organic byproducts, and crop residues to ensure proper utilization and protect water quality. The NMP is written to ensure all manure and process wastewater applied to fields is incorporated into the soil as a fertilizer for plant uptake, thus significantly reducing the potential for nutrient pollution of surface or ground water.

The NMP describes how the following NR 243 requirements will be met on a field-by-field basis:

- Applications near navigable waters, wetlands and their conduits [referred to as SWQMA restrictions in NR 243.14.(4)].

- Applications near private or community wells, direct conduits to ground water, and fields containing drain tiles [NR 243.14(2)(b)].

- Timing of manure and process wastewater [saturated soils, forecasted precipitation, frozen or snow covered ground, and areas of fields with depth to ground water of less than 24 inches [NR 243.14(2)(b)].

- Nutrient Crediting [NR 243.14(3)].

- Phosphorus-based nutrient management and managing for nutrient impaired waters [(NR 243.14(5)].

- All fields managed to meet Tolerable Soil Loss (T) for the rotation [NRCS 590 V.A.2].

- Ephemeral field erosion is minimized or eliminated via best management practices (e.g., contour strips, filter strips, maintaining > 30% crop residue on soils after planting, and fall cover crops) [NRCS 590 V.C.1].

- All nutrient applications consistent with NRCS 590 nutrient management criteria (yield goals attainable under average conditions) and soil fertility recommendations found in UW-Extension Publication A2809 [NRCS 590 V.A.1].

A majority of fields listed in the NMP contain wet soils described as ‘w’ soil units. The NMP describes ‘w’ soils as: soils with less than 12 inches to apparent water table (ground water) at certain times of the year. The NMP, per NRCS 590 standard, identifies the ‘w’ soils as having a high potential for nitrogen leaching to ground water. The close proximity of ground water for ‘w’ soil fields, at certain times of the year, represents an increased risk for bacterial pollution of ground water from manure spreading activities. The percentage of ‘w’ soils for each field listed in the NMP varies. Some fields are < 10% while others may be up to > 90% of the total field area.

In response to these ground water pollution risks, the NMP contains specific best management practices (BMPs). The BMPs describe how ***all*** fields with ‘w’ soils will be either avoided or managed to prevent nutrient pollution (i.e., nitrates, bacteria) of ground water. Specific department guidance for ‘w’ soil fields is included with the BMPs. It is expected that compliance with the guidance, and the other NMP best management practices related to manure spreading, will significantly reduce the risk for nutrient pollution of ground water.

The manure spreading sites and frequency proposed for Phase I (5,631 acres), and additional acres expected with Phase II, will increase the following factors above current conditions:

- Truck traffic volume and frequency on roads (to transport and apply manure to fields).
- Manure field application volume and frequency (most fields are currently farmed using commercial fertilizer only).
- Risk for manure spills on roadways, on fields, or into surface or ground water.
- Risk for bacterial and nutrient pollution of surface water (streams, lakes and wetlands) and ground water (private and public drinking water wells).

However, the pollution risks listed above are minimized by legal requirements for compliance with the NMP, including the specific NR 243 criteria listed above, and WPDES permit conditions, which directly address manure transport and spill response. Compliance with all regulatory criteria is expected to reduce or eliminate most of the risk caused by the projects proposed manure spreading activity.

It is inappropriate to state the risk for water pollution from this project is eliminated entirely; the risk can only be minimized via required implementation of pollution prevention best management practices. This is the case with every WPDES permit the department issues. The WPDES permit requires the NMP to be fully implemented at all times and for Rosendale Dairy, Inc., to report periods of non-compliance with the permit. Should Rosendale Dairy, Inc., fail to comply with the requirements outlined above (and below), it would be a violation of its permit and subject to department enforcement.

The NR 243 criteria written into the applicant's NMP only became effective for some CAFO WPDES facilities in July 2007. The remainder of CAFO WPDES permitted operations will be required to amend their NMPs and implement this criteria either during a permit modification or scheduled permit re-issuance. The Department has not been able to complete any monitoring studies showing how NMP requirements found in NR 243 result in specific reduction in nutrient and sediment delivery from fields to downstream waters because:

1. Short time period since inception of NR 243 requirements;
2. Limited number of farms are currently managing manure according to NR 243 criteria;
3. Department resources are very limited to complete monitoring studies to document how NMPs reduce nutrient and sediment delivery from fields to downstream waters.
4. For statistically reliable findings, monitoring studies need to be completed for one year or more (to account for variations by season, agricultural methods, soils, etc., etc.)

Most BMPs listed in the NMP, however, are written to prevent pollution via the following procedures:

- Prohibition of manure applications to fields with high risk conditions.
- Allowance of manure applications to fields with low risk conditions.
- Monitoring fields before, during and after manure applications for pollution risks.
- Amending manure application methods based upon application results.
- Review of manure application requirements with haulers before, during and after applications via meetings.
- Documentation of manure application meetings and field checking via written logs.

By eliminating manure applications to high risk fields and applying manure and process wastewater to fields as a fertilizer for plant uptake only, the NMP and WPDES permit requirements significantly reduce the risk for nutrient pollution of surface or ground water caused by the project.

I.E.2.d. Animal disposal & rendering

Animals dying due to injury or other causes (mortality rate is generally highest for newborn animals) will be disposed of through a mortality disposal company to remove all dead animals within 24 hours of a death event. There will be no burning or incineration of trash or refuse or animal mortality at the site. All dead animals will be stored out of public view to reduce other conflict.

I.E.2.e. Feed & silage storage & treatment

A leachate collection system is utilized to collect and treat the leachate and runoff coming from the feed bunkers. Leachate is collected in the leachate collection system and pumped into the earthen manure storage facility. Eliminating the leachate reduces odors from the feed bunkers. Feed will be harvested at optimal moisture to minimize the potential for excessive leachate coming from stored feeds. Feed will be covered with plastic and tires to reduce the amount of spoiled feed. Excess and waste feed will be removed frequently and properly land applied according to the operation's nutrient management plan. Both the feed storage pad and the sweet corn storage pad have individual leachate collection systems. Designs indicate that the sweet corn pad has a below grade tile drainage system to further protect groundwater. Drain lines are installed around the perimeter and beneath the concrete slab. The drain tile lines lie on top of a 1.5-foot thick clay base. The clay layer will impede vertical movement of any leachate that seeps through the concrete. Any liquids will flow into the tile lines and gravity flow to a pump sump and be transferred into WSF 3 for storage.

The application includes a detailed Operations and Maintenance plan for feed storage structures listing the monitoring and inspection frequency for these collection systems.

I.E.3. Transportation management

There would be traffic associated with the transportation of livestock, milk, feed, and manure. The following are estimates of truck traffic:

I.E.3.a. Manure hauling

Nutrients (manure) – up to 5950 annual total loads for Phase I and an additional 5950 total loads for Phase II; during May through November. However, nutrient loads may be substantially lower depending on the advanced manure technology that is adopted in Phase II. For example, installation of an anaerobic digester in Phase II will only reduce the total loads by 3%. Dissolved Air Floatation coupled with center pivot irrigation could reduce total loads by up to 60%. Ultra filtration could reduce total loads by 70%. None of these advanced technologies are planned for Phase I but will be evaluated for Phase II.

I.E.3.b. Feed hauling

Corn Silage and Haylage, approximately 2187 annual total loads for Phase I with an additional 2187 annual total loads for Phase II; during May, June, July, August, September, October and November.

Sweet Corn Silage – approximately 1600 annual total loads for Phase I and no increase for Phase II; during August, September and October.

Grain Corn – 225 annual total loads for Phase I and an additional 225 annual total loads for Phase II; throughout the entire year.

Other Feed – 300 annual total loads for Phase I and an additional 300 annual total loads for Phase II; throughout the entire year.

Note that corn silage and haylage harvest trucking occurs when the plant moisture and maturity is at specific harvest parameters; thus harvest times and days are highly dependent on the weather conditions and trends. Most other trucking will occur during business hours. Field bound truck routes will be the shortest distance to the field. Incoming trucks will use Highway M in both directions to State Highway 23 (southbound) and 41 (northbound).

I.E.3.c. Product (milk) hauling

Milk will be removed from the production area to a local dairy milk processor in semi trailers. Five (5) loads per day in Phase I is expected and an additional six (6) loads per day in Phase II.

I.E.3.d. All trucking & commuting

Most truck traffic will occur during daylight hours. However, during crop harvesting, traffic will occur whenever necessary to bring in the crop. Vendors are instructed to follow standards related to truck routes and engine braking. “Courtesy to neighbors” signs will be installed at property exits to remind drivers. Driveways will be paved in Phase II. Figures 7a, and 7b, below, show likely trucking routes.

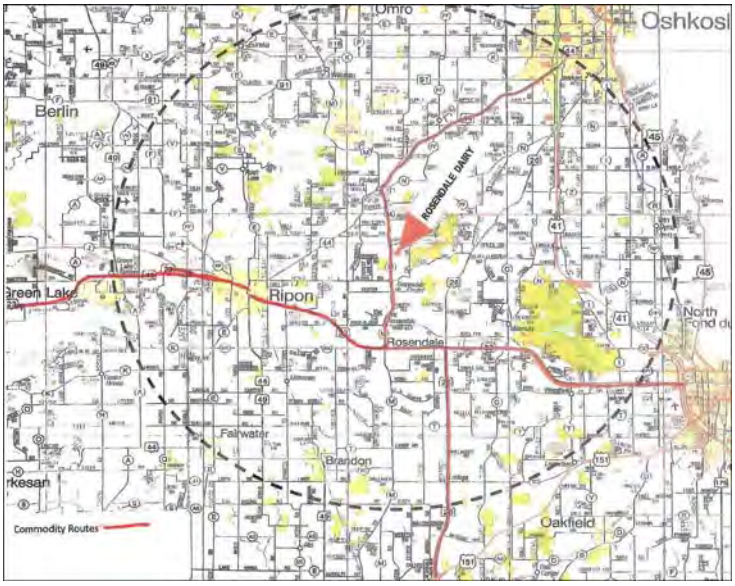


Figure 7a - Commodity Routes

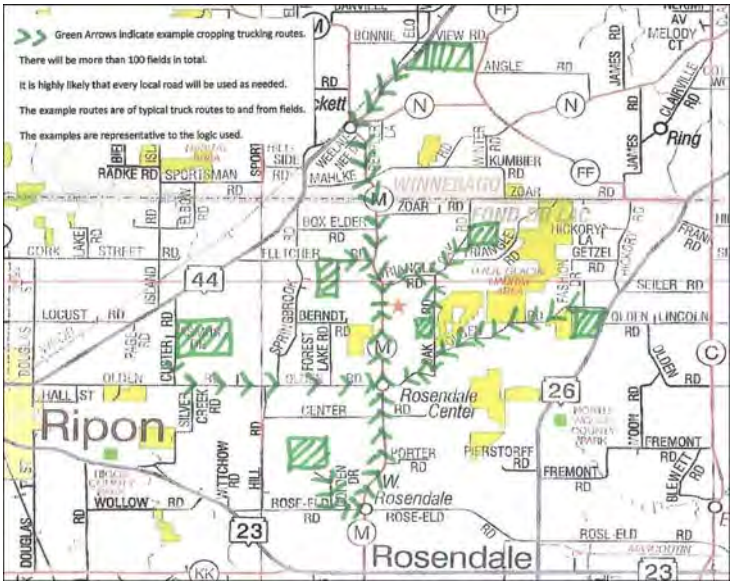


Figure 7b - Cropping Route Examples

I.E.4. Environmental control & monitoring

I.E.4.a. Stormwater control & monitoring

Conformance with the site-specific erosion control plan and stormwater management plan is required. Erosion and sediment control best management practices and treatment devices must be installed and operated as indicated by the erosion control plan, stormwater management plan and plan sheets. The following erosion and stabilization practices are, or have been, employed on the construction site: Channel Erosion Mat, Construction Site Diversion, Ditch Check, Dust Control, Mulching, Seeding, Stone Tracking Pad, Temporary grading Practices for erosion control, Vegetative Buffer. The following Sediment Control Practices are, or have been, employed at the construction site: Sediment Bale Barrier (non-channel), Sediment Basin, and Silt Fence. The following post-construction treatment practices are employed at the construction site: Grassed Swales, Wet Detention Pond. All applicable DNR Technical Standards must be adhered to.

Inspection & Maintenance

During Construction: Weekly inspections of installed erosion and sediment controls are required. Inspections of erosion and sediment controls within 24 hours after a rainfall event of 0.5 inches or larger is required. Repair or replace erosion and sediment control BMPs as necessary within 24 hours of an inspection or notification indicating that repair or replacement is needed. Inspection records are retained on site.

Post Construction:

Stormwater runoff is conveyed to two wet detention basins by a series of culverts, swales and ditches. The stormwater flow pattern is shown in Figure 4 on page I-7. Runoff is treated in the wet detention basins by settling of the suspended solids into the bottom of the basin. The cleaner water near the top of the basin is discharged through small outlet holes during and after storm events. The storm water conveyance system, and each wet detention basin will be inspected a minimum of two times each year. The swales and conveyance system will be inspected for damage. The wet detention basin inlets and outlet structures will be inspected for blockages and damage, trash and debris will be removed. Plantings will be watered if necessary to maintain growth. Soil erosion will be repaired as necessary. Wet detention basin sediment depth will be measured annually. Stored sediment will be removed and legally disposed of when the distance between the permanent pool elevation and the top of the accumulated sediment is less than three feet. Inspection and maintenance records will be maintained.

I.E.4.b. Air emission control & monitoring

Rosendale Dairy has no plans to perform formal environmental monitoring of odors or air emissions at the site of the dairy and none are required by law. WDNR has odor response regulatory authority in NR 429. The waste storage facilities are located as far from the roadways and off site buildings as practical. Rosendale Dairy has developed an Odor Management Plan according to the criteria contained in Wisconsin Administrative Code ATCP 51. Rosendale Dairy will implement this plan to reduce odors and air emissions from the dairy and will respond

to any odor complaints. Land applied manure odor issues will be short lived because of required incorporation timing, or applications to actively growing crops.

Dust from gravel driveways may be generated during periods of high traffic during Phase I, until Phase II construction when all driveways will be asphalted. During Phase I, Rosendale Dairy will water the driveway daily during periods of high use. High use is defined as more than 7 loads per hour. Typically, that will only occur during harvest and nutrient application. In that event, Rosendale Dairy will apply ¼ inch of water to high traffic gravel areas at least 2-3x per day in high use areas, using their own water tanker.

The Commodity Building for feed mixing was designed and built specifically to eliminate the possibility of windblown dust. The southern exposure prevents against prevailing westerly winds. Feed will be mixed inside the Commodity Building, out of direct wind to eliminate the risk of wind and weather affecting the feed mixing. Occasionally, water will be added to rations that are considered excessively dry.

I.E.4.c. Groundwater monitoring structures & equipment

No groundwater quality monitoring is proposed by the applicant. Groundwater use will be monitored as required under Chapter NR 820, Wis. Adm. Code.

It is presumed that the groundwater separation distances for all of the waste storage facilities (WSF 1, WSF 2 and WSF 3) meet or exceed the requirements contained in NRCS Practice Standard, Code 313 Waste Storage Facility. All of the waste storage facilities are designed with water tight concrete liners and meet the requirements of NR 243.15.

While all of the required separation distances are satisfied, a perimeter drain around the eastern footprint of WSF 1 and WSF 2 has also been designed. A 4-inch tile line will serve as a monitoring system for those cells, intercepting any leakage that may occur from either cell. The tile lines go through a manhole that includes a tee, shutoff valve and a sampling port. These fittings will allow inspection of the flow from the tile lines and observation of any contaminated discharge. If a leakage is detected, the discharge will be stopped by closing a valve located in the manhole. The contaminated flow can then be diverted into a tanker until repairs to the waste storage facility can be made. The Operations and Maintenance plan (See Ex. 5) details the monitoring frequency for these waste storage facilities and the leakage monitoring system.

Feed Storage Structures – As mentioned above, both the feed storage pad and the sweet corn storage pad have individual leachate collection and transfer systems to minimize potential impacts to the environment.

The feed pad leachate collection system is designed to collect runoff from the feed and convey it to WSF 2. Small or short duration rainfalls will produce a rate of runoff that is less than the capacity of the transfer pump. During these limited rainfalls, the transfer pump will be able to transfer the entire volume of runoff to WSF 2. Larger storms will produce a runoff rate that exceeds the capacity of the transfer pump. As the rate of runoff exceeds the pumping capacity, the level in the transfer pump sump will rise until liquids back-up into the 20 ft wide collection

channel. The channel will direct the runoff to gravity flow to the concrete lined detention basin and on to a vegetated treatment area that is 3.2 acres in size.

The sweet corn silage pad leachate collection system has been designed with a concrete floor and 12 foot high precast concrete walls. The concrete will be protected using a high quality cure designed to protect against low pH products. All joints are sealed to prevent exfiltration of leachate. In addition, the sweet corn pad has a below grade tile drainage system to further protect groundwater. Drain lines are installed around the perimeter and beneath the concrete slab. The drain tile lines lie on top of a 1.5-foot thick clay base. The clay exceeds the minimum requirements set forth in NR 213.10 and NR 213.11. The clay layer will impede vertical movement of any leachate that seeps through the concrete. Any liquids will flow into the tile lines and gravity flow to the HDPE pump sump and be transferred into WSF 3 for storage. All runoff from the sweet corn silage pad will be collected and conveyed to WSF 3. When the rate of runoff exceeds the pumping capacity of the transfer pump, the level in the transfer structure will rise until the overflow is reached. The overflow will discharge runoff to the HDPE lined equalization basin by gravity.

The Operations and Maintenance plans details the monitoring and inspection frequency for these feed storage structures and the respective leachate collection systems.

II. Authorities & approvals

II.A. Department of Natural Resources

The Department has the following authorities regarding this operation:

- Wisconsin Pollutant Discharge Elimination System (WPDES) Permit for Concentrated Animal Feeding Operations under s. 283, Wis. Stats., and ch. NR 243, Wis. Adm. Code

- Wisconsin Pollutant Discharge Elimination System (WPDES) Permits for Concentrated Animal Feeding Operations (CAFO), i.e. those operations with 1,000 animal units or more, s. 283.31, Wis. Stats.

  A WPDES permit contains a number of restrictions designed to address potential water quality impacts from the proposed operation. Requirements include: (1) proper design, construction and operation of structures associated with manure and process wastewater handling at the site; (2) development and implementation of an emergency response plan; (3) restrictions on the amount, location, and timing of applications of manure and process wastewater through a nutrient management plan; (4) restrictions on runoff from animal housing, feed storage and manure storage facilities; (5) self-monitoring of production and land application areas; and (6) reporting of land application activities and results of animal production area inspections.

  Operations covered under a WPDES permit are required to conduct: (1) daily inspections of water lines to discover and correct any significant leakage; (2) weekly inspections of stormwater diversions and storage structures; (3) quarterly inspections of raw material storage areas (e.g., feed storage areas); and (4) periodic calibration and leak inspection of landspreading requirement. The Department evaluates the construction of structures related to manure handling in conjunction with potential water quality concerns to determine if additional monitoring is necessary.

- Storm water discharges from the Rosendale Dairy construction site is regulated under ch. 283, Wis. Stats, ch. NR 216, Wis. Adm. Code, and in accordance with WPDES General Permit No. WI-S067831-3, Construction Site Storm Water Runoff. Permit coverage under WPDES General Permit No. WI-S067831-3 was granted on February 5, 2008.

- Review and approval authority of manure storage facilities, transfer systems, feed storage and runoff control systems-- s. 281.16, Wis. Stats.

- Nutrient Management Plan review, ch. NR 243, Wis. Adm. Code, and NCRS technical standard 590

- High capacity well permits are required for operations using 70 gallons/minute or more from operator – owned wells, s. 281.34, Wis. Stats. Two permits were approved May 2008; two more well approvals have been requested.

- Under chapter NR 812, EPA drinking water standards must be met for Non Transient, non community wells. These are non-residential wells that serve the same 25 people for more than 6 months/year.

- NR 809.04(48) Non-transient non- community water system means a non-community water system that regularly serves at least 25 of the same persons over 6 months per year. Examples of non-transient non-community water systems include those serving schools, day care centers and factories

- Air emission limitations from s. NR 415.04, Wis. Adm. Code, covering fugitive dust sources

- Air emission limitations from ch. NR 445, Wis. Adm. Code, regarding control of hazardous pollutants

- Odor control requirements may be imposed by order of the Department if it determines that a violation of s. NR 429.03 – Malodorous Emissions, Wis. Adm. Code, occurs.

II.B. Other Wisconsin agencies

The Department is not aware of any other state authorities.

II.C. County & local

To the best of our knowledge Fond du Lac County requires:

- Construction Site Erosion Control and Stormwater Management permit (ss. 17.09 and 17.10)—permit # SE-79 issued 9/8/08

- Approval of on-site domestic wastewater system

- Manure Storage permit

II.D. Federal

USEPA - National Pollutant Discharge Elimination System (NPDES) Permits for Concentrated Animal Feeding Operations (40 CFR). This program is implemented through the Wisconsin DNR's delegation of the NPDES Permit program (WPDES)

III. Existing environment

III.A. Physical environment

III.A.1. Area

III.A.1.a. Location & Size

The Rosendale Dairy Facility is located in the Fond du Lac River Watershed, which drains approximately 250 square miles - 209 square miles in Fond du Lac County and 41 square miles in Winnebago County. The Winnebago County portion of the watershed encompasses the lower half of Van Dyne Creek and several other smaller intermittent tributaries to Lake Winnebago. The watershed also includes the southern half of the city of Oshkosh (see Figure 9, below).

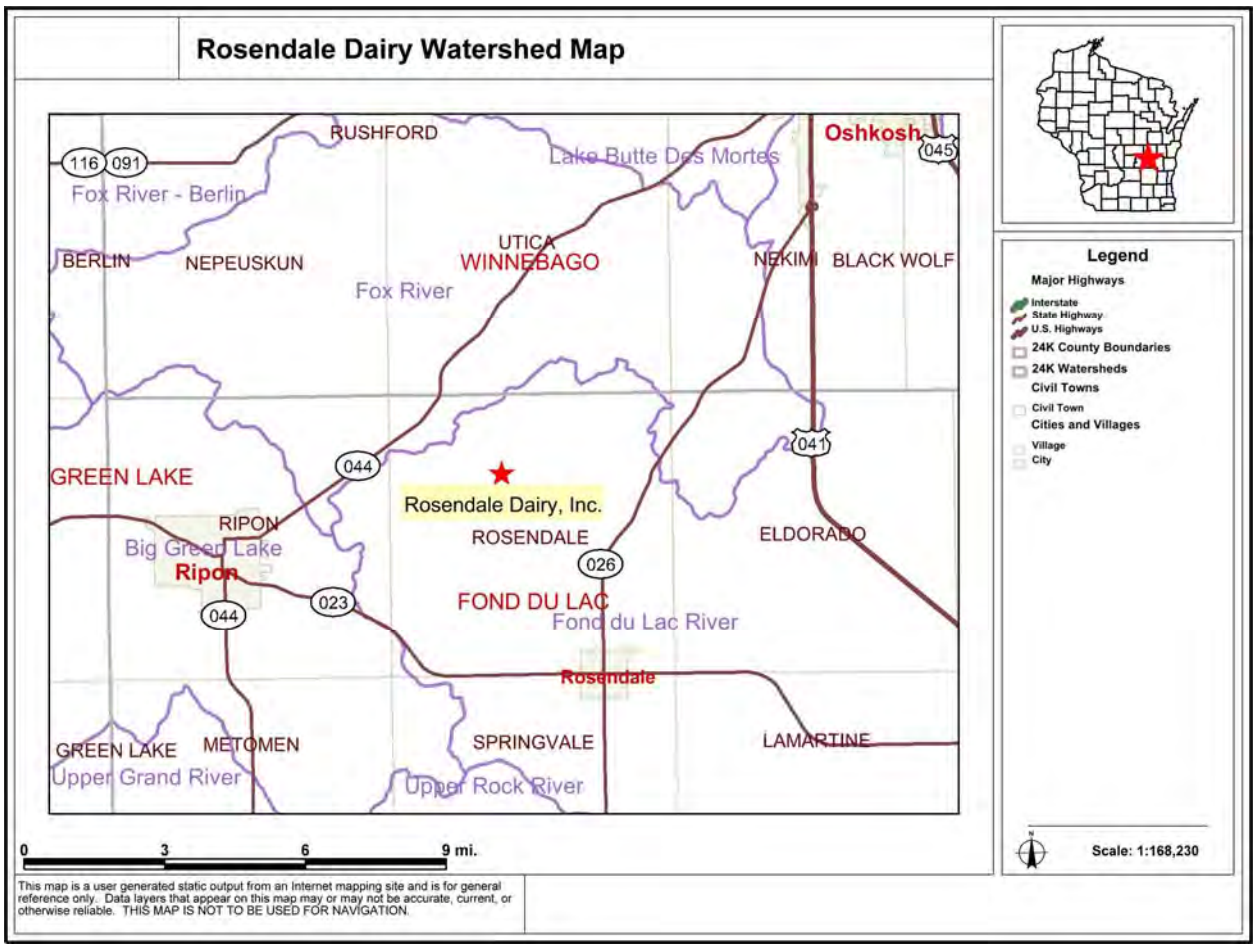


Figure 9 - Watersheds

Agriculture is the predominant land use in the watershed, comprising almost 62% of the acreage in the Fond du Lac River Watershed. Dairy farming, grain farming, and the production of crops for canning dominate the agricultural land use.

III.A.1.b. Topography

The Rosendale Dairy and lands designated for land spreading are located in an area that can generally described as low gently rolling hills with large wetland complexes interspersed . The Rosendale Dairy facility site is primarily located in upland, though the northeast corner of the property is wetland. To the northwest and east, off of the property, are large wetland complexes.

III.A.1.c. Soils

The climate of Fond du Lac County is of the cool, moist-subhumid , continental type characteristic of the north-central United States. The soils formed through the action of climate and living organisms upon the parent material. Most of the soils were formed in glacial till. In many areas a layer of loess up to four feet thick has been deposited over the till.

Soils in the project area are primarily of the Lomira-Virgil association, Houghton–Palms association, and to a lesser extent, the Plano-Mendota association. (see Figures 10a and 10b, below)

<u>Lomira-Virgil</u>

These are well drained and somewhat poorly drained, silty, moderately permeable soils, a part of a ground moraine underlain by calcareous loam till. Soils types found in these areas include; Lomira (60%), Virgil (15%) and Pella (5%). The remaining 20% is made up of Palms, Rollin and Houghton. This association is mainly in the western part of the county. Soils in this association are mainly used for crops. Limitations are slight to moderate. Wetness is the main limitation for Virgil and Pella soils.

<u>Houghton-Palms</u>

These are organic soils over calcareous outwash, till or lacustrine deposits. This association occupies large, nearly level depressions and wetland areas throughout Fond du Lac County. The soils found in this association were formed in fibrous plant remains and consist of; Houghton (45%), Palms (35%), and the remaining 20% are Rollin, Carbondale, Adrian and Ogden. They are poorly drained and subject to ponding. Wetness is the main limitation.

<u>Plano-Mendota</u>

These are well-drained, silty, moderately permeable soils underlain by calcareous loam till. This association is on ground moraine characterized by gently sloping low ridges and knobs, and nearly level uplands and depressions. Almost all of this association is used for crops. It is made up of Plano (40%), Mendota (35%), with the remaining 25% consisting of Elburn and Pella. Limitations are slight to moderate for farming. Erosion is a concern in sloping areas if row crops are grown.

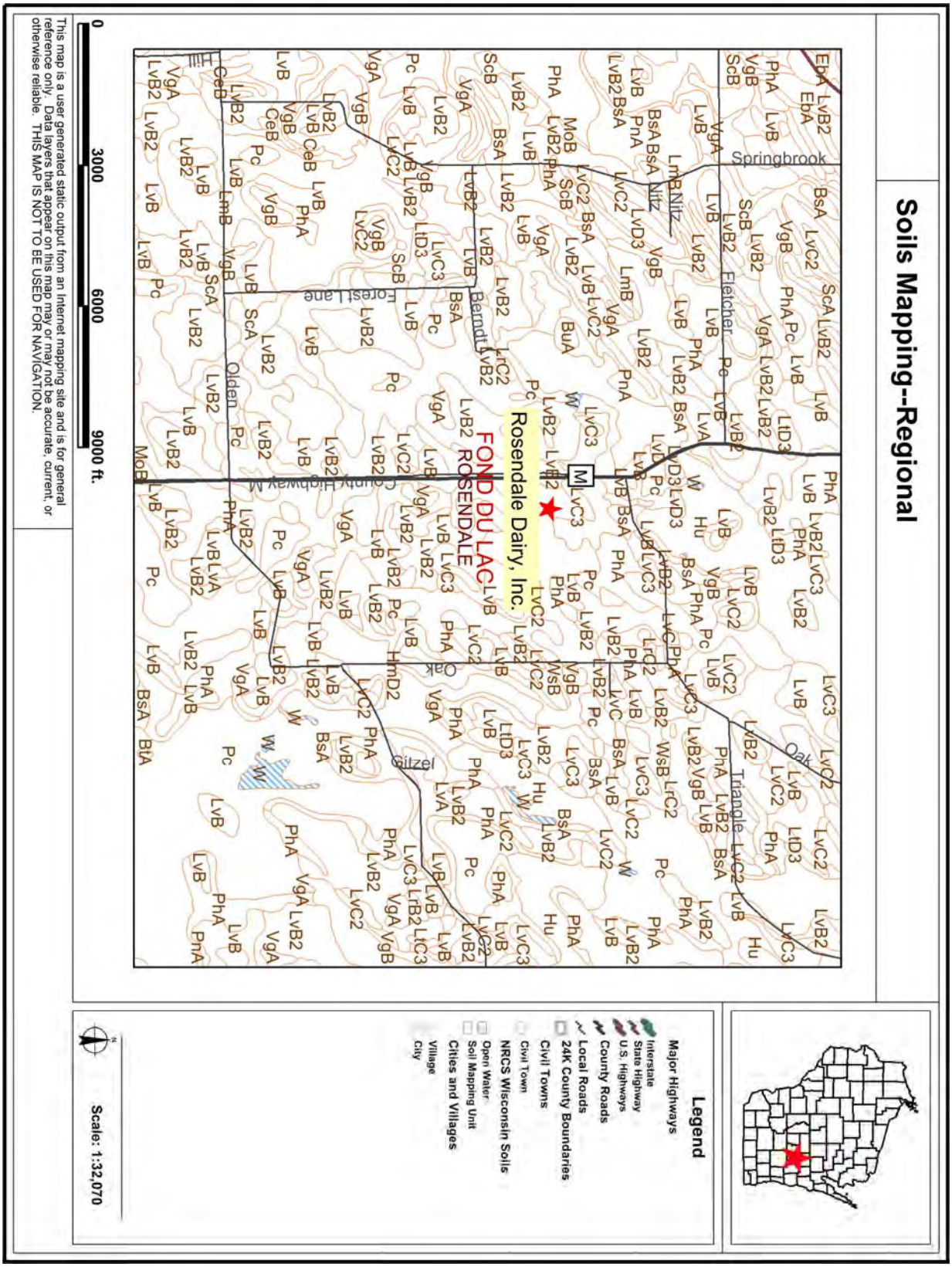


Figure 10a - Regional Soils

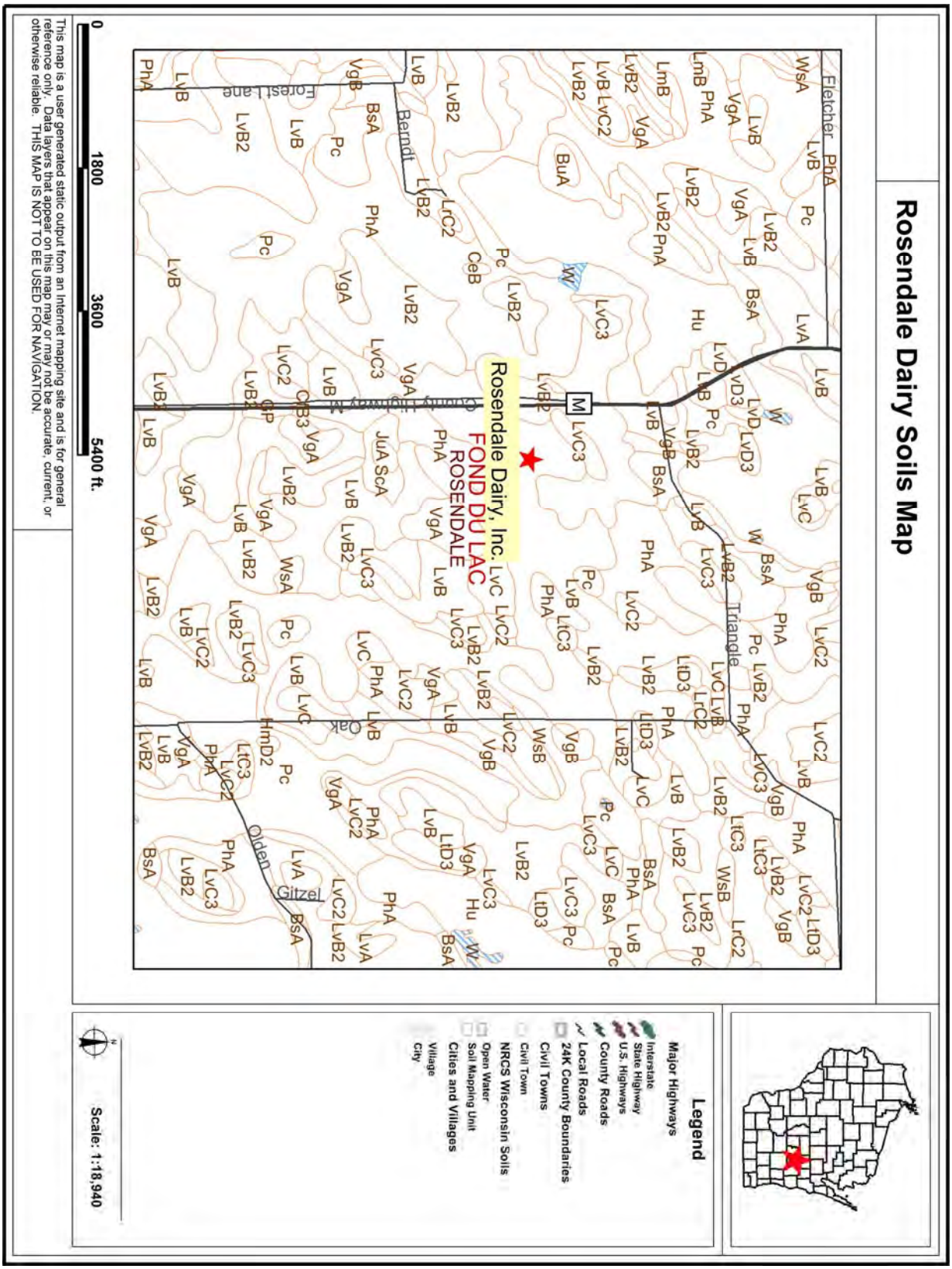


Figure 10b - Rosendale Dairy Soils

III.A.1.d. Geology

The generalized geology of western Fond du Lac County (see Figure 11, below), from the ground surface down consists of glacially deposited silt, sand and gravel, Ordovician age Galena-Plateville dolomite (known as the Sinnipee group), St. Peter sandstone, Prairie du Chien dolomite, Cambrian age sandstone underlain by Precambrian age crystalline bedrock (granite and quartzite). If the overlying bedrock could be removed, the Precambrian crystalline bedrock surface would resemble hills and valleys with several hundred feet of relief in some areas. Cambrian and Ordovician sedimentary bedrock was deposited on top of this irregular surface, filling in the valleys. In western Fond du Lac County there are places where the granite and quartzite "peaks" are so high they pierce the younger sedimentary bedrock. In these areas the younger Galena – Plateville dolomites sit directly on top of the Precambrian bedrock.

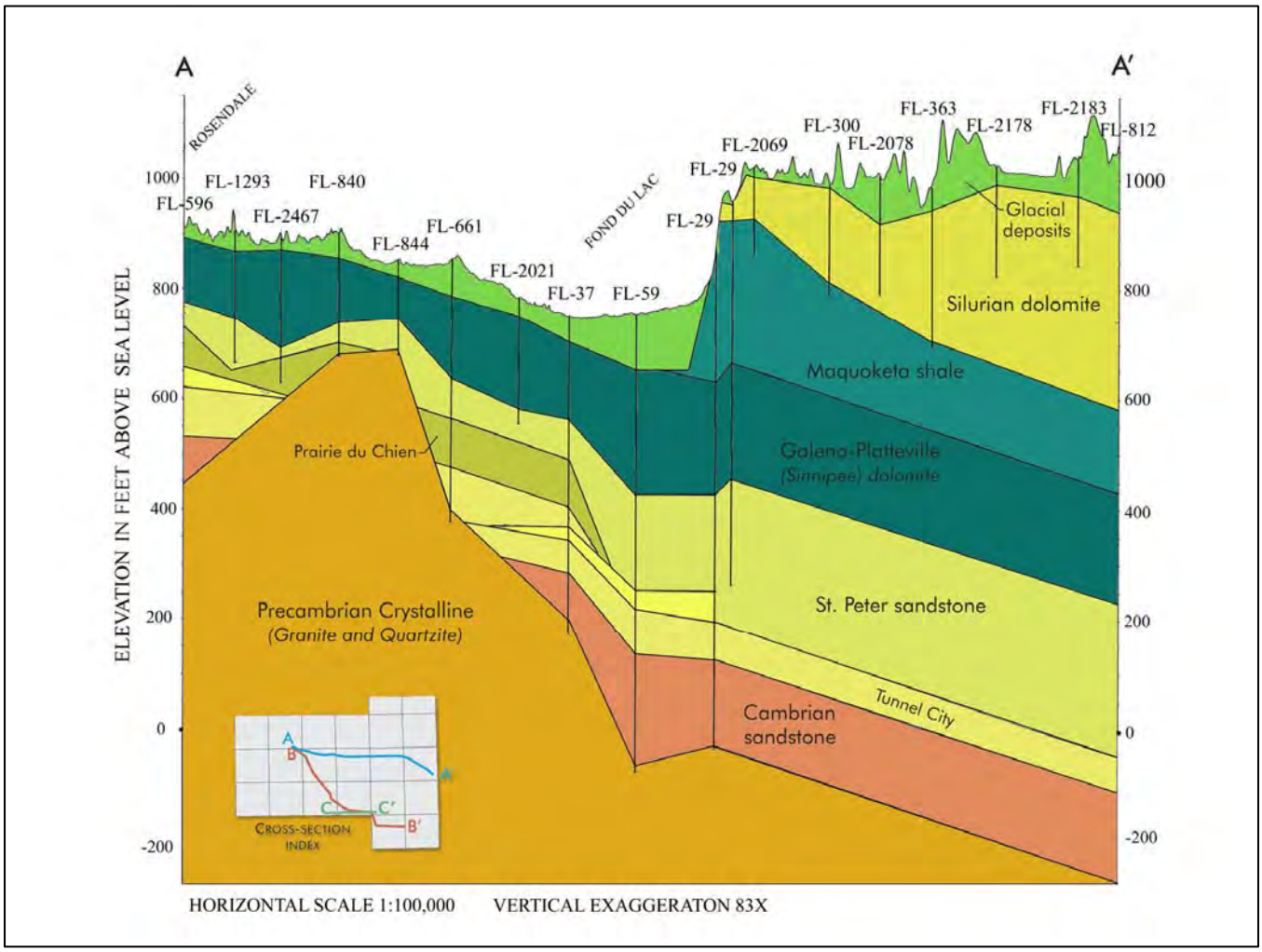


Figure 11 Generalized Geology of Western Fond du Lac County

The Cambrian, and Ordovician sandstones and dolomites were laid down as near shore and shallow sea bottom deposits between 500 and 400 million years ago as an ancient sea advanced and retreated over what is now Wisconsin. Later, when the sea receded, the older dolomite formation, the Prairie du Chien was exposed to the elements, eroded and in some places removed

completely. On top of this irregular surface the St. Peter sandstone was deposited, also in a marine environment. The St. Peter is capped by the fairly even Sinnipee group (Galena-Platteville) consisting of dolomites and shales. The Maquoketa shale and Silurian dolomite covered the entire county at one time but are now only present east of the topographic east of Fond du Lac known as the Niagara Escarpment.

Glaciers moved back and forth across Wisconsin depositing unconsolidated silt, sand and gravel. These sediments are present in most of Fond du Lac County and are between 10 and 70 feet thick west of the Niagara Escarpment.

Dolomites and other carbonate rocks can form karst terrain when fractures and bedding planes are enlarged due to dissolution as water moves through these secondary flow features. The result can be sinkholes, caves, and enlarged surface fractures that are direct conduits to groundwater. In Fond du Lac County, these features are generally not prominent because the glacial sediments cover the carbonate rocks. Contaminants can move through the overlying glacial material to groundwater through infiltration, direct conduits such as unused wells, or through improper well drilling techniques. The contaminated groundwater can move quickly through fractures and along bedding planes within the Galena – Platteville dolomite.

Character of the formations (from the bottom to the ground surface):

Precambrian

Underlying the sedimentary bedrock of Fond du Lac County are crystalline quartzite, granite, schist and gneiss estimated to be several thousand feet thick. The surface of the Precambrian rocks is uneven, with a relief of several hundred feet in the county. The rocks of Precambrian age do not yield water and form an impermeable base below the sedimentary rocks.

Cambrian

Sandstones of Cambrian age filled the depressions and covered most of the high areas on the Precambrian surface. The thickness of the sandstones varies from 0 to 515 because of the irregular surface of the Precambrian rocks. Of the different sandstone formations that make up the Cambrian age deposits, the Galesville is described as the most productive water-bearing unit. Most of the sandstones of Cambrian age are described as dolomitic and silty which may cause variable permeability.

Prairie du Chien Group

The Prairie du Chien is a cherty dolomite with thin beds of shale. The dolomite is gray to white, hard and dense. The thickness of this unit is very irregular due to erosion. These rocks have a low permeability but can yield sufficient water for private wells from fractures and bedding planes common in the formation.

St. Peter Sandstone

The St. Peter sandstone is a fine to medium grained consolidated sandstone that is dolomitic in some places. There are thin shale beds present in some places. It was deposited on the eroded surface of the Prairie du Chien so has an irregular lower surface. The upper surface is relatively even. In places the St. Peter is missing. Most wells that draw water from the St. Peter also draw from either the upper or lower carbonate rocks. Mineralized zones within the St. Peter can be a source of arsenic if wells are not constructed properly.

Galena – Platteville Formations

They consist of light – gray to medium bluish-gray massive dolomite with bedding planes and fractures. These formations yield small to moderate amounts of water. Where the St. Peter is absent, the Galena- Platteville is the main source of water for shallow domestic wells. Karst terrain, which consists of sinkholes and caves, is not documented in the Galena – Platteville formations. It is important to note that because groundwater flows in fractures and along bedding planes (known as secondary flow) there is little attenuation of contaminants that have infiltrated through over lying soils and unconsolidated materials or been introduced through direct conduits.

Quaternary Deposits

The glacially deposited sediments consist of stratified clay, sand, and gravel and unstratified till (unsorted sediments). Because these sediments are not thick in western Fond du Lac County (20 – 70 feet) they don't provide adequate amounts of water for wells.

III.A.1.e. Hydrography & surface water quality & quantity

Background information

In order to understand the description of the water resources associated with the area around Rosendale Dairy, it is important to understand the terminology used to describe the landscape draining to lakes, rivers, and streams. It is equally important to understand how water quality and habitat are impacted by the materials that wash into these water bodies.

The term "watershed" is used to define an area of land draining to a specific body of water. Every water body has a watershed that drains water to it. Even the smallest stream has its own watershed. The watershed of a river is composed of multiple smaller sub-watersheds. In Wisconsin we call large watersheds "basins". The Upper Fox River Basin has 15 watersheds, composed of a number of smaller sub-watersheds.

For example, the small sub-watersheds of Parsons Creek and Campground Creek, are part of the Fond du Lac River Watershed. The Fond du Lac River Watershed is one of the 15 watersheds of the Upper Fox River Basin.

Water quality and habitat degradation can come from a variety of sources, but rural and urban runoff pollution are the largest sources of water pollution in Wisconsin. Runoff pollution comes

from water running over the land surface picking up and carrying along suspended and dissolved materials. Typical rural runoff includes eroded soil particles, pesticides, fertilizers containing phosphorus and nitrogen, manure, decaying plant material, and bacteria. Urban runoff pollution commonly contains heavy metals, herbicides, fertilizers, fecal matter from birds and pets, bacteria, grass clippings, and soil particles from eroded ditches and construction sites.

Phosphorus and soil particles are the two constituents of runoff pollution that pose the greatest threat to the State's water resources. Phosphorus, a plant nutrient, can be delivered to water bodies in several forms. It can be dissolved in runoff water, attached to soil particles, or as part of the cell structure of plant material. Phosphorus stimulates the growth of algae and other aquatic plants. Some algae are normal and healthy for lakes and streams. When a water body becomes overly phosphorus enriched, algae can cloud the water in dense blooms, reducing light penetration so that rooted aquatic plants, which provide good fish habitat, struggle to survive.

The dense algae blooms seen on Lake Winnebago are the result of excessive nutrient enrichment. Some blooms are harmless green algae blooms but sometimes the excessive nutrients in the lake stimulate a blue-green algae (cyanobacteria) bloom. Blue-green algae can produce a variety of different toxins which can make the water unsafe for humans, pets, and wildlife. More information on blue-green algae can be found at:
http://dnr.wi.gov/lakes/bluegreenalgae/

In streams, algae can from dense blooms or form mats on the stream bottom, making it unsuitable for many organisms.

Aquatic organisms depend on oxygen dissolved in the water the same way humans depend on oxygen in the air. Algae and rooted aquatic plants produce oxygen during the day. However, at night they consume oxygen. Waters with abundant algae or rooted plant growth have high concentrations of dissolved oxygen during the day, but at night oxygen levels decrease as the plants respire. It is common for dissolved oxygen concentrations to severely decline at night, with the lowest concentrations, often approaching zero, just before dawn.

When algae and other plants die, bacteria and fungi populations increase to decompose the mass of nutrient-rich cells. The flourishing populations of bacteria and fungi consume oxygen and cause dissolved oxygen depletion. Each organism has its own tolerance for low oxygen. If dissolved oxygen concentrations get too low, aquatic organisms begin to die if they cannot escape the oxygen depleted area.

Cold water streams typically do not have dissolved oxygen problems. The amount of dissolved oxygen the water can hold is strongly controlled by water temperature. Cold water can hold much more oxygen than warm water.

The two constituents of greatest concern from manure runoff are ammonia and Biochemical Oxygen Demand (BOD) which is a measure of the level of oxygen demanding materials in water. Ammonia is a form of nitrogen that is toxic to aquatic organisms. The level of toxicity is determined by the ammonia concentration in the water, water temperature, and the acidity of the water. Ammonia is more toxic in warm water with low acidity.

BOD is affected by the amount of organic matter available for decomposition by bacteria and fungi and by the presence of dissolved chemicals which react with and consume oxygen from the water. It is typically measured by determining the drop in dissolved oxygen in a water sample held in the dark for five days at 20 C degrees, which is 68 F degrees.

Ammonia toxicity and oxygen depletion typically associated with manure spills is lethal to fish, aquatic insects, snails, crayfish, mussels, and certain life stages of amphibians.

Soil particles carried and deposited by water is commonly called sediment. Heavy sediment loads harm streams by covering the natural stream bottom, eliminating deep holes used by fish for cover and as a refuge during low flow conditions. Sediment can bury high quality habitat such as gravel bars and cobble, which are home to many aquatic insects and serve as spawning areas for fish. Heavy sediment deposits can reduce channel depth forcing the stream to become wider in order to convey the same volume of water. This exposes more of the water to more sunlight which can increase water temperature and decrease dissolved oxygen.

Water Resources - Town of Rosendale

Rosendale Dairy is located in the Town of Rosendale which is in the northwestern portion of Fond du Lac County. Most of the Town, including the site of the dairy is located in the Fond du Lac River Watershed of the Upper Fox River Basin. More specifically, the facility is located in the headwaters of the West Branch of the Fond du Lac River. The Fond du Lac River discharges into Lake Winnebago which ultimately discharges to Lake Michigan at the City of Green Bay, via the Lower Fox River (see Figure 12, below).

The southwestern corner of the Town includes a small portion of the Big Green Lake Watershed. Big Green Lake, in turn, discharges through the Puchyan River to the Upper Fox River.

The northwestern corner of the town lies in the Fox River-Rush Lake watershed and is tributary to Rush Lake. Rush Lake discharges to the Upper Fox River via Waukau Creek. A small portion of the northeastern corner of the town drains to Eightmile Creek, which is also part of the Fox River-Rush Lake watershed. Eightmile Creek discharges directly to Waukau Creek several miles downstream from the outlet of Rush Lake.

The water resources of the Town of Rosendale are typically low gradient intermittent and permanent streams, often in association with wetlands and agricultural fields. Many of these stream channels have been ditched and straightened in an effort to improve agricultural suitability of the surrounding landscape. This level of disturbance severely degrades aquatic habitat. These streams provide a delivery network for transporting rural runoff pollution to the larger water bodies in the watershed.

During dry periods many of these streams have little or no flow, or may dry up. Aquatic organisms in these water bodies are generally limited to insects or forage fishes tolerant of warm water and low dissolved oxygen concentrations. Water quality is generally poor due to nutrient enrichment and sediment deposition from runoff pollution.

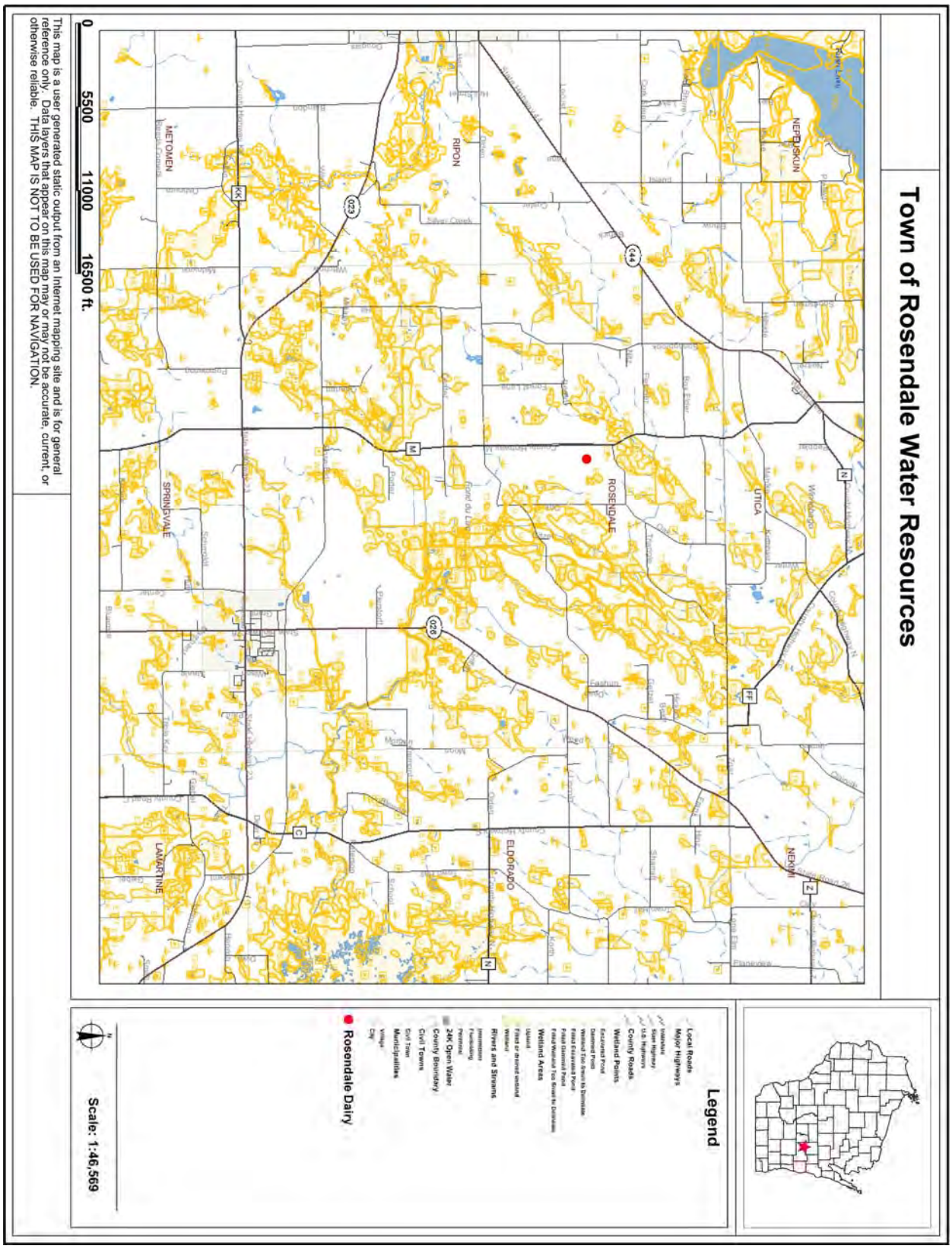


Figure 12 - Town of Rosendale Water Resources

The lower reaches of an unnamed creek, locally known as Rosendale Creek, located in the southeastern corner of the town, has somewhat better water quality due to more gradient, which reduces sediment deposition, and from the presence of springs, which cools the water allowing it to hold more dissolved oxygen.

Water Resources - Regional

As already noted, Rosendale Dairy is located in the northwestern portion of Fond du Lac County, not far from Green Lake County and Winnebago County. The Green Lake County line lies about eight miles to the west of the facility and the Winnebago County line lies about two miles to the north. The Dodge County line lies 16 miles to the south. There are four watersheds in two different basins in the vicinity of the Dairy. Three of the watersheds are in the Upper Fox River Basin and one watershed is in the Upper Rock River Basin. See Figure 9 on page III-1.

Upper Fox River Basin

The Upper Fox River Basin is located in east-central Wisconsin. The basin is more than 2000 square miles in size and it comprises all waters draining to Lake Winnebago except those of the Wolf River Basin. The Upper Fox River Basin is composed of 15 watersheds. The water resources of the basin are diverse and range from high quality cold water trout streams to nutrient enriched, warm water streams which have been ditched and straighten and are only capable of supporting the most tolerant of insects and/or forage fish.

The Upper Fox River originates in southern Green Lake County and flows southwesterly toward the City of Portage. At Portage the Upper Fox River and Wisconsin River come to within two miles of each other. The two rivers are separated by the Sub-Continental Divide. The waters of the Upper Fox River Basin flow into the Great Lakes and ultimately into the Atlantic Ocean through the Saint Lawrence River. The Wisconsin River is part of the Mississippi River Basin which drains to the Gulf of Mexico.

Fond du Lac River Watershed

Lower Fond du Lac River

The Fond du Lac River has an east and west branch which join together in the City of Fond du Lac about one and a half miles from its mouth at Lake Winnebago. The West Branch is the longer of the two branches and it has a larger watershed.

The lower 1.5 miles of the Fond du Lac River, from the mouth upstream to the confluence of the east and west branches, is in an urban setting. It has had many modifications and a corresponding decrease of habitat. This stretch the river is subjected to heavy sediment and nutrient loads from upstream rural runoff pollution, urban runoff pollution, and historical industrial discharges, resulting in poor water quality.

This portion of the Fond du Lac River is on Wisconsin's list of Impaired Waters due to contaminated sediment and toxicity for certain aquatic organisms. Wisconsin is required under

Section 303(d) of Federal Clean Water Act to identify impaired waters. Impaired Waters are those that do not meet water quality standards or are not supporting their biological or recreational potential. The list of Impaired Waters is submitted to the US Environmental Protection Agency every two years.

Rough fish and some warm water sport fish, such as largemouth bass and panfish, reside in the lower river. Spring runs of suckers and northern pike also pass through this reach as they move upstream into the East and West branches to spawn.

East Branch Fond du Lac River

The East Branch of the Fond du Lac River has poor water quality from urban and rural runoff pollution, yet it does support some warm water sport fish. The lower two miles of the East Branch are in the urbanized landscape of the city. Many of the tributary streams have poor water quality and very low flows during the summer, offering little habitat for aquatic organisms.

The exceptions to this are two streams with good water quality and quantity; Parsons Creek and Campground Creek. Both streams have significant cold water inputs from springs and diffuse groundwater flow entering through the sides and bottom of the stream channels.

Parson's Creek is designated as a trout stream and it once supported a healthy, native brook trout population. However, due to habitat degradation and runoff pollution it is not meeting its full potential and is on the state's Impaired Waters list. A community-based project to restore water quality and in-stream habitat is currently under way.

Campground Creek, according to historical accounts, also supported native brook trout. Currently it only supports forage fish due to degraded habitat and elevated water temperature. Since it is not meeting its biological potential it is on the Impaired Waters list. No restoration projects have yet been initiated for Campground Creek.

Sevenmile Creek is also a tributary to the East Branch. It supports limited forage fish due to habitat degradation and runoff pollution. It is on the Impaired Waters list, but no restoration projects specific to the creek have yet been initiated.

West Branch Fond du Lac River

Rosendale Dairy is located in the headwaters of the West Branch of the Fond du Lac River. From the headwaters down to Eldorado Marsh, the landscape is fairly flat with numerous small wetlands along the river and its tributary streams. Many of the tributaries are intermittent and only flow during periods of high runoff. Some have been ditched and straightened in an effort to improve agricultural suitability of the surrounding landscape. This level of disturbance severely degrades aquatic habitat. These streams provide a delivery network for transporting runoff pollution to the larger water bodies in the watershed.

Aquatic organisms in these water bodies are generally limited to insects or forage fishes tolerant of warm water and low dissolved oxygen concentrations. Water quality is generally poor due to nutrient enrichment and sediment deposition from runoff pollution.

While the West Branch is identified as a warm water sport fishery, the upper portions only support forage fish. Yet, there is a small chance that in some wet springs, northern pike and suckers might manage to get past the dam at the Eldorado Marsh and migrate into the wetlands of the upper portions of West Branch watershed.

Rosendale Creek discharges to the West Branch above Eldorado Marsh. It has somewhat better water quality than other streams in the area due to more gradient, which reduces sediment deposition, and the presence of springs, which cools the water, allowing it to hold more dissolved oxygen.

The West Branch of the Fond du Lac River flows through Eldorado Marsh, a State Wildlife area. Here, the river is impounded behind a dam to maintain broad area of wetlands for wildlife conservation and public recreation.

The portion of the West Branch below Eldorado Marsh has a steeper gradient and better habitat conditions for warm water sport fish. However, the water quality remains poor due to runoff pollution. The lowest portion of the West Branch is in the City of Fond du Lac where urban runoff pollution also contributes to poor water quality.

Lake Winnebago Subwatershed

The Fond du Lac River watershed was defined to also include all of the streams that drain directly to Lake Winnebago between the City of Fond du Lac and the City of Oshkosh. Most of these streams support warm water sport fish in their lower portions near Lake Winnebago, but quickly become intermittent a short distance upstream. They often support spring runs of northern pike and suckers.

Three of the larger streams in this portion of the sub-watershed are Van Dyne Creek, Mosher Creek, and Anderson Creek, All three are on Wisconsin's list of Impaired Waters due to degraded habitat from excessive sediment deposition originating from runoff pollution.

Rush Lake-Fox River Watershed

Just a few miles to the north, northwest, and northeast of Rosendale Dairy is the Rush Lake-Upper Fox River watershed. Rush Lake is a 3,070 acre deep water marsh. Most of the lake is only a couple feet deep. While it supports rough fish and sometimes perch and northern pike, they are often subjected winterkill conditions when snow and ice suppress light penetration to the point where algae and other aquatic plants fail to produce sufficient dissolved oxygen to sustain them. Rush Lake is well known for its waterfowl use, particularly since the 2006-2007 drawdown, which improved habitat conditions.

The major streams of the watershed are Waukau Creek, which drains from Rush Lake to the Upper Fox River, and Eightmile Creek which drains into Waukau Creek. Both of these streams support warm water sport fish and forage fish. A ten-mile reach of the Upper Fox River is also included in this watershed. It supports a wide variety of warm water sport fish.

Big Green Lake Watershed

Eleven miles to the east of Rosendale Dairy is 7,346 acre Big Green Lake, which is the state's deepest natural lake at 236 feet. Big Green Lake, because of its depth and good water quality, is considered to have a two-story fishery. Its upper waters support a good warm water fishery and its deeper, cold waters support a naturally reproducing population of cisco and a lake trout fishery sustained through stocking.

Big Green Lake is on the states list of Impaired Waters due to the historical presence of PCB's in fish flesh. PCB's were banned in 1977. Currently PCBs have declined to the point where a specific fish consumption advisory is no longer warranted for Big Green Lake. Removing the lake from the Impaired Waters List will be considered when the list is updated in 2010.

Four tributaries to Big Green Lake are designated as cold water trout streams; White Creek, Dakin Creek, Assemble Creek, and Silver Creek. Silver Creek is not meeting its potential as a trout stream due to urban and rural runoff pollution reducing water quality and increasing temperatures to levels that are marginal for trout survival. Therefore, Silver Creek is on the state's list of Impaired Waters.

Three other creeks draining to Big Green Lake are also on the list of Impaired Waters due to degraded habitat from sediment and/or phosphorus coming from runoff pollution. They are Hill Creek, Roy Creek, and Wuerches Creek.

Lake Winnebago

Lake Winnebago is the state's largest lake at 137,708 acres. It supports a diverse warm water fishery, including North America's largest self-sustaining population of lake sturgeon. Walleye, large mouth and small mouth bass, yellow perch, and white bass are popular game fish. The lakes of the Lake Winnebago system, which also includes lakes Poygan, Winneconne, and Butte des Morts, draws anglers from across the Midwest.

Even though the lake supports a good fishery, it still has severe algae blooms resulting from nutrient enrichment. Lake Winnebago is on Wisconsin's list of Impaired Waters due to contaminants in fish, degraded habitat, and nutrient enrichment.

Upper Rock River Basin

The entire Rock River Basin is extremely large, spanning significant portions of Wisconsin and Illinois. It extends from southern Fond du Lac County southward to the Rock River's confluence with the Mississippi River at Rock Island Illinois. In Wisconsin, the 3600 square mile basin is split into two management units; the Upper Rock River Basin and Lower Rock River Basin. The

split is at Fort Atkinson. Land draining to the Rock River north of this point is in the Upper Rock River Basin while land draining into the river south of this point is in the Lower Rock Basin. The Rock River and its branches in Wisconsin are on the Impaired Waters List for degraded habitat and poor water quality from urban and rural runoff pollution of phosphorus and sediment. A project to eliminate the impairments is currently being developed.

Upper Rock River Watershed

The Upper Rock River Watershed is the northern-most watershed of the Upper Rock River Basin. It extends from southern Fond du Lac County to the outlet of Horicon Marsh. Rosendale Dairy is located six miles north of the northern-most extent of the Upper Rock River Watershed. The West Branch and South Branch of the Rock River are the two major streams in this watershed. Both have degraded habitat and are highly nutrient enriched from rural runoff pollution. The City of Waupun and the Village of Brandon discharge treated wastewater to the main branches of the river. Alto Dairy is the only industry discharging treated wastewater to the river in this watershed.

The watershed has numerous small unnamed drainages flowing through agricultural fields and wetlands. Many of these stream channels have been ditched and straightened in an effort to improve agricultural suitability of the surrounding landscape. This level of disturbance severely degrades aquatic habitat. These channels provide a delivery network for transporting runoff pollution to the larger water bodies in the watershed. During dry periods many of these water bodies have little or no flow or may dry up. Aquatic organisms in these water bodies are generally limited to insects or forage fishes tolerant of warm water and low dissolved oxygen concentrations.

Horicon Marsh, lies at the bottom of the watershed. It is owned and managed by the US Fish and Wildlife Service and the Wisconsin Department of Natural Resources. The Marsh is internationally renowned for its extensive wetlands and heavy waterfowl use. It is the largest cattail marsh in North America. Water quality and habitat in the marsh is severely impacted by high phosphorus and sediment loads delivered by the South and West Branches of the Rock River.

Neenah, Menasha, Appleton and Oshkosh draw drinking water from Lake Winnebago. Table 1, below, is a summary of information in the Source Water Assessment reports for those communities. Drinking water from Lake Winnebago has a relatively high susceptibility to contamination and is significantly impacted by land use in the source water area. Potential contaminant sources in the eastern and southern portions of the source water area include stormwater and agricultural runoff. The turbid nature of Lake Winnebago of Lake Winnebago and the source water area’s high concentrations of urbanized and agricultural land, make these communities source water particularly susceptible to microbial, volatile organic and synthetic organic contamination. Recently, blue-green algae blooms have been a concern in Lake Winnebago, however, studies have shown that blue-green algal toxins are removed by the local utilities' routine water treatment processes.

Animal feeding operations are listed as a potential source of drinking water contamination for these systems: Animal feeding operations generally congregate animals, feed, manure, dead animals, and production operations on a relatively small area of land. Feed is brought to the animals rather than the animals grazing or otherwise seeking feed in pastures. Animal waste and wastewater can enter water bodies from spills or breaks of waste storage structures (due to accidents or excessive rain), and manure spreading practices. Animal feeding operations have the potential to contribute pollutants such as inorganic, synthetic organic and microbial contaminants as well as hormones and antibiotics to the source water.

Table 1- Source Water Assessment Summary

City	Population	Water Demand (mgd)	Treatment
Appleton (with Grand Chute and Waverly)	96,825	9 to 20	Lime softening, granular activated carbon contractors, ultrafiltration and chlorination.
Oshkosh	63,000	7.5	Flocculation, sedimentation, filtration, ozonation, granular activated carbon filtration, chlorination and fluoridation.
Neenah	24,500	5 to 9	Flocculation, sedimentation, filtration and chlorination.
Menasha	23,275	3 to 8	Aeration, flocculation, sedimentation, filtration and chlorination.

III.A.1.f. Groundwater quantity & quality

Regional Groundwater Flow and Quantity

Groundwater flow in western Fond du Lac County is east and southeast toward Lake Winnebago in both the shallow and deeper aquifers. There are strong downward gradients between the Galena-Platteville and St. Peter Sandstone units. These downward gradients are a concern in western Fond du Lac County because contamination can be drawn quickly into the lower sandstone from fractures and bedding planes in the upper, less porous dolomite. Many wells in western Fond du Lac County draw water from both the Sinnipee Group dolomite and the St. Peter Sandstone. Shallow wells are cased through part of the carbonate bedrock with an open borehole that extends through the rest of the dolomite and into the more permeable St. Peter sandstone. WDNR recommends that wells be cased down through the Sinnipee dolomite to prevent drawing surface contamination into the St. Peter Sandstone.

Figure 13, below, shows generalized groundwater flow for Fond du Lac County. The site is located just east of a regional groundwater divide. Both shallow and deeper flow is to the east with deeper flow moving more to the southeast due to the cone of depression around the City of Fond Du Lac well field. Flow west of the divide is to the northwest.

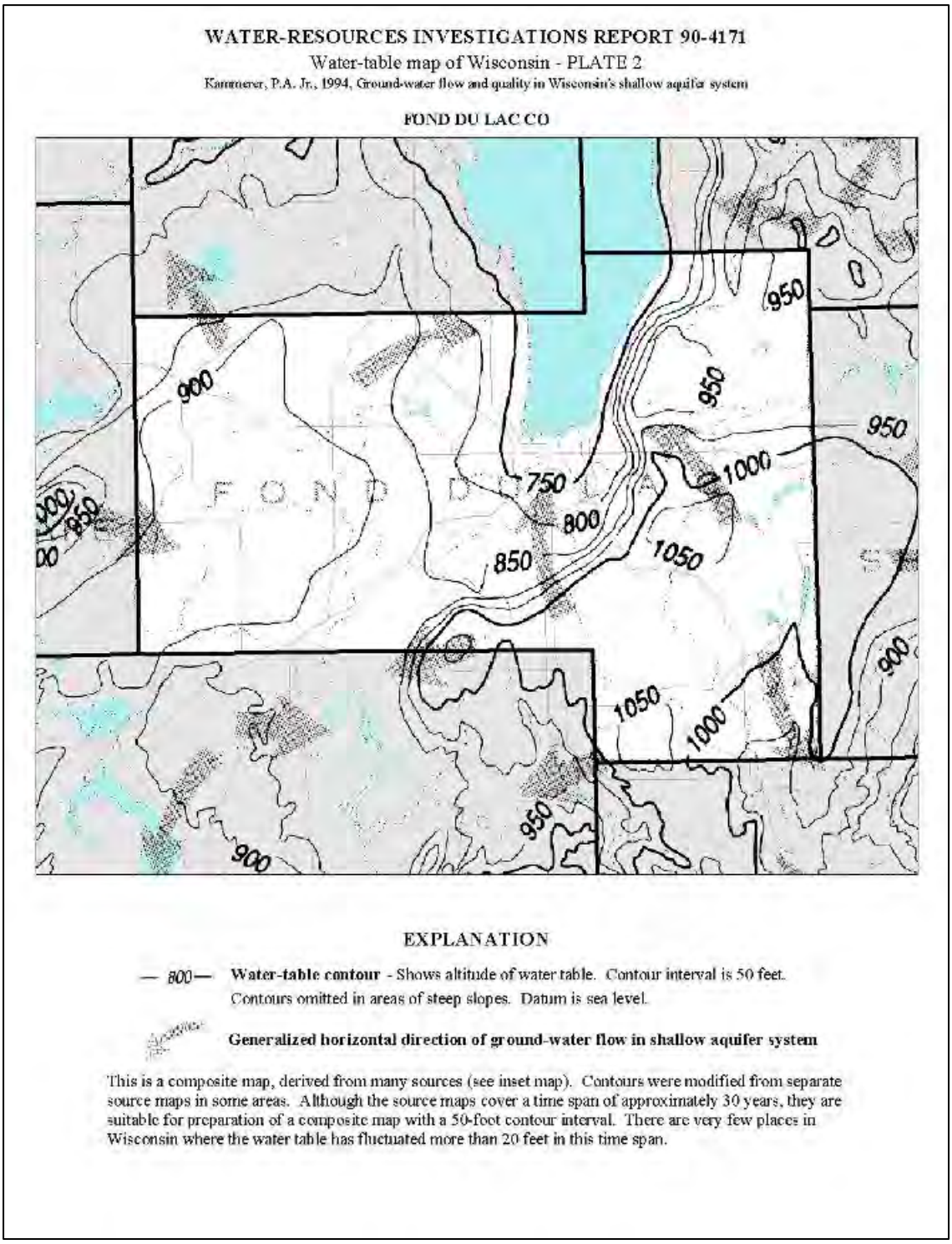


Figure 13 - Generalized Groundwater Flow in Fond du Lac County

Regional Groundwater Quality

Nitrate contamination in the area is localized. Private well samples show that 92% of 368 private well samples collected in Fond du Lac County from 1990-2006 met the health-based drinking water limit for nitrate-nitrogen. Figure 14, below, shows nitrate sample locations and nitrate-nitrogen concentrations in Fond du Lac County.

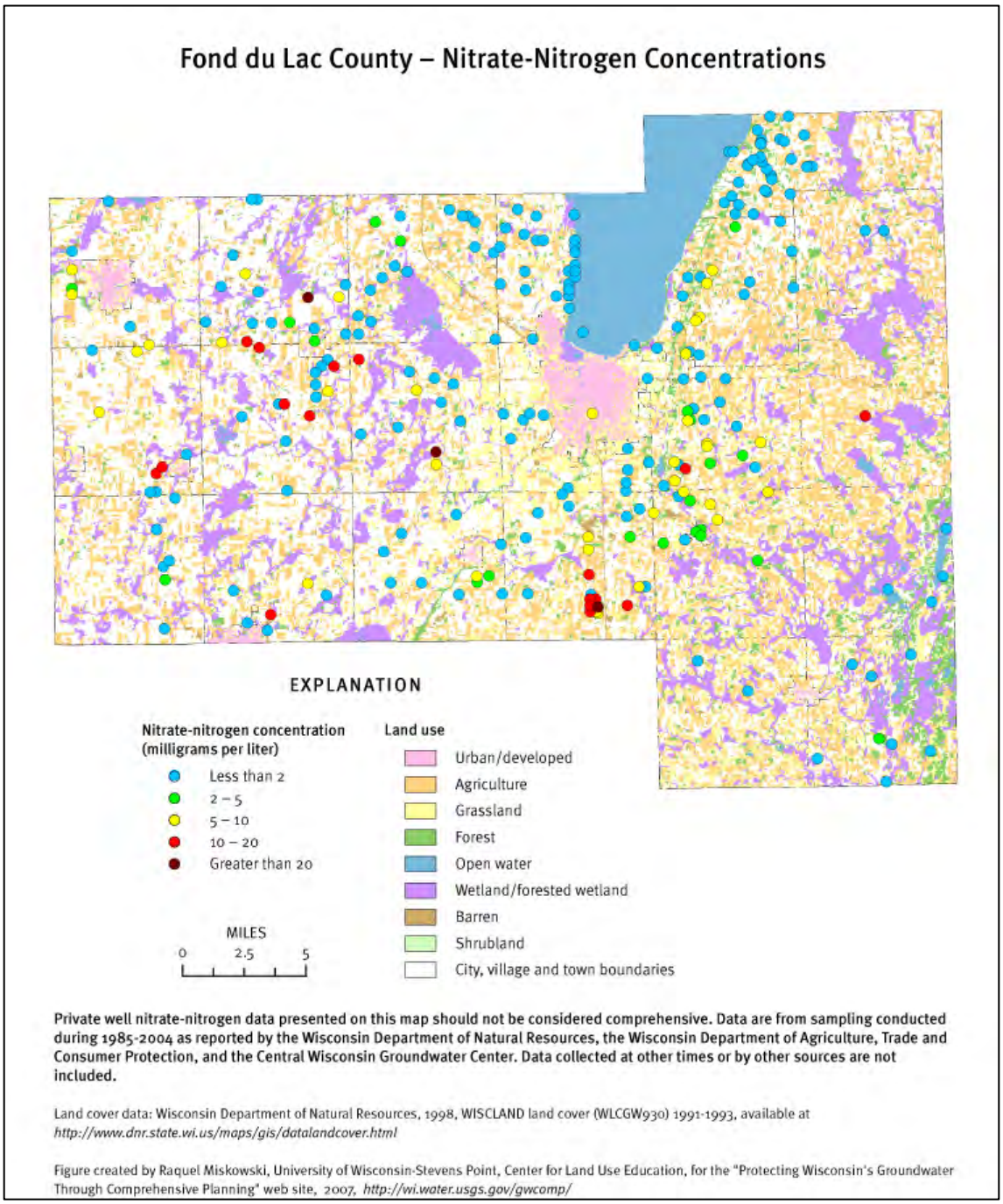


Figure 14 - Nitrate-Nitrogen Concentrations in Fond du Lac County

Naturally occurring arsenic is an issue in Fond du Lac County. While water quality has not been tested in the area near the dairy, there is arsenic contamination north, south and west of the site. The St Peter sandstone has mineralized horizons in this area. There is a potential for release of arsenic from the mineralized zones by oxidation. Figure 15, below, shows wells that have been tested for arsenic.

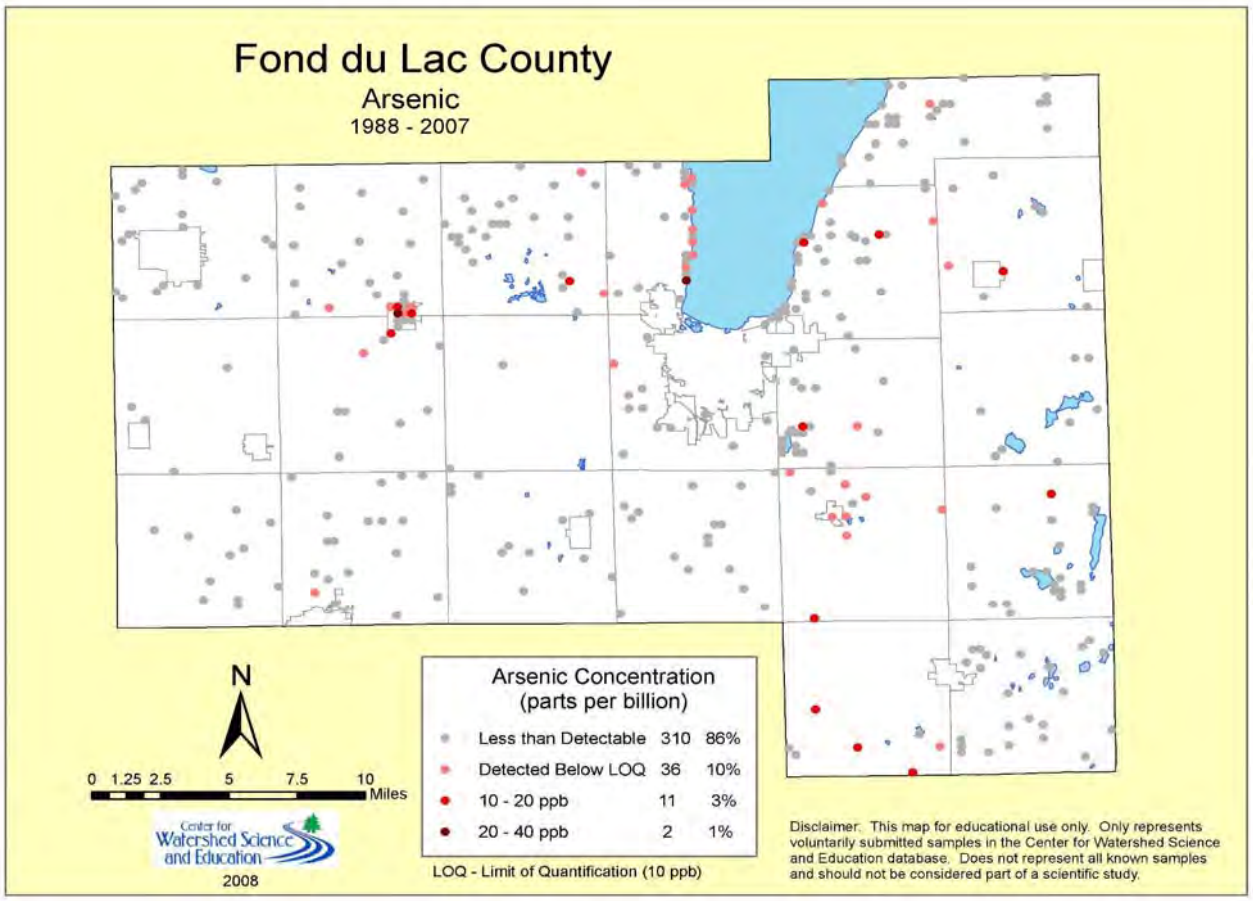


Figure 15 - Arsenic in Fond du Lac County Wells

Groundwater Vulnerability

"Susceptibility of Groundwater to Pollutants" is defined as the ease with which a contaminant can be transported from the land surface to the top of the groundwater called the "water table" Many materials that overlie the groundwater offer good protection from contaminants that might be transported by infiltrating waters. The amount of protection offered by the overlying material varies, however, depending on the materials. Thus, in some areas, the overlying soil and bedrock materials allow contaminants to reach the groundwater more easily than in other areas of the state.

In order to identify areas sensitive to contamination, the Wisconsin Department of Natural Resources, in cooperation with the University of Wisconsin Extension, Wisconsin Geological

and Natural History Survey and the USGS, has evaluated the physical resource characteristics that influence this sensitivity.

Five physical resource characteristics were identified as important in determining how easily a contaminant can be carried through overlying materials to the groundwater. These characteristics are depth to bedrock, type of bedrock, soil characteristics, depth to water table and characteristics of surficial deposits. Existing statewide maps of these five characteristics were used whenever possible. New maps were compiled when existing information wasn't already mapped. The resource characteristic maps used in this project were compiled from generalized maps at a scale of 1:250,000 or 1:500,000.

Each of the five resource characteristic maps was put into digital form using a Geographic Information Systems (GIS) program. All of the information contained in the five maps was overlaid and combined into one composite map. A numeric rating scheme developed for each map was used to score the maps and the five resource map scores were added together within GIS. The composite map (see Figure 16, below) shows the scores for each area – low scores represent areas that are more susceptible to contamination and high scores represent areas that are less susceptible to contamination.

The method described above is a subjective rating method; specifically an index method. An index method assigns a subjective ratings or score to physical resource characteristics of an area to develop a range of contamination susceptibility categories (ranging, in this case, from more susceptible to less susceptible). Index methods are fairly popular approaches to groundwater susceptibility, because they are quick and straightforward, and they use data that are readily available. However, the mapped distribution of susceptibility categories produced by an index method is typically fraught with uncertainty, primarily due to the subjectivity in the approach. The susceptibility categories include little quantifiable or statistical information on uncertainty and this limits their use for defensible decision making. So while susceptibility maps produced using index methods can be useful, their inherent uncertainty must be kept in mind. (National Research Council, 1993; Focazio and others, 2002).

Land applied animal waste, or leaking manure storage lagoons are potential sources of contamination to groundwater in Fond du Lac County. In August of 2007, five families in the Town of Byron discovered that their wells were infected with manure-sourced E. Coli bacteria. UW-Extension began coordinated efforts with DNR, Town of Byron Board of Supervisors, and Fond du Lac County to design a response for the Township. Of the 97 wells sampled, 21% exceeded the drinking water standard for nitrates while 26% of wells sampled tested positive for bacteria. Five of the wells were replaced, three using DNR well compensation grants.

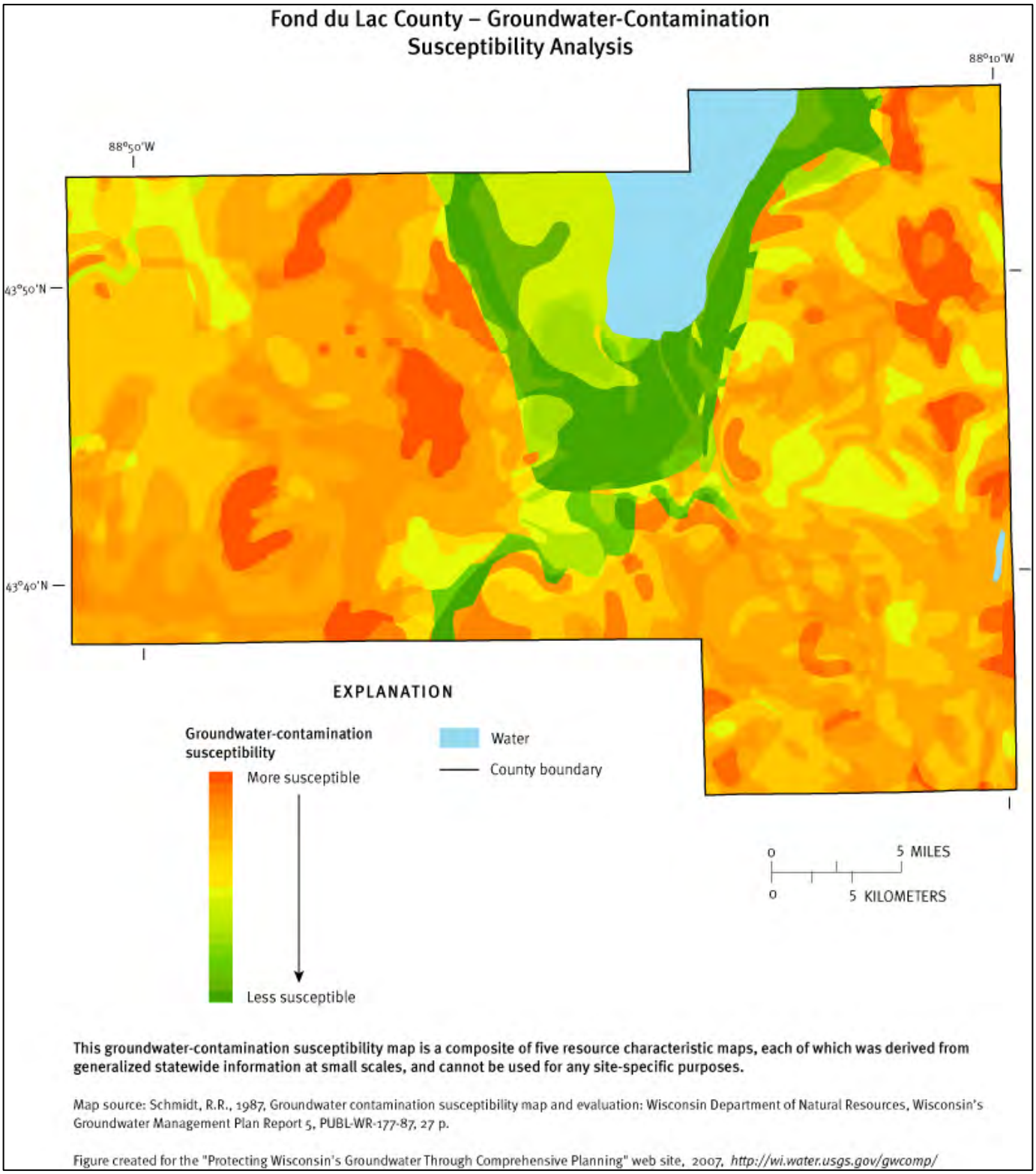


Figure 16 - Fond du Lac County Groundwater Contamination Susceptibility

III.A.1.g. Air quality

Fond du Lac County is in compliance with federal standards for ozone, particulate matter, sulfur dioxide, nitrogen oxides, carbon monoxide, and lead. The nearest multi-parameter monitoring site to Rosendale is the "Mayville" site located in the town of Hubbard in Dodge County. Among the compounds tested at this location are particulate matter ($PM_{2.5}$) and ammonia (NH_3), both of which known to be associated with agricultural operations.

The Mayville monitoring site is located on a hill in a rural area. There are no industrial or significant agricultural operations near the instruments. Three dairy CAFOs are located between 10 and 15 miles of the site, ranging from 870 to 3994 animal units. The air shed in this location is substantially similar to that of the proposed Rosendale dairy, located some 40 miles to the north.

Table 2, below, presents a summary of current $PM_{2.5}$ and NH_3 concentrations collected at Mayville ($\mu g/m^3$).

Table 2 - Mayville $PM_{2.5}$ and NH_3 Concentrations

	Annual	**24 Hour**
2005-07 $PM_{2.5}$ Design Value	11.6	30.0
$PM_{2.5}$ Standards	*15.0*	*35.0*
2007 Maximum NH_3 Concentration	2.4	6.6
NH_3 Standards	*100.0*	*418.0*

III.A.1.h. Flora

The proposed Rosendale Dairy is located in the Southeast Glacial Plains Ecological Landscape (SEGPEL). The SEGPEL is shown in Figure 17, below. Historically, vegetation in the Southeast Glacial Plains consisted of a mix of prairie, oak forests and savanna, and maple-basswood forests. Wet-mesic prairies, southern sedge meadows, emergent marshes, and calcareous fens were found in lower portions of the Landscape. End moraines and drumlins supported savannas and forests. Agricultural and urban land use practices have drastically changed the land cover of the Southeast Glacial Plains since Euro-American settlement. The current vegetation is primarily agricultural cropland. Remaining forests occupy only about 10% of the land area and consist of maple-basswood, lowland hardwoods, and oak.

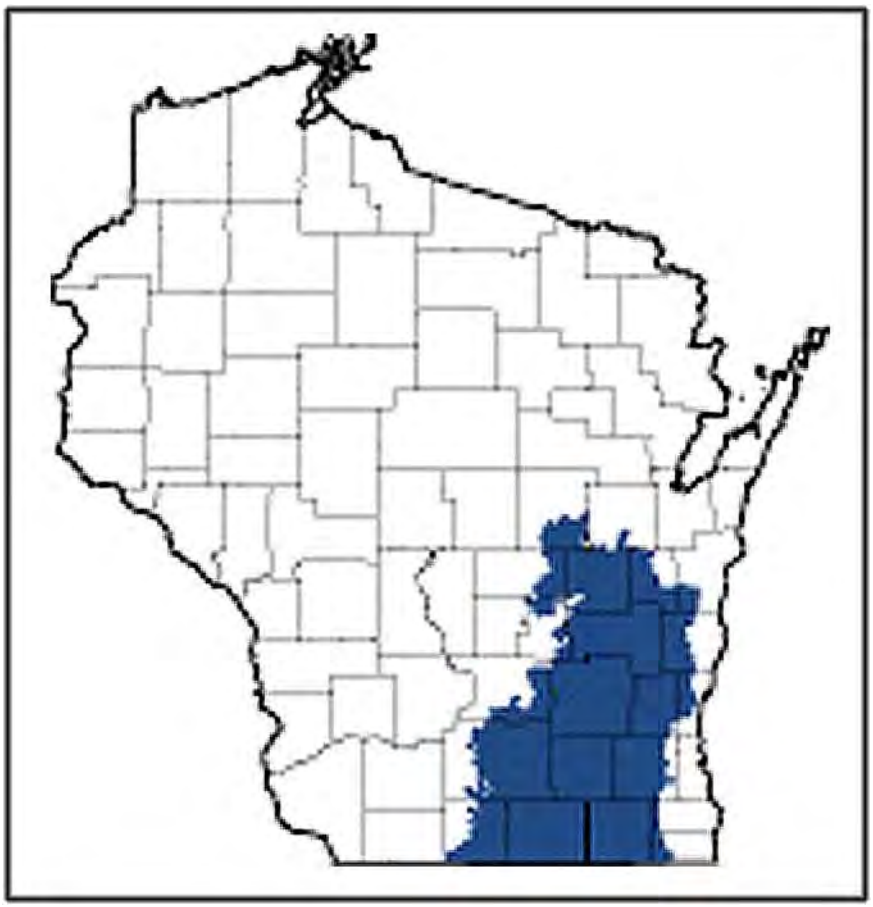


Figure 17- Southeast Glacial Plain Ecological Landscape

Presently, Fond du Lac County is comprised of 15% wetland, 73% agriculture land and 8% woodland. Upland woods are comprised of red, white, bur oaks, and shagbark hickory with some aspen and black cherry mixed in. The few, small isolated pockets of original oak savanna are being taken over by common buckthorn European honeysuckles. Common tree species of riparian woodlands include green ash, cottonwood and black willow.

Most of the native grassland cover has been plowed and converted to agriculture but small pockets still exist along Railroad right-of-ways. Species typical of the remnant prairies include; big and little bluestems, Indian grass, switch grass, wild bergamot, Canada tick trefoil, yellow coneflower, and common milkweed. Most wetlands that have been ditched and tiled are degraded with reed canary grass, cottonwood and willow, but areas that have not been disturbed have nice sedge meadow vegetation such as blue-joint grass, prairie cordgrass, boneset, ironweed, joe-pye weed, asters, and tussocks sedge.

Several Glacial Habitat Restoration Areas (GHRA's) are present within a 2-mile radius of the project. The GHRA program takes a regional approach to wildlife management by restoring, creating and maintaining habitat for waterfowl, wild pheasants, and non-game songbirds. Common prairie vegetation of the GHRA's consists of grasses like big blue stem, Indian grass, Canada wild rye and wildflowers such as black-eyed susan, prairie dock, and yellow coneflower.

III.A.1.i. Fauna

Rosendale Dairy is located in the Southeast Glacial Plain ecological landscape. In pre-settlement times, the glacially carved landscape was predominately oak savannas and southern mesic forests, with a mosaic of prairies, extensive sedge meadows, emergent marshes, southern dry forest and lowland hardwood forests. This ecological landscape contains the heart of the best historical waterfowl and pheasant range in Wisconsin. Rosendale Township is located in the heart of the best waterfowl and pheasant range for Fond du Lac County.

Today, Fond du Lac County land cover types are 73% agriculture, 8% forest, 14% wetland and 4% urban/residential due to settlement. Rosendale Dairy is located in the headwaters of the West Branch of the Fond du Lac River subwatershed (80 sq. mi.), part of the Fond du Lac River watershed (244.7 sq. mi.) This is the only known subwatershed in Fond du Lac County that has a wild rice population, native or introduced is unknown. Wild rice is a very important fall food resource for waterfowl, muskrats and provides year round habitat for aquatic invertebrates.

Tables 3a - 3d, below, are not exhaustive lists of wildlife in the township, county or region.

Table 3a - Reptiles & Amphibians

Blue-spotted salamander	Eastern tiger salamander	Spotted salamander
Central newt	Mudpuppy	American toad
Chorus frog	Northern spring peeper	Bullfrog
Wood frog	Eastern gray treefrog	Snapping turtle
Painted turtle	Spiny softshell turtle	Smooth green snake
Eastern milk snake	Common garter snake	Plains garter snake
Red-bellied snake	Brown snake	Northern water snake
Northern leopard frog	Green frog	

Table 3b - Mammals

Common opossum	Long-tailed shrew	Southern saddle-backed shrew
Short-tailed shrew	Little brown bat	Silver-haired bat
Big brown bat	Eastern red bat	Cottontail rabbit
Woodchuck	Thirteen-lined ground squirrel	Eastern Chipmunk
Gray squirrel	Fox Squirrel	Southern flying squirrel
Beaver	Harvest mouse	Prairie deer mouse
Northern white-footed mouse	Red backed vole	Meadow mouse
Prairie vole	Muskrat	Norway rat
House mouse	Red fox	Gray fox
Raccoon	Short-tailed weasel	Least weasel
Long-tailed weasel	Mink	Badger
Striped skunk	Otter	White-tailed deer
Coyote	Starnose mole	

Table 3c - Birds

Double-crested cormorant	American bittern	Great blue heron
Great egret	Green-backed heron	Black-crowned night heron
Canada goose	Wood duck	Mallard
Blue-winged teal	Gadwall	Northern harrier
Red-tailed hawk	American kestrel	Cooper hawk
Sharp-shined hawk	Gray partridge	Ring-necked pheasant
Northern bobwhite	Sora	American coot
Sandhill crane	Killdeer	Common snipe
Black tern	Rock dove	Mourning dove
Black-billed cuckoo	Yellow-billed cuckoo	Great horned owl
Red-necked grebe	Virginia rail	Chimney swift
Red-headed woodpecker	Hairy woodpecker	Yellow-shafted flicker
White-breasted nuthatch	Brown creeper	Downy woodpecker
Hooded merganser	Green-winged teal	Eastern wood-pewee
Willow flycatcher	Least flycatcher	Great crested flycatcher
Eastern phoebe	Eastern kingbird	Horned lark
Tree swallow	Northern rough winged swallow	Bank swallow
Barn swallow	Blue jay	American crow
Black-capped chickadee	House wren	Sedge wren
Marsh wren	Eastern bluebird	Wood thrush
American robin	Gray catbird	Brown thrasher
Cedar waxwing	European starling	Yellow-throated vireo
Warbling vireo	Red-eyed vireo	Yellow warbler
American redstart	Ovenbird	Common yellowthroat
Northern cardinal	Rose-breasted grosbeak	Indigo bunting
House finch	Dickcissel	Chipping sparrow
Field sparrow	Vesper sparrow	Savannah sparrow
Grasshopper sparrow	Song sparrow	Swamp sparrow
Bobolink	Eastern meadowlark	Western meadowlark
Red-winged blackbird	Yellow-headed blackbird	Common grackle
Brown-headed cowbird	Baltimore oriole	Orchard oriole
American goldfinch	House sparrow	Brown thrasher
*Whooping crane	Blue-winged warbler	Bell’s vireo
**Snowy owl	**Snow bunting	**Lapland longspur
Forester’s terns	White pelican	Henslow’s sparrow
Scarlet tanager	Wild turkey	Common moorhen
Pied-bill grebe	Belted kingfisher	Shoveler
Clay-colored sparrow	Eastern towhee	Turkey vulture
Alder flycatcher		

* Spring 2008 - Unconfirmed sighting of a whooping crane mixed in with a flock of sandhill cranes in Rosendale Township, Section 22.

** Winter Transients

*Table 3d - Invertebrates**

Zooplankton (copepods, rotifers, cladocearans)	Crayfish
Snails	Mollusks
Mayflies	Dragonflies
Aquatic beetles	Aquatic flies and midges
Terrestrial moths	Terrestrial butterflies
Damselflies	

* There is no known survey of invertebrates for this area. These are typical.

Rosendale Dairy is located in the Glacial Habitat Restoration Area (GHRA). A Bureau of Wildlife Management (WDNR) project using a landscape scale approach to habitat management to incorporate a patch work of wetlands and grasslands with cropland to create habitat conditions more favorable for self-sustaining wildlife populations in the glacial moraine area of east central Wisconsin. The 530,000 project area is located in 24 townships in parts of Columbia, Dodge, Fond du Lac and Winnebago counties. The project uses perpetual easements, fee title acquisition, other agency programs, volunteer agreements, and cost-sharing to establish 38,600 acres of grassland nest cover, and restore 11,000 acres of drained wetlands within the project boundary. Primary grassland bird species targeted are ring-necked pheasant, mallard, blue-winged teal and nongame passerine birds. There are 5 parcels located in Rosendale Township for a total of 700 acres. The need for such a program is based on a documented decline in grassland and wetland wildlife populations. Reductions in habitat quality and quantity as a result of land use changes have contributed to the decline of grassland nesting wildlife populations. Likewise, wetland loss or degradation has been an important factor in the decline of many wetland wildlife species. Since pre-settlement times, the GHRA area has lost 99% of its prairie and 50% of its wetlands.

Other nearby large wetland complexes are Rush Lake and Uihlein Waterfowl Production Area (WPA). Rush Lake is located 5 miles northwest of Rosendale Dairy. Rush Lake is a 3,070-acre prairie pothole marsh bounded by two low hills in southwestern Winnebago County, Wisconsin. Its size makes it the largest prairie pothole east of the Mississippi River. Historically, Rush Lake had extensive stands of native aquatic vegetation and was home to a multitude of wetland birds, including several threatened and endangered species. Some of the rare birds that nest on the Lake include Wisconsin's largest nesting population of red-necked grebes, as well as Forster's terns, and black-crowned night herons. The emergent vegetation community is dominated by cattails and hardstem bulrush, for which Rush Lake was named. Average water depth of Rush Lake is 1.5 feet and water levels are affected by a small dam located in the northeast corner at the lake's outlet to Waukau Creek. Located immediately east of Rush Lake, Uihlein WPA is a1,926 acre US Fish and Wildlife Service managed wetland complex for waterfowl and shorebirds.

Eldorado State Wildlife Area (6,300 acres) is located approximately 9 miles downstream from the Rosendale Dairy site (see Figure 18). The West Branch of the Fond du Lac River is damned at both the Village of Eldorado and combination dike and dam on the wildlife area creating a 1,500 acre impoundment. Its primary purpose is waterfowl production.

All of the above wetland complexes have unique wetland restoration efforts on going. Also, there is a large complex (800 acres) of private land wetland impoundments about 2 miles downstream from Rosendale Dairy. Figure 18, below, shows the State Wildlife properties in the area.

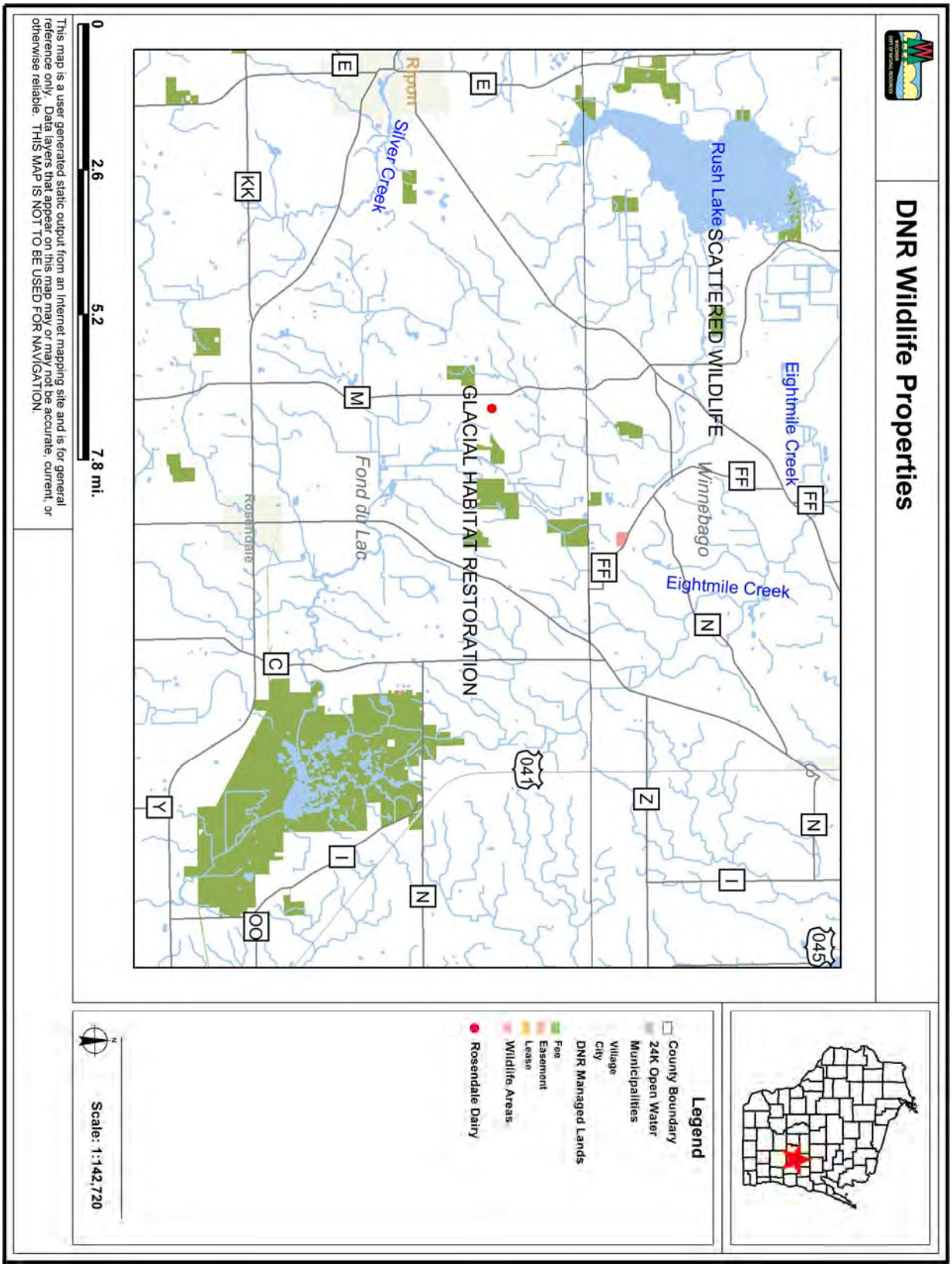


Figure 18 - DNR Wildlife Properties

Many large lakes and wetlands occur a short distance from Rosendale Dairy. These features include Lake Winnebago and its upstream pools (Lake Poygan, Lake Winneconne, and Lake Butte des Morts). Winnebago pool lakes are located 17 miles north and east of Rosendale Dairy. Green Lake, the deepest inland lake in Wisconsin (235 feet deep) is located about 9 miles to the southwest of Rosendale Dairy. Horicon Marsh, (32,000 inland freshwater cattail marsh is located about 17 miles to the southeast. The abundance and diversity of lakes, rivers and wetlands in the region make it appealing to waterfowl and other wetland dependent wildlife species.

III.A.1.j. Rare Species

Historically, the state threatened, woolly milkweed occurred on dry, gravelly prairies and the state endangered, harbinger of spring would have been present in the forest understory during the spring ephemeral blooming season. Land use changes in the area have altered or converted habitat for these species such that they no longer occur on these sites. The state endangered, red-tailed prairie leafhopper would have also been present in the dry prairies scattered through the area where its host plant, prairie dropseed was plentiful. Currently, the leafhopper is known only from the Ripon Prairie State Natural Area. Wet prairie remnants are known to occur in Springvale Township but most remnants have been plowed and converted to be productive agricultural lands. Numerous birds including the state special concern black-crowned night heron, common moorhen, black tern, least bittern, and state endangered Caspian tern and red-necked grebe have been documented on nearby Rush lake and the Oakridge hunting club.

Results from the NHI database query on the manure spreading sites indicated that there are a number of rare species found to occur within the properties or within the 1-mile buffer. At the Bartz Farms-complex found two historic plant hits were found on four of the properties in this group. Based on the search, the state threatened, woolly milkweed and state endangered, harbinger of spring were found to occur within the BaBUTTKE, BaMASHOCK, and BaWALTENBERRY properties and within the 1-mile buffer of the BaBREMER property. Woolly milkweed is a prairie species occurring on dry, gravelly hills while harbinger of spring is a woodland spring ephemeral. While these plants are known to have been present in the area historically, it is highly unlikely that they currently exist here; first, the last observation date for each plant was 1938 and 1940 respectively. Second, these lands are currently active agricultural areas and have been farmed for many years. Third, the occurrences may be outside of the project area. Fourth, both plants species tolerate disturbance poorly and would have been eliminated by plowing or logging practices.

At the Rosendale Dairy-complex woolly milkweed and harbinger of spring were found to occur within the 1-mile buffer of Rd19, RdHIELKE and within the RdRU property. A third species, small white lady’s-slipper orchid was also found to occur within the 1-mile buffer of the RdHIELKE property. The potential for woolly milkweed and harbinger of spring to still exist in this area is highly unlikely on these parcels per the reasons stated above. The record for small white lady’s-slipper came from the Rush Lake area. The lady slipper orchid is found in wet prairies and likely would have already been eliminated from the RdHIELKE property if appropriate habitat ever existed there through agricultural conversion. Four bird hits also occur within the 1-mile buffer of the RdHIELKE property. The state special concern common moorhen, black tern and least bittern, and state endangered Caspian tern were documented on

Rush Lake. Two additional bird hits were found within the 1-mile buffer for Rd16_17 and RdZIM properties. The state special concern Black-crowned night heron and state endangered red-necked grebe were observed at the Oakridge hunting club. These species are highly associated with shorelines and open water areas surrounded by natural vegetation. No suitable open water habitat for these species is located on these farms. Finally, the wet prairie natural community hit found within the 1-mile buffer of Rd16_17 and RdZIM is outside of the project area.

At the Goeden Farms-complex, woolly milkweed and harbinger of spring were found to occur within the 1-mile buffer for the GoGEISE_HAGE, GoHOCH_ROST_ENG, GoM_L_S_H, GoMOODIE, GoPOMMERING, GoSMOODY and GoLEITZ properties and within the search area for the GoBRANDEL_LEHMAN, GoLANGE, and GoWALTERS. The potential for woolly milkweed and harbinger of spring to still exist on these sites is highly unlikely on these parcels per the same reasons stated under the query results for Bartz Farms-complex. At the GoLEITZ property, a hit for the state endangered red-tailed leafhopper and dry prairie natural community were found to occur within the 1-mile buffer. The leafhopper is highly dependant on prairie dropseed (its sole host plant), a native dry prairie grass. In degraded dry prairies where dropseed has been eliminated red-tailed leafhoppers cannot survive. No impacts to the leafhopper or the prairie are expected since these hits occur outside of the project area at the Ripon Prairie State Natural Area. Finally, as above, the wet prairie natural community hit found within the 1-mile buffer of GoPOMMERING is outside of the project area.

III.A.2. Production site & vicinity

III.A.2.a. Location & Size

The production site is constructed on approximately 100 acres located at N8997 County Road M, Pickett, Town of Rosendale, NE ¼ and SE ¼ of the SW ¼ and a portion of the NW ¼ and SW ¼ of the SE ¼ Sec.9, T16N R15E. The land was formerly used for agricultural row crops and forage. This new dairy and livestock facility will provide for housing, feeding, and milking of 8000 dairy cows plus housing and feeding of 300 beef steers which are the equivalent of 11,500 animal units.

This project is planned to occur in two phases. The first phase is planned to be completed by the end of 2008 and includes construction of one freestall barn (the South Freestall), one milking parlor containing one 80-cow milking carousel, a sand separator, a sand and solids stacking bunker, a manure handling system, three reinforced concrete manure storage facilities (referred to as Waste Storage Facility (WSF) #1, #2, and #3), a feed storage pad for the corn silage and haylage, a sweet corn storage pad, leachate/runoff collection for the feed storage and sweet corn silage pads, and two stormwater management basins.

Phase I is planned to house 3500 milking cows and 500 dry cows along with 150 steers for a total of 5,750 Animal Units (AUs). Phase I was constructed during 2008. Phase II is proposed to be completed by the Fall of 2010 and consists of constructing a second freestall barn (the North Freestall) and adding a second 80-cow milking carousel to the milking parlor. Following completion of the North Freestall barn and installation of the second milking carousel, an

additional 3500 milking cows, 500 dry cows, and another 150 steers will be brought to the site. This is an addition of 5750 AUs which would bring the total number of AUs at the site to 11,500. The Waste Storage Facilities have been designed to contain all the liquid manure that will be generated by the total number of animal units following completion of Phase II, i.e. 11, 500 animal units.

III.A.2.b. Topography

Prior to construction, the site was used for agricultural fields. The topography of the project site was gently rolling and was changed only slightly to provide a level surface for construction.

III.A.2.c. Soils

Topsoil and subsoil at the construction site were removed and stockpiled during the clearing and grubbing phase of the building process, then all reused on the site.

General information on the types of soils that might be found at the production site and those soils' suitability for various purposes can be found at: http://websoilsurvey.nrcs.usda.gov/ Specific information on the types of soils and depths to bedrock and/or groundwater was submitted in the soil boring logs provided along with the plans and specifications. This information is reviewed as part of the plan and specification review and approval process.

III.A.2.d. Geology

See section III.A.1.d.

III.A.2.e. Hydrography & surface water quality & quantity

III.A.2.e.01 Wetlands

There were no mapped wetlands on the production site prior to construction in 2008. There is a wetland within the woodlot on the east side of the site. Rosendale Dairy is surrounded within one mile, on the west, north, and east sides by wetlands connected through unnamed ditches and small streams which combine to form the West Branch of the Fond du Lac River. The landscape is dominated by agricultural fields interspersed with wetlands and woodlots. Figure 19, below, shows wetlands near the production site.

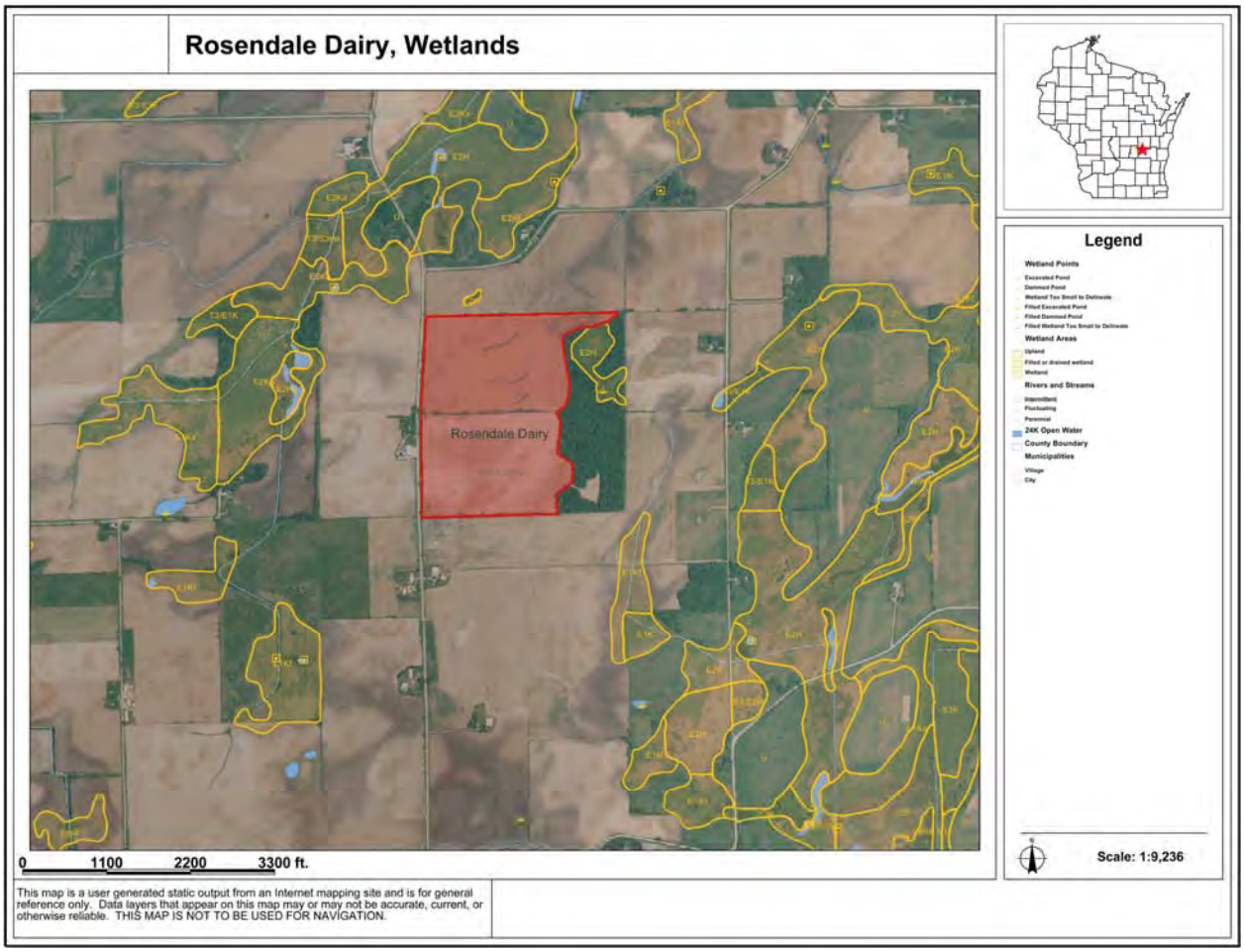


Figure 19 - Wetlands Near Rosendale Dairy

III.A.2.e.02 Surface water

An intermittent stream begins to the west of the facility, flows northerly, and arcs eastward north of the Dairy, and then flows southward approximately one mile to the east of the Dairy. The ditches and streams to the west and north of the facility are indicated on 7.5 minute United States Geological Survey (USGS) maps as intermittent stream channels, meaning they only flow during periods of high runoff. To the northeast of the facility the USGS maps indicate the channel has perennial flow where it crosses Triangle Road. To the east of the facility the stream picks up additional volume from other wetland drainage. The USGS map names the main channel as the West Branch of the Fond du Lac River about two miles southeast of Rosendale Dairy.

All of these waters are phosphorus enriched from landscape runoff. Few aquatic organisms exist in the intermittent channels, but tolerant insects and forage fish may exist in channels with perennial flow. There is a remote chance that in some wet springs, northern pike and suckers might manage to get past the dam at the Eldorado Marsh and could migrate into the wetlands within one mile of Rosendale Dairy.

Prior to development, the production site was primarily agricultural fields which allowed for some infiltration of precipitation. Post-development, much of the site will be impervious, prohibiting infiltration. Precipitation running off of these surfaces will be directed to stormwater detention ponds. Runoff generated from precipitation falling directly onto feed storage pads will also be directed to stormwater detention ponds. Precipitation falling into the manure storage facilities will be land spread along with the manure. Overall, the amount of precipitation infiltrating into the soil to recharge groundwater across the site will be reduced when compared to pre-development conditions.

The stormwater management system for the site is designed to control 80% of the sediment generated from the site. Stormwater discharged from the ponds may reach nearby intermittent or perennial streams and some may infiltrate into the soil. Stormwater management is more fully described elsewhere in this document.

Stormwater runoff from the site prior to construction drained in three different directions. Post-construction storm water runoff from all impervious surfaces including the general production area, the feed storage pad, rooftops, and driveways will be directed to one of two stormwater management basins.

The peak discharge for the 2, 10, and 100-year design storm is reduced to less than the allowable rates by the stormwater management plan. The sweet corn pad and Waste Storage Facilities, which constitute 22.20 acres of the site, are considered No-Runoff areas since stormwater falling on or into them is contained and does not contribute to the flow of either stormwater basin. The basin in the northeast corner of the site is designed to capture runoff from the large feed storage pad and areas north of that feed pad. Leachate and the “first flush” of rainwater from the feed pad will flow into a sump and be pumped into Waste Storage Facility #2. Any additional rain or snowmelt water from the feed pad will flow, along with runoff from north of the feed pad, into the north stormwater basin. This stormwater basin is designed to remove 80% of the sediment the runoff water might contain as it enters that basin. Figure 4 on page I-7 shows the stormwater system.

Stormwater exits the north sedimentation basin (Feed Pad basin) through four parallel upright pipes or “bubblers” which disperse the discharge onto a vegetated strip. This strip then further reduces flow and aides in removing any remaining sediment. From the vegetated strip, the Feed Pad basin discharge water flows into a cropped field to the northeast.

The basin in the southeast corner of the site is designed to capture runoff from the area on the north side of the north barn to the south side of the south barn. This stormwater basin is designed to remove 80% of the sediment the runoff water might contain as it enters that basin. Stormwater exiting the south sedimentation basin (Barn basin) flows into a grassed waterway, then into an intermittent stream.

The basins are designed to contain a peak flow rate comparable to a 25-year, 24-hour storm event. Once the water level reaches its design capacity, it flows out of the sedimentation basin at a rate equivalent to that of a 2-year, 24-hour rainfall event prior to site development.

III.A.2.f. Groundwater quality & quantity

According to the application, depth to groundwater at the site averaged 12 feet and ranged from 4 to 18 feet below the ground surface. No boring logs showing depth to water have been provided.

A conditional high capacity well approval was given by DNR for two high capacity wells that were constructed to prevent arsenic contamination of well water. These wells are shown in Figure 3 on page I-5. Static water level in the new high capacity wells is 30 feet (WN 180) and 70 feet (WL 980) below the ground surface. It is stated in the pump test report that: "Based on the well's recorded geology in the DNR Well Construction Report, a 29-foot shale layer separates the upper aquifer from which the monitoring wells draw their supply and the lower aquifer from which the high-capacity production well draws." This is the Readstown shale which is formed at the base of the St Peter Sandstone where it is deeply incised into the Prairie Du Chien or Cambrian. It is not continuous across the area and is not noted in other area wells.

The nearest well serving a public utility is the Ripon waterworks Well #5 which is located approximately 5.7 miles southwest of the facility wells. No impacts to this municipal well are expected from the operation of the two approved wells.

III.A.2.g. Air quality

Fond du Lac County is in compliance with federal standards for ozone, particulate matter, sulfur dioxide, nitrogen oxides, carbon monoxide, and lead. The nearest multi-parameter monitoring site to Rosendale is the "Mayville" site located in the town of Hubbard in Dodge County. Among the compounds tested at this location are particulate matter ($PM_{2.5}$) and ammonia (NH_3), both of which known to be associated with agricultural operations.

The Mayville monitoring site is located on a hill in a rural area. There are no industrial or significant agricultural operations near the instruments. Three dairy CAFOs are located between 10 and 15 miles of the site, ranging from 870 to 3994 animal units. The air shed in this location is substantially similar to that of the proposed Rosendale dairy, located some 40 miles to the north.

Table 4, below, presents a summary of current $PM_{2.5}$ and NH_3 concentrations collected at Mayville.

Table 4 - $PM_{2.5}$ and NH_3 at Mayville ($\mu g/m^3$)

	Annual	**24 Hour**
2005-07 $PM_{2.5}$ Design Value	11.6	30.0
$PM_{2.5}$ Standards	*15.0*	*35.0*
2007 Maximum NH_3 Concentration	2.4	6.6
NH_3 Standards	*100.0*	*418.0*

III.A.2.h. Flora

The 100 acre site is situated on formerly cropped lands. The fields were planted in corn, soybeans, alfalfa, and other crops. Post-construction, the vegetation around the facility and adjacent fields will likely be comprised of weedy annual or perennial plants that thrive under bare ground conditions. The agricultural lands surrounding the facility may be cropped with corn, soybeans or other crops.

III.A.2.i. Fauna

These are the probable bird species that utilize the completed production site, such as european starling, english sparrow, killdeer, common nighthawk, rock dove, american robin, chipping sparrow, barn swallow and mourning dove.

There are nearby wetlands west, north and east of the production site. The herptiles in the area do migrate from one wetland to another during their breeding cycle and to their upland foraging areas. Some examples would include eastern tiger salamander, eastern gray treefrog, American toad, common garter snake and snapping turtle. For mammals this would include muskrat, mink, and otter.

Of course, one of the major mammals that utilizes the production site area is the white-tailed deer. Rosendale Dairy is located in Deer Management Unit 68A. Unit 68A 2007 overwinter population estimate of 86 deer per sq. mi. of deer range which is 186% above the overwinter population goal of 30 deer per sq. mi. of deer range. This overpopulation of deer has caused considerable agricultural crop damage in the vicinity. Other mammals would include red fox, coyote, raccoon, opossum and striped skunk.

Lighting of the site likely attracts insects consequently attracting foraging bats such as little brown bat and big brown bat to the site.

III.A.2.j. Rare Species

The NHI query indicated that no rare species were present within the project facility site or surrounding 1-mile buffer.

III.A.3. Sand and soil borrow and disposal sites

All fill and topsoil for this project grading and construction was obtained from within the construction site. Topsoil was removed prior to construction, temporarily stockpiled at two sites within the property boundary during construction, and then used on site as needed. It is anticipated that all stockpiled topsoil will be used at the farm site. Appropriate erosion control measures were taken to ensure that any runoff from exposed and stockpiled materials did not result in this material leaving the construction site.

Gravel for subgrade or final grading was obtained off-site from four commercial sites owned by Michels Materials (Hughes, Schmokers, Bencarrie, and Edmunds). These sites are shown in Figure 5 on page I-11.

Sand for bedding will be purchased from Michels Materials – Meyer Pit located in Sections 35 & 36 in the town of Oasis, Waushara County.

III.A.4. Manure spreading/irrigation sites

III.A.4.a. Location & Size

Detailed maps and other documents that describe manure spreading locations (fields) and sizes (acreage) are in the Rosendale Dairy Nutrient Management Plan (NMP). The NMP is written only for Phase I of the project and must be amended over time on, at least, an annual basis. The NMP will be amended to reflect Phase II of the project before Phase II herd size expansion occurs. All NMP amendments must be reviewed and approved by the Department.

Phase I reflects the following herd size and acreage: 4000 milking/dry cows, 150 steers (combined 5,750 Animal Units) and 5,631 spreadable acres. 1831 acres are owned and 3800 acres are rented or have been included in formal agreements with other landowners.

Phase II, as provided by the applicant, shows the following total herd size and acreage: 8000 milking/dry cows and 300 steers (combined 11,200 Animal Units) and additional acres above existing land base (5,631 acres) will be obtained in year two of operation to support herd size expansion.

III.A.4.b. Topography

Topography of all manure spreading locations (fields) are described in Rosendale Dairy Nutrient Management Plan (NMP). Maps and other documents are used to describe field topography.

The NMP is written only for Phase I of the project and must be amended over time on, at least, an annual basis. The NMP will be amended to reflect Phase II of the project before Phase II herd size expansion occurs. All NMP amendments must be reviewed and approved by the department.

The NMP estimates manure applications for the project will occur twice a month, for 3-4 day periods in May, July, October and November. Spreading will occur in spring before planting and fall after harvest or after harvest of alfalfa, wheat or other crops. In fall and spring, liquid manure will be injected as much as possible, or incorporated within 48 hours of application, whichever is safer. Incorporation will be completed using a disk till.

The NMP for Phase I has been reviewed by the department and determined to be in compliance with applicable NRCS 590 criteria and all NR 243 requirements. These requirements include topography.

III.A.4.c. Soils

Soils found within all manure spreading locations (fields) are described in the Rosendale Dairy Nutrient Management Plan (NMP). Maps and other documents are used to describe soil units on fields.

A majority of fields listed in the NMP contain wet soils described as ‘w’ soil units. The NMP describes ‘w’ soils as: soils with less than 12 inches to apparent water table (ground water) at certain times of the year. The NMP, per NRCS 590 standard, identifies the ‘w’ soils as having a high potential for nitrogen leaching to ground water. The close proximity of ground water for ‘w’ soil fields, at certain times of the year, represents an increased risk for bacterial pollution of ground water from manure spreading activities. The percentage of ‘w’ soils for each field listed in the NMP varies. Some fields are < 10% while others may be up to > 90% of the total field area. Figure 12 on page III-10 shows wetlands in the Town of Rosendale.

III.A.4.d. Geology

See section III.A.1.d.

III.A.4.e. Hydrography & surface water quality & quantity

The nutrient management plan for Rosendale Dairy indicates that most of the land application of manure will occur on existing crop fields across four different watersheds. Most will occur within the Fond du Lac River Watershed in the Town of Rosendale. Smaller portions of the Town in the Rush Lake-Fox River, and the Big Green Lake watersheds, will also receive manure.

Land application will also occur in the Town of Springvale in the Big Green Lake, Upper Rock River, and Fond du Lac River watersheds. In the Town of Ripon some lands are identified for land application of manure in the Big Green Lake and Fond du Lac River watersheds.

Very little is specifically known about the water bodies closest to the fields identified in the nutrient management plan. Documentation of the hydrology, water quality, habitat, and biological communities of the intermittent and perennial streams is lacking.

More generally though, the water resources of the area are typically slow flowing, low gradient intermittent and permanent streams, often in association with wetlands and agricultural fields. Water quality is generally poor due to nutrient enrichment and sediment deposition from runoff pollution. During dry periods many of these water bodies have little or no flow or may dry up. Few aquatic organisms exist in the intermittent channels, but tolerant insects and forage fish may exist in channels with perennial flow. Many of these stream channels have been ditched and straightened in an effort to improve agricultural suitability of the surrounding landscape. This level of disturbance severely degrades aquatic habitat.

Land application of manure will occur in the watersheds of four water bodies on the Wisconsin list of Impaired Water. Each of these water bodies is impaired, in whole or in part, from phosphorus and sediment related to rural runoff pollution. These water bodies are Silver Creek in the Big Green Lake Watershed, the lower portion of the Fond du Lac River in the Fond du Lac River Watershed, Lake Winnebago, and the Upper Rock River in the Upper Rock River Watershed. Figure 9 on page III-1 shows watersheds in the project area.

III.A.4.f. Groundwater quality & quantity

The general groundwater flow for Fond du Lac County is provided above. Site specific groundwater information for each known spreading site is not available.. Thin unconsolidated deposits overlying the fractured bedrock aquifer or elevated water table makes groundwater in this area susceptible to contamination. Because the aquifer is vulnerable to contamination, it is recommended that wells be inspected and tested for nitrate and bacteria annually or if a change is detected in the taste, color or smell of the water.

A review of well driller construction reports for wells within adjoining sections of known spreading sites indicates a large number of wells, which are cased to a relatively shallow depth. Also included are wells that represent a dual aquifer well. A dual aquifer well is well that has open borehole through or into different geological formations and is not cased through the different geological formations. Therefore, contaminants that are able to access an upper aquifer are also able to contaminate a lower aquifer by moving downward through the borehole.

III.A.4.g. Air quality

See Section III.A.1.g.

III.A.4.h. Flora

The acreage used proposed for land spreading has a long history of agricultural use. The land spreading sites are currently being used as agricultural crop land. The long-term use of these fields as crop production areas has altered the native plant community to a seasonally monotypic

stand of corn, soybeans, or other crops and the associated weedy annual or perennial plants that are commonly found in farm yards or farmed lands.

III.A.4.i. Fauna

There are a whole host of wildlife species that will use the manure spreading/irrigation sites. Ring-billed, herring and black-headed gulls especially fall time when they migrate inland to forage.

Harvested cropland would be used by a whole host of wildlife species, such as cottontail rabbit, white-tailed deer, ring-necked pheasant, and mourning dove. Waterfowl, especially canada geese, mallard and wood duck will forage in these fields preparing them for their fall and spring migration.

Many of the local raptors, such as red-tailed hawk, great horned owl , short-eared owl and barred owl hunt these fields for rodents.

III.A.4.j. Rare species

Historically, the state threatened, woolly milkweed occurred on dry, gravelly prairies and the state endangered, harbinger of spring would have been present in the forest understory during the spring ephemeral blooming season. Land use changes in the area have altered or converted habitat for these species such that they no longer occur on these sites. The state endangered, red-tailed prairie leafhopper would have also been present in the dry prairies scattered through the area where its host plant, prairie dropseed was plentiful. Currently, the leafhopper is known only from the Ripon Prairie State Natural Area. Wet prairie remnants are known to occur in Springvale Township but most remnants have been plowed and converted to be productive agricultural lands. Numerous birds including the state special concern black-crowned night heron, common moorhen, black tern, least bittern, and state endangered Caspian tern and red-necked grebe have been documented on nearby Rush lake and the Oakridge hunting club.

Results from the NHI database query on the manure spreading sites indicated that there are a number of rare species found to occur within the properties or within the 1-mile buffer. At the Bartz Farms-complex found two historic plant hits were found on four of the properties in this group. Based on the search, the state threatened, woolly milkweed and state endangered, harbinger of spring were found to occur within the BaBUTTKE, BaMASHOCK, and BaWALTENBERRY properties and within the 1-mile buffer of the BaBREMER property. Woolly milkweed is a prairie species occurring on dry, gravelly hills while harbinger of spring is a woodland spring ephemeral. While these plants are known to have been present in the area historically, it is highly unlikely that they currently exist here; first, the last observation date for each plant was 1938 and 1940 respectively. Second, these lands are currently active agricultural areas and have been farmed for many years. Third, the occurrences may be outside of the project area. Fourth, both plants species tolerate disturbance poorly and would have been eliminated by plowing or logging practices.

At the Rosendale Dairy-complex woolly milkweed and harbinger of spring were found to occur within the 1-mile buffer of Rd19, RdHIELKE and within the RdRU property. A third species, small white lady's-slipper orchid was also found to occur within the 1-mile buffer of the RdHIELKE property. The potential for woolly milkweed and harbinger of spring to still exist in this area is highly unlikely on these parcels per the reasons stated above. The record for small white lady's-slipper came from the Rush Lake area. The lady slipper orchid is found in wet prairies and likely would have already been eliminated from the RdHIELKE property if appropriate habitat ever existed there through agricultural conversion. Four bird hits also occur within the 1-mile buffer of the RdHIELKE property. The state special concern common moorhen, black tern and least bittern, and state endangered Caspian tern were documented on Rush Lake. Two additional bird hits were found within the 1-mile buffer for Rd16_17 and RdZIM properties. The state special concern Black-crowned night heron and state endangered red-necked grebe were observed at the Oakridge hunting club. These species are highly associated with shorelines and open water areas surrounded by natural vegetation. No suitable open water habitat for these species is located on these farms. Finally, the wet prairie natural community hit found within the 1-mile buffer of Rd16_17 and RdZIM is outside of the project area.

At the Goeden Farms-complex, woolly milkweed and harbinger of spring were found to occur within the 1-mile buffer for the GoGEISE_HAGE, GoHOCH_ROST_ENG, GoM_L_S_H, GoMOODIE, GoPOMMERING, GoSMOODY and GoLEITZ properties and within the search area for the GoBRANDEL_LEHMAN, GoLANGE, and GoWALTERS. The potential for woolly milkweed and harbinger of spring to still exist on these sites is highly unlikely on these parcels per the same reasons stated under the query results for Bartz Farms-complex. At the GoLEITZ property, a hit for the state endangered red-tailed leafhopper and dry prairie natural community were found to occur within the 1-mile buffer. The leafhopper is highly dependant on prairie dropseed (its sole host plant), a native dry prairie grass. In degraded dry prairies where dropseed has been eliminated red-tailed leafhoppers cannot survive. No impacts to the leafhopper or the prairie are expected since these hits occur outside of the project area at the Ripon Prairie State Natural Area. Finally, as above, the wet prairie natural community hit found within the 1-mile buffer of GoPOMMERING is outside of the project area.

III.B. Socioeconomic environment

III.B.1. Area

III.B.1.a. Demographics

Fond du Lac County is located in east central Wisconsin along the south end of Lake Winnebago. The county seat is the City of Fond du Lac, which is also the largest city in the county. The county has a total area of 766 square miles, of which 723 is land and 43 square miles is water.

The Town of Rosendale is located in northwestern Fond du Lac County. The town has a total area of 35.7 square miles, of which only 0.04 square miles is water. The Village of Rosendale is partially located within the township.

Population

The 2000 census found a population of 97,296 people (2002 WDOA estimate is 98,589), with 36,931 households, and 25,482 families residing in the county. The racial makeup of the county was 96.16% white, 2.04 % Hispanic, 0.90% black or AA, 0.38% Native American, 0.87% Asian, the remainder Pacific Islander or other races.

As of the 2000 census there were 783 people, 284 households and 222 families residing in the township. Population density was 22.0 people per square mile.

The median income for a household in the town was $50,272, and the median income for a family was $53,125. The per capita income for the town was $20,404. About 2.6% of the families and 3.3% of the population were below the poverty line.

Employment

Employment statistics for 2007 for Fond du Lac County and the state of Wisconsin show a similar pattern. The largest employment sectors for the county and the state are manufacturing, health care, hospitality, and retail. Fond du Lac showed employment in agriculture and forestry of about 1.5% in 2007. Table 5 and Figure 20 below present employment data for the county and state.

Table 5 - Fond du Lac County and Wisconsin Annual Employment and Wages for 2007

Fond du Lac County and Wisconsin Annual Employment and Wages for 2007

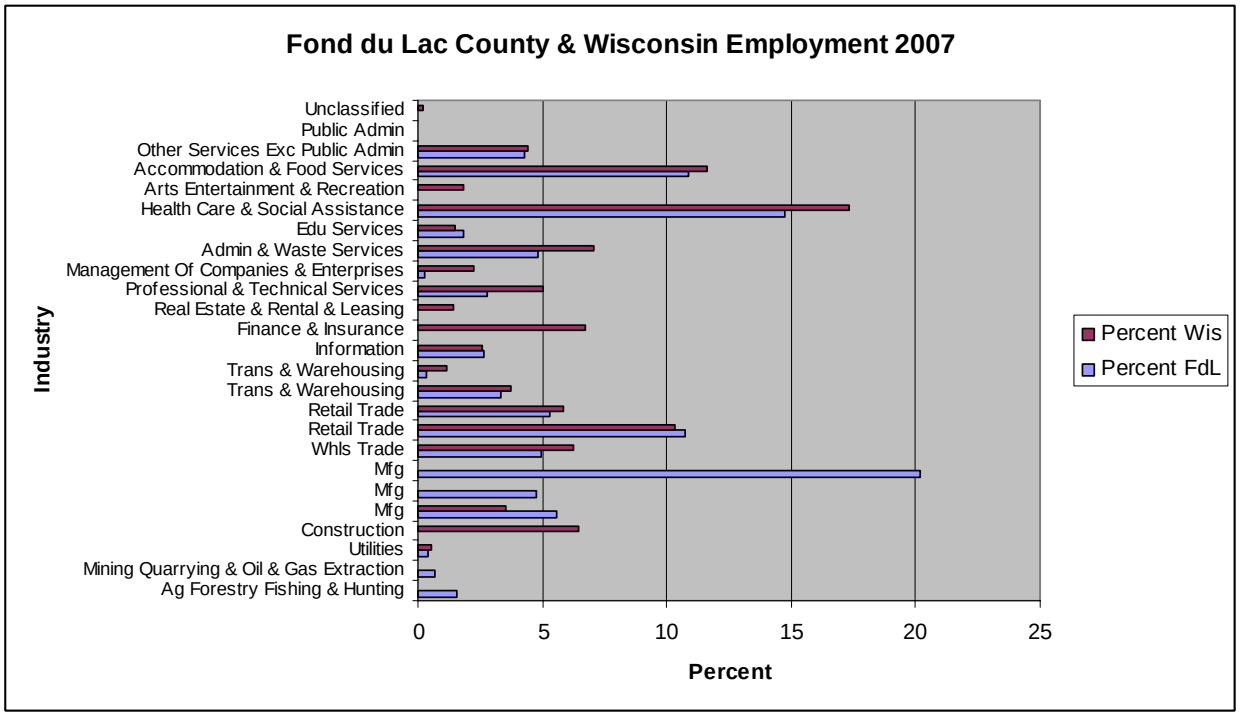
Industry	Fond du Lac County Avg Emp	Fond du Lac County Percent	Wisconsin Avg Emp	Wisconsin Percent
Ag Forestry Fishing & Hunting	541	1.527515035	S	
Mining Quarrying & Oil & Gas Extraction	251	0.708699212	S	
Utilities	139	0.392466894	11114	0.5716708
Construction	S		125952	6.4785924
Mfg	1962	5.539712567	68594	3.5282693
Mfg	1692	4.777366801	S	
Mfg	7152	20.19369229	S	
Whls Trade	1750	4.941129966	122152	6.2831319
Retail Trade	3791	10.70389926	201144	10.346243
Retail Trade	1884	5.319479346	113654	5.8460203
Trans & Warehousing	1177	3.32326284	72384	3.7232155
Trans & Warehousing	111	0.313408815	22689	1.167054
Information	944	2.665386679	50133	2.5786909
Finance & Insurance	S		131008	6.7386579
Real Estate & Rental & Leasing	S		28055	1.4430649
Professional & Technical Services	993	2.803738318	98253	5.0538391
Management Of Companies & Enterprises	99	0.279526781	43305	2.2274791
Admin & Waste Services	1699	4.797131321	136849	7.0391014
Edu Services	656	1.852217861	29598	1.5224322

Health Care & Social Assistance		5216	14.7273908	337346	17.352065
Arts Entertainment & Recreation	S			36234	1.8637681
Accommodation & Food Services		3846	10.85919191	225619	11.605163
Other Services Exc Public Admin		1514	4.274783296	85945	4.4207526
Public Admin		0	0	0	0
Unclassified		0	0	4098	0.2107888
Total		35417		1944126	

S = Suppressed

Wisconsin Department of Workforce Development
Bureau of Workforce Training - Labor Market Information
Query Results - Created on December 14, 2008
http://WORKnet.Wisconsin.gov

Figure 20 - Fond du Lac County & Wisconsin Employment 2007



Wisconsin Department of Workforce Development, Bureau of Workforce Training - Labor Market Information
Query Results - Created on December 14, 2008, http://WORKnet.Wisconsin.gov
Chart by DNR

Health

Health statistics indicate that the population health of Fond du Lac County is very similar to the state population as a whole. Statistics for the county on the occurrence of chronic health conditions in recent years is shown in Table 6 below.

Table 6 - Chronic Health Occurrences in Fond du Lac County & Wisconsin

Chronic Condition	FdL County Percent	State Percent
Cancer	3	4
Diabetes	5	4
Hypertension	11	11
Coronary Heart Disease	3	4
Heart Attack	1	2
Stroke	1	1
Asthma	6	7
Arthritis	10	12

Wisconsin Department of Health Services:
http://dhs.wisconsin.gov/localdata/chronicconditions/chronper.asp

III.B.1.b. Land use

The main land uses in the Town of Rosendale are agriculture, rural residential, and recreational.

Rosendale Dairy has recently purchased approximately 2500 acres of land in the project vicinity that is in agricultural production and zoned A1 Ag. The applicant indicates that the reason that the Rosendale area was selected was the large agricultural land base and compatible zoning.

The number of dairy farms in Fond du Lac County and the Town of Rosendale has been steadily declining. There were 937 dairy farms in the county in 1987 versus 467 in 2002. The Town of Rosendale had 32 dairy farms in 1987 versus 13 in 2002. (UW PATS 2004)

III.B.1.c. Transportation

Transportation needs for the Rosendale Dairy are provided by a network of local, county and state roads and highways. Transportation facilities on the State Trunk Highway (STH) system serving the dairy are State Trunk Highway 44 (STH 44) to the north and west; STH 23 to the south; and STH 26 to the east. A number of town roads serve the local residents and farms and will also provide access for traffic coming from and going to the dairy.

The dairy is located on County Trunk Highway M (CTH M) between STH 44 and STH 23. Traffic count data from 2005 (WI Dept of Transportation-WDOT) shows an average daily traffic (ADT) count of 760 vehicles per day on CTH M north of the dairy site, and 860 vehicles per day south of the dairy. Crash data from WDOT (2003-2008) shows 260 crashes per hundred million entering vehicle. This does not include deer crashes. A typical county highway has a crash rate of 150 crashes per hundred million entering vehicles.

There is no rail access in the township. The closest commercial airports are in Oshkosh (~12 miles) and Fond du Lac (~13 miles).

III.B.1.d. Zoning

Lands occupied by the Rosendale Dairy facility and adjacent lands to the north, south and west are zoned A1 Agriculture and in agricultural production. Land to the east is zoned Recreation.

Most of the Town of Rosendale is similarly zoned (see Figure 21, below).

The Town of Rosendale Zoning handbook breaks the zoning districts into approximately ten categories. Currently approximately 5 categories are active (see Zoning Map for locations). The Zoning Handbook describes the intent of the primary 5 categories as follows:

> A-1 Agricultural District. (Farm Preservation)
>
> The intent of this district if to identify and to establish those areas of the Town suited to the economics of large-scale agricultural uses. In turn, the value of this land is to be maintained by protecting these areas from the intrusion of urban uses. The location of this district should encompass sufficient acreage where soil characteristics and/or existing operation will facilitate extensive production of crops; forest products; livestock, poultry and their products; and dairy products. Identification of such districts should be by the use of detailed soils maps and by production records of the State of Wisconsin, Department of Agriculture.
>
> AT Agricultural Transition District
>
> The intent of this district is to allow the development of recreational, agricultural, and residential mixed uses on suitable sized parcels where the use is not inconsistent with surrounding properties and contiguous zoning districts. It is intended that this district will be used to accommodate the transition of traditional agricultural lands to less intensive uses which are normally considered recreational or hobby activities. The district may also be used to accommodate family farm members who wish to create residential areas within areas currently zoned exclusive agricultural as part of a family farm operation.
>
> ID Industrial
>
> The intent of this district is to provide for the development of industrial employment centers within the immediate vicinity of residential neighborhoods. As with any activity which draws users from beyond the immediate population which surrounds it, suitable traffic routes and parking facilities must be integral to the location of the plot plan design of the district.
>
> R-1 Rural Residential District
>
> The intent of this district is to provide a lot size and associated standards for home sites developed on a scattered basis. The criteria of this district are designed to provide reliable, single-family home sites in those areas where “neighborhood” and “community” facilities and services are of secondary significance to the location of the home site itself.

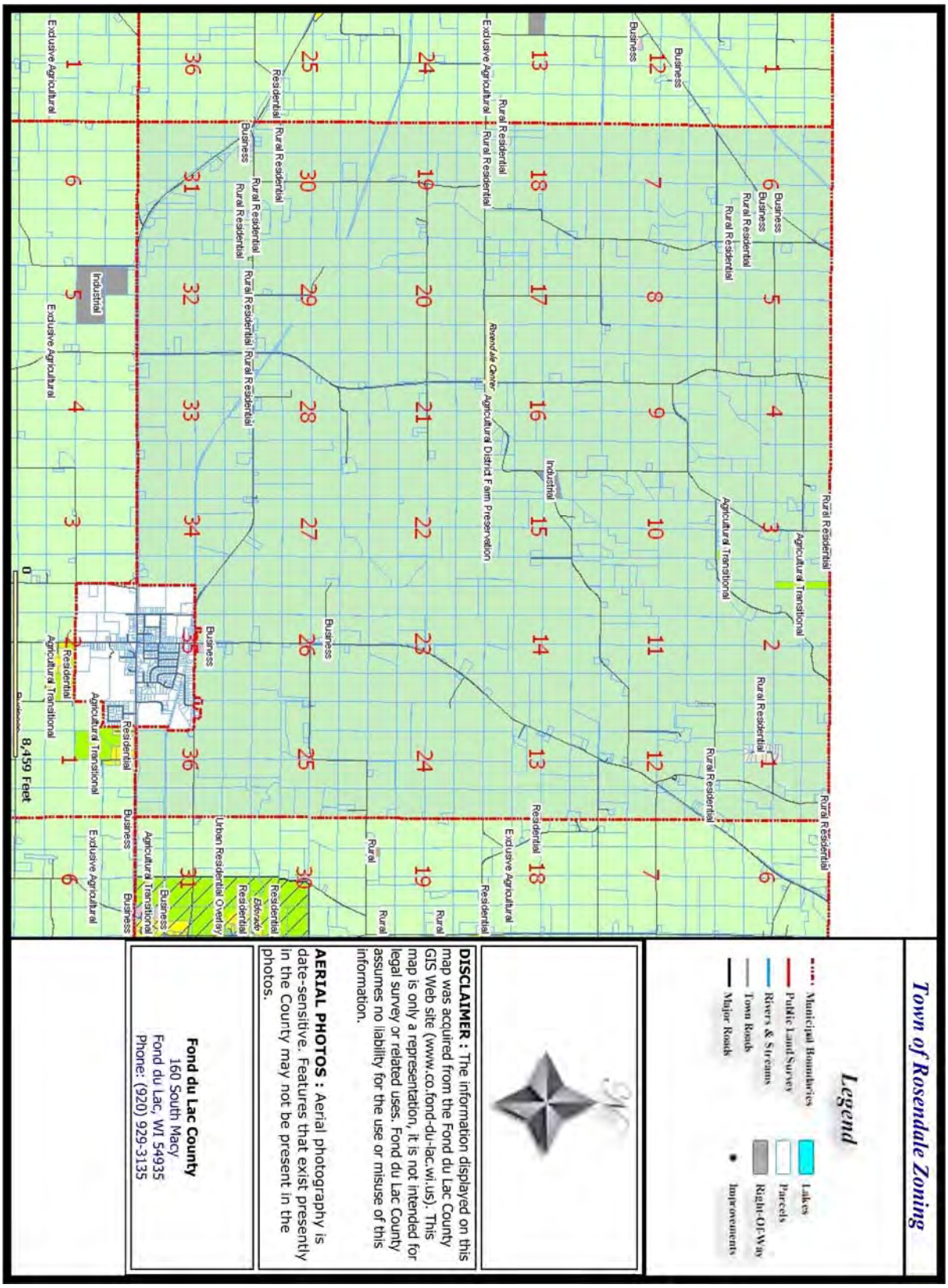


Figure 21 - Town of Rosendale Zoning

C-1 Commercial District (shown on mapping as Business)

The intent of this district is to provide for an individual or small grouping of retail and customer service establishments which will serve the daily needs of the local area residents. The physical location and arrangement of these facilities should be laid out so as to orient themselves to the local residential population to be served while remaining compatible in appearance and character with the area.

A-2 Agricultural District

The intent of this district is to allow the development of small scale farming activities characterized by the mixed crop of the traditional "family farm" along with residential growth. This district can be located in those areas where the occurrence of scattered urban uses is likely to occur. However, the agricultural district is to be recognized as the dominant activity of the area.

III.B.1.e. Economy

The existing economy in Fond du Lac County is dominated by the manufacturing, retail trade and health care sectors. The labor force is approximately 57,500, with an unemployment rate of 4 to 5% in June 2008. (U.S.Census, WDWD).

The University of Wisconsin Extension estimated in 2004 that there were 8500 jobs in Fond du Lac County that were related to agriculture, including farm owners, employees, veterinarians, consultants, vendors, contractors and lenders. Farming and related activities generated $1.117 billion in economic activity. Every dollar of sales of agricultural products spurs an additional $0.45 in other parts of the county economy.

Dairy was the top agricultural commodity for Fond du Lac County in 2002, with $98.9 million in sales. Economic activity associated with agriculture in Fond du Lac County accounted for over $28 million in property, sales and other taxes. (UW-EX)

A 2006 economic study conducted by the University of Wisconsin-Green Bay, University of Wisconsin Extension, and DNR determined that anglers brought more than $234 million into the economy of the five counties surrounding Lakes Winnebago, Butte des Morts, Winneconne, and Poygan. http://basineducation.uwex.edu/foxwolf/economics/angling.htm

III.B.1.f. Property values & taxes

The Town of Rosendale is almost entirely farm land, recreational, or scattered rural residential. Valuations are determined for each type of property and the improvements on the parcel. The total of all the values of all parcels in the Town is the tax base. According to UW-Extension, agricultural land in Fond du Lac County paid $8.2 million in property taxes in 2004. According to application materials, for 2005, Town of Rosendale property taxes totaled $548,112, and in 2006, this total had increased to $586,478.

III.B.1.g. Agriculture

The area surrounding the project site is quite extensively agricultural. Besides the large amount of agricultural fields used for growing crops, there are also numerous grain storage facilities for harvested crops nearby, as well as other businesses which serve agricultural needs. There are currently two WPDES CAFOs within a 10 mile radius of Rosendale Dairy - Rickert Brothers and Thistle. Both facilities are located to the east of the Rosendale site. These two CAFOs along with others located in the county are shown in Figure 22, below.

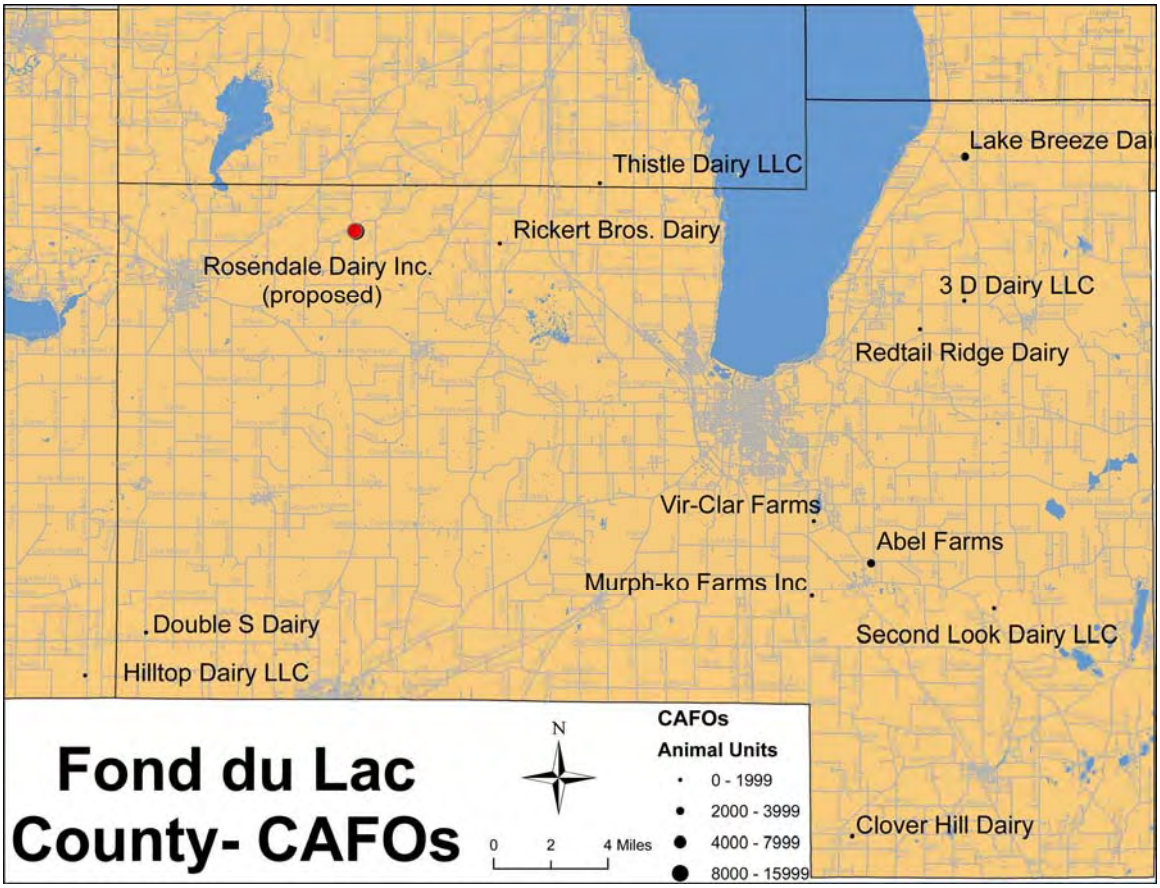


Figure 22 - Fond du Lac County CAFOs

According to a 2004 University of Wisconsin Extension report titled "Fond du Lac County Agriculture", Fond du Lac County ranks among leaders in the state for its number of milk cows, along with the production of milk, corn for grain, corn silage, soybeans, winter wheat, alfalfa, sweet corn, ad green peas. Dairy is the largest part of Fond du Lac County's agriculture contributing $698.2 million to the county's economy. Agriculture provides jobs for more than 8510 Fond du Lac county residents; of this number, 3270 jobs are for on-farm milk production and dairy processing. Each dairy cow generates more than $15,000 to $17,000 of economic activity. Agriculture contributes $341.4 million to the county's total income. Agriculture pays $28.2 million in taxes (this figure does not include all property taxes paid to local schools). Fond du Lac County is home to nine plants that process dairy products.

III.B.1.h. Archaeological & historical

Fond du Lac County and the Town of Rosendale have archaeological and historical resources scattered about the local landscape. There are no known resources on the production site or adjacent lands. There are several known sites on parcels identified in the Nutrient Management Plan (NMP) for land spreading manure. Adverse impacts that would trigger further investigation would be those activities which would entail extensive soil disturbance or excavation in areas of recorded sites, or ones that would impact significant historic structures. Any proposed activities of this nature related to either farm expansion or the NMP should be reviewed by the Department.

III.B.1.i. Visual

The eastern portion of Fond du Lac County is largely open agricultural land, interspersed with woodlots, wetlands and low gradient streams and ditches. Agricultural buildings are common.

III.B.2. Production site

III.B.2.a. Land use

The area land use is agricultural. This is one of the primary reasons this site was selected for development of the Rosendale Dairy. It was felt there was little other commerce, aside from the agricultural related business, that would drive development and that situating a dairy in this area would maintain the rural, agricultural atmosphere.

III.B.2.b. Zoning

The land on which the production site is located is zoned A1 Agricultural, as is about 95% of the land in the Town of Rosendale. The adjacent land to the east is recreational and is owned by a local resident. Rosendale Dairy and that landowner have a signed option to eventually transfer this property to Rosendale Dairy. See Figure 21 on page III-44.

III.B.2.c. Prime farmlands

Prime farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, forestland, or other land, but it is not urban or built-up land or water areas. The soil quality, growing season, and moisture supply are those needed for the soil to economically produce sustained high yields of crops when proper management, including water management, and acceptable farming methods are applied. In general, prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, an acceptable salt and sodium content, and few or no rocks. The water supply is dependable and of adequate quality. Prime farmland is permeable to water and air. It is not excessively erodible or saturated with water for long periods, and it either is not frequently flooded during the growing season or is protected from flooding. Slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Natural Resources Conservation Service.

According to the Fond du Lac County Parks and Planning Department , no prime farmland has been identified in the Towns of Rosendale or Springvale, Fond du Lac County to date.

III.B.2.d. Archaeological & Historical

There are no known archaeological resources or historical sites on or adjacent to the Rosendale Dairy production facility.

III.B.2.e. Light

Some lighting will be added to this site which formerly had none.

III.B.2.f. Noise

When this site was used for agricultural crop growing, equipment was used to till the land, spread fertilizers, and harvest crops. In their place, construction and general farm equipment have been and will be generating noise.

III.B.2.g. Visual

The 100 acre production site was recently converted from agricultural row crops to the current complex of basins and buildings. Viewed from County Highway "M", the two large barns and the milking parlor building would appear to the right, the central area would provide an open view of the large feed storage pad area with the manure storage lagoons in the background. To the left the feed storage pad would be the commodity building near the highway, with the sweet corn silage pad and other lagoons to the far left. A woodlot separates the site (and the eastern most lagoons) from lands to the east.

The site is shown in Figure 23 below.

Figure 23 - Rosendale Dairy under construction 2008, viewed looking east

Barn construction is shown in Figure 24 below.

Figure 24 - Rosendale Dairy Barn under construction 2008, viewed looking east

Figure 25 below shows construction grading for waste storage facility number 2. The woodlot borders this lagoon to the east.

Figure 25 - Rosendale Dairy WSF#2 under construction 2008, viewed looking northeast

III.B.3. Sand and soil borrow and disposal sites

All fill and topsoil for this project grading and construction was obtained from within the construction site. Topsoil was removed prior to construction, temporarily stockpiled at two sites within the property boundary during construction, and then used on site as needed. It is anticipated that all stockpiled topsoil will be used at the farm site. Appropriate erosion control measures were taken to ensure that any runoff from exposed and stockpiled materials did not result in this material leaving the construction site.

Gravel for subgrade or final grading was obtained off-site from four commercial sites owned by Michels Materials (Hughes, Schmokers, Bencarrie, and Edmunds). See Figure 5 on page I-11.

Sand for bedding will be purchased from Michels Materials – Meyer Pit located in Sections 35 & 36 in the town of Oasis, Waushara County.

III.B.4. Manure spreading/irrigation sites

III.B.4.a. Land use

Agriculture (specifically crop land) is the current land use at, and adjacent to, main dairy and a majority of fields used by Rosendale Dairy for manure spreading.

III.B.4.b. Zoning

Current zoning at, and adjacent to, the projects main facility and fields was not considered during the department's review of the Rosendale Dairy NMP. The NMP contains maps and other documents that describe manure spreading locations (fields) and sizes (acreage).

The following local governments have information that describe current zoning at & adjacent to main dairy and also for fields used by Rosendale Dairy for manure spreading:

(1) Fond du Lac County:
(http://gis.fdlco.wi.gov/Website/FondduLacIMS/viewer.htm)

(2) Townships of Rosendale (North of Hwy 23) and Springvale (S of Hwy 23):
http://www.fdlco.wi.gov/Index.aspx?page=622

Reviewing zoning maps and NMP field maps may provide specific zoning determinations for main dairy and for specific fields that receive manure applications. Local governments have jurisdiction and expertise to make legal zoning determinations.

III.B.4.c. Prime farmlands

Prime farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, forestland, or other land, but it is not urban or built-up land or water areas. The soil quality, growing season, and moisture supply are those needed for the soil to economically produce sustained high yields of crops when proper management, including water management, and acceptable farming methods are applied. In general, prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, an acceptable salt and sodium content, and few or no rocks. The water supply is dependable and of adequate quality. Prime farmland is permeable to water and air. It is not excessively erodible or saturated with water for long periods, and it either is not frequently flooded during the growing season or is protected from flooding. Slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Natural Resources Conservation Service.

According to the Fond du Lac County Parks and Planning Department , no prime farmland has been identified in the Towns of Rosendale or Springvale, Fond du Lac County to date.

With that said, a majority of fields listed in the Rosendale Dairy NMP are current agricultural lands that have been used for crop production using commercial fertilizer for several years. The specific prior cropping history and production (yield) on fields listed in NMP are not known. Some cropland listed in the NMP may meet the definition of prime farmland. The project intends to continue agricultural land use at all manure spreading sites.

III.B.4.d. Archaeological & Historical

Fond du Lac County and the Town of Rosendale have archaeological and historical resources scattered about the local landscape. There are no known resources on the production site or adjacent lands. There are several known sites on parcels identified in the Nutrient Management Plan (NMP) for land spreading manure. Land application of manure, or other normal or routine agricultural practices would not normally cause adverse impacts or effects to existing archaeological or historical resources. Adverse impacts that would trigger further investigation would those activities which would entail extensive soil disturbance or excavation in areas of recorded sites, or ones that would impact significant historic structures. Any proposed activities of this nature related to either farm expansion or the NMP should be reviewed by the Department.

III.B.5. Local community

III.B.5.a. Community features

III.B.5.a.01. Schools

The Town of Rosendale is broken into two school districts; Rosendale and Ripon (see map). The Rosendale Dairy is primarily located in the Ripon School District. However, both school districts have bus routes near Rosendale Dairy. The closest school in the Rosedale School District is Laconia High School which is approximately 6 miles from the dairy. The closest school in the Ripon School District is Murray Park Elementary School with is approximately 8 miles from the dairy. Figure 26, below shows nearby school locations, school bus routes, and medical facility locations.

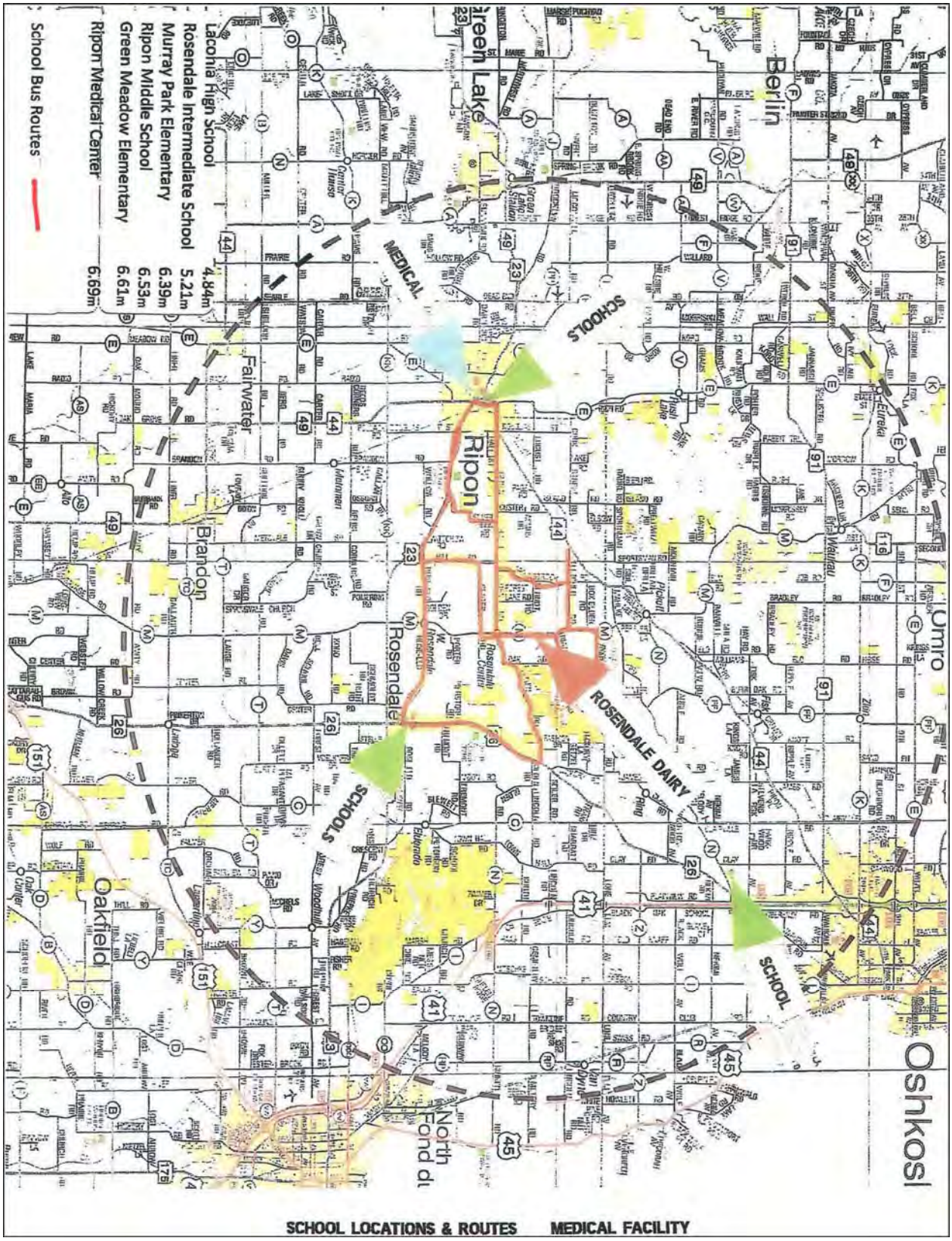


Figure 26 - Schools, School Bus Routes & Medical Facilities

III.B.5.a.02. Hospitals, clinics & nursing homes

The closest hospital is Ripon Medical Center located at 933 Newbury Street in Ripon (see Figure 26, page III-53). It is approximately 12 minutes and 8.1 miles from the Rosendale Dairy. The second closest hospital is St Agnes Hospital—Berlin located at 745 South Street in Berlin. It is approximately 21 minutes and 14 miles from the Rosendale Dairy. The third closest hospital is Mercy Medical Center located at 500 South Oakwood Road in Oshkosh. It is approximately 21 minutes and 17.1 miles from the Rosendale Dairy.

The closest medical clinic is Affinity Medical Group-Ripon located at 635 West Oshkosh Street in Ripon. It is 10 minutes and 7.6 miles from the Rosendale Dairy. The second closest medical Clinic is Affinity Medical Group located at 1855 South Koeller Street in Oshkosh. It is 18 minutes 15.2 miles from the Rosendale Dairy. The third closest clinic is CHN Internal Medicine Clinic located at 225 Memorial Drive #1100 in Berlin. It is 27 minutes and 20.1 miles from the Rosendale Dairy.

The closest nursing homes are found in surrounding communities such as Ripon, Oshkosh, and Fond du Lac.

III.B.5.a.03. Parks & recreation areas & facilities

The Rosendale Dairy is located within the Glacial Habitat Restoration area which provides recreation areas for the citizens of Wisconsin. The Glacial Habitat Restoration Area (GHRA) is a Wisconsin Department of Natural Resources (WDNR) program which takes a regional approach to wildlife management by restoring, creating and maintaining habitat for waterfowl, wild pheasants, and non-game songbirds. The program's focus is the creation of a patchwork of restored grasslands and wetlands amid the established croplands of Columbia, Dodge, Fond du Lac and Winnebago counties and thereby maximizing wildlife habitat. In an era of increasing rural development and disappearing farmland and wetland, these areas are critical to the nesting, feeding and overall survival of birds and other wildlife populations. Figure 27, below, shows county recreation areas in Rosendale Township. See also Figure 18 on page III-27.

Through the purchase of land and the establishment of perpetual conservation easements, the GHRA is working towards its goal of restoring and conserving 38,600 acres of permanent grassland nesting cover and 11,000 acres of wetlands in the 24-township area. These restoration activities are made possible through a variety of funding sources including the use of state Stewardship funds which are used primarily for land acquisition activities. In addition, habitat restoration activities are funded through license fees as well as pheasant, turkey and waterfowl stamp accounts. Federal sources of funding are also utilized heavily including Pittman-Robertson Funds and North American Wetland Conservation Act (NAWCA) grants. Besides these public sources of funding, numerous local and state conservation organizations, as well as private donors, contribute financially to the success of the GHRA habitat objectives.

North Woods County Park is a largely undeveloped 35-acre woods located on Highway 26 about two miles north of Rosendale. Some hiking trails have been cut in the woods, and a small, gravel parking lot is available. Park users are allowed to hike through the property and enjoy nature.

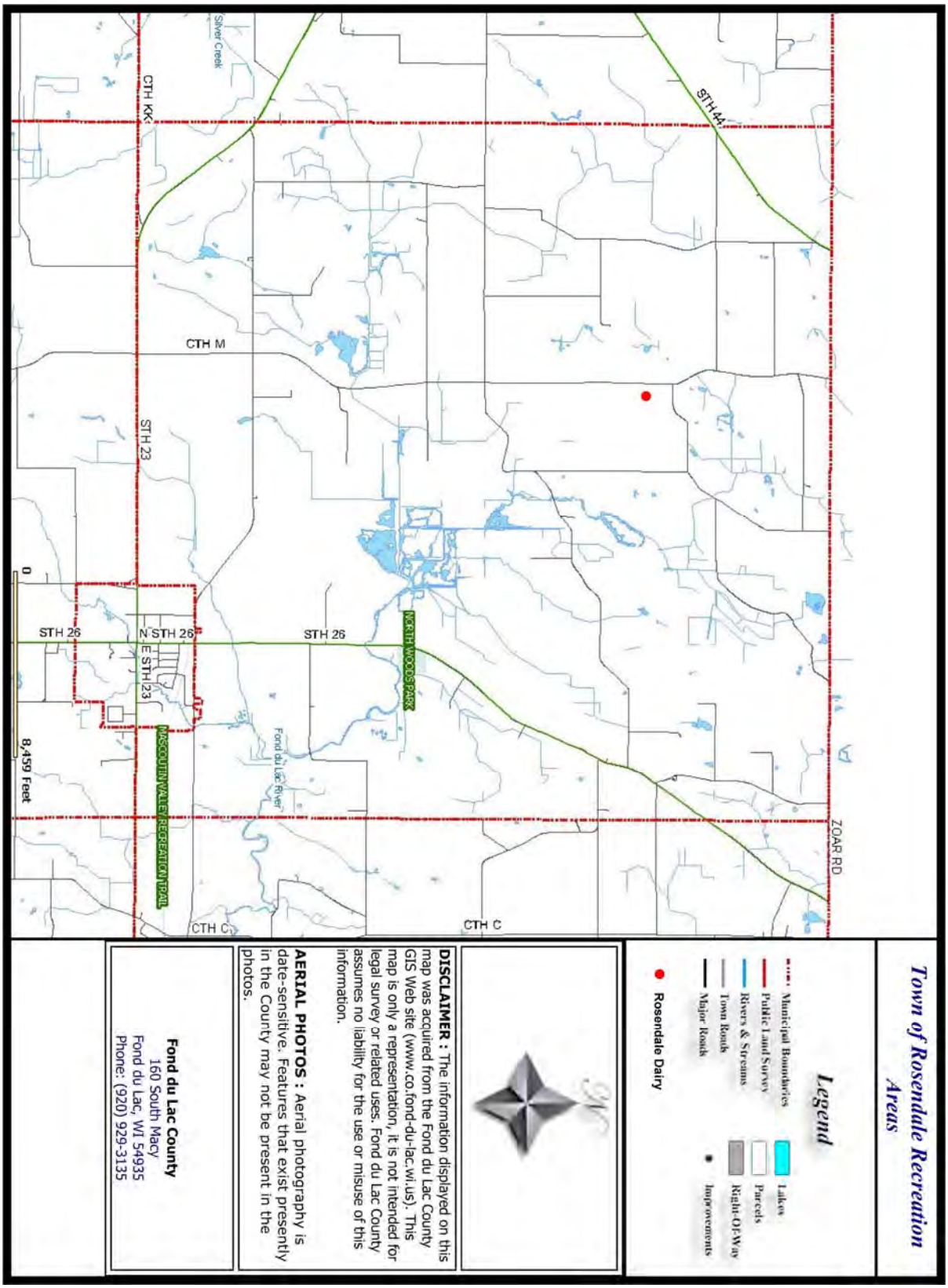


Figure 27 - Town of Rosendale Recreation Areas

III.B.5.b. Local roads and use

III.B.5.b.01. Description

Transportation needs for the Rosendale Dairy are provided by a network of local, county and state roads and highways. Transportation facilities on the State Trunk Highway (STH) system serving the dairy are State Trunk Highway 44 (STH 44) to the north and west; STH 23 to the south; and STH 26 to the east. A number of town roads serve the local residents and farms and will also provide access for traffic coming from and going to the dairy.

The dairy is located on County Trunk Highway M (CTH M) between STH 44 and STH 23. Traffic count data from 2005 (WI Dept of Transportation-WDOT) shows an average daily traffic (ADT) count of 760 vehicles per day on CTH M north of the dairy site, and 860 vehicles per day south of the dairy. Crash data from WDOT (2003-2008) shows 260 crashes per hundred million entering vehicle. This does not include deer crashes. A typical county highway has a crash rate of 150 crashes per hundred million entering vehicles. Local roads are shown in Figure 28, below.

There is no rail access in the township. The closest commercial airports are in Oshkosh (~12 miles) and Fond du Lac (~13 miles).

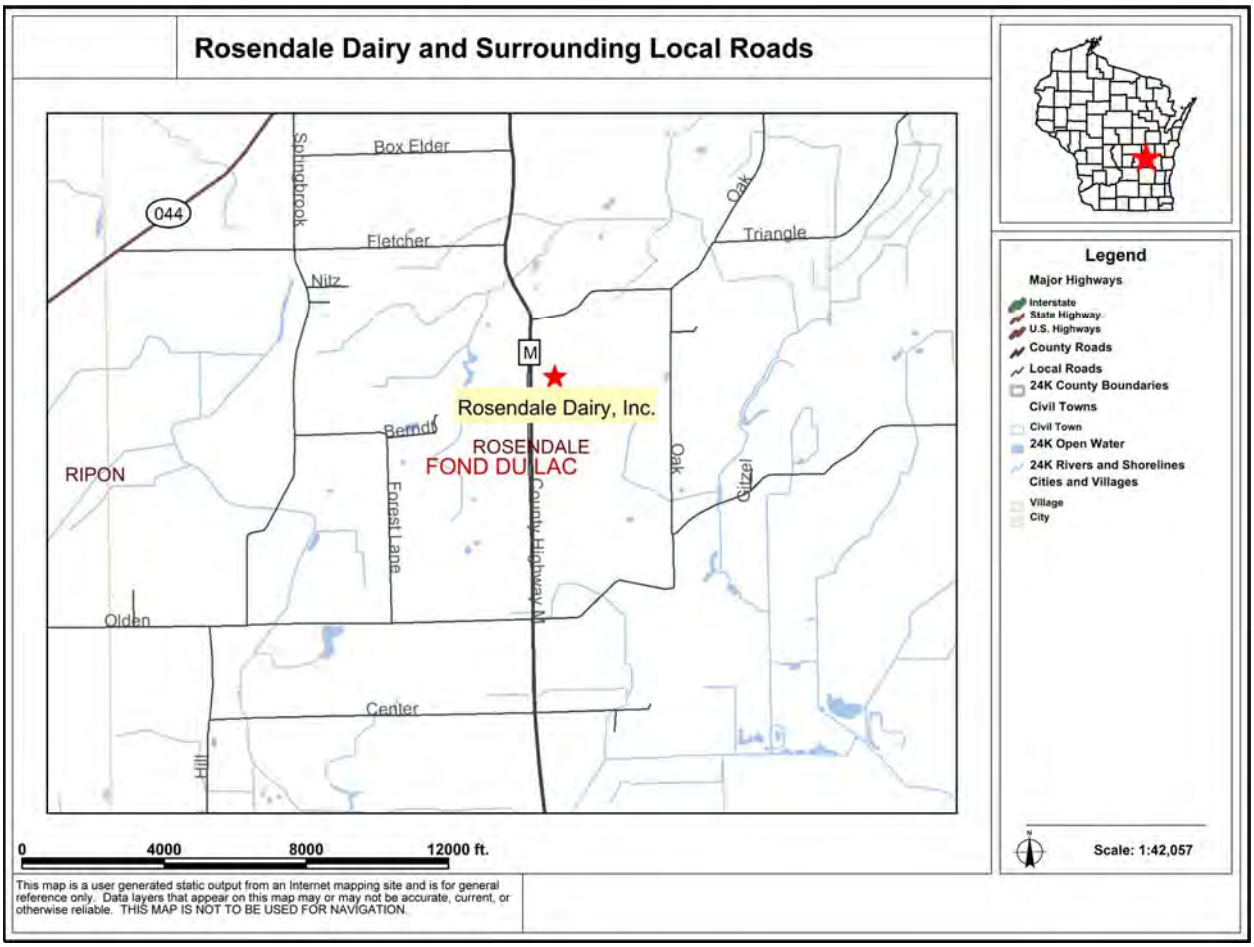


Figure 28 - Local Roads

III.B.5.b.02. School bus routes

The Rosendale school bus route closest to the Dairy uses Olden Road – CTH M – Center Road – Hill Road – Rose-Eld Road – Hwy 23 – Hwy 26.

The Ripon school bus route closest to the Dairy uses STH 23 – Silver Creek – Silver Creek Road – Springbrook Road – Forest Lane Road – Springbrook Road – Fletcher Road – CTH M – Zoar Road – Triangle Road – Oak Road.

School bus routes are shown in Figure 26 on page III-53.

III.B.5.b.03. Safety records

According to crash information (2003-2008) supplied by the Wisconsin Department of Transportation, 31 crashes have occurred along the CTH M corridor from STH 23 to STH 44 including these two intersections. The crash rate for this segment is about 260 crashes per hundred million entering vehicles excluding deer crashes. A typical county highway has a crash rate around 150 crashes per hundred million entering vehicles excluding deer crashes.

The intersection of STH 23 & CTH M has had 3 crashes over the 5.75 year period. The intersection of STH 44 & CTH M has had 5 crashes over the same time period. This crash data would not indicate a current safety issue at either intersection.

III.B.c. Residential neighbors

III.B.c.01. Description

Within approximately one mile of the dairy site, there are about 24 single family residences. The majority of them are one quarter mile or further apart. Four of the residences closest to Rosendale Dairy were purchased by Milksource. They are all located along County Road M – one directly across the road to the west, two due south of the dairy on the same side of the road, and the fourth is the first residence north of Triangle Road on the west side of County Road M.

The remaining two residences closest to the dairy site not owned by Milksource are about a quarter mile north of the north property line and south of the south property line. There are several residences also located directly adjacent to the fields which will be used for landspreading.

Figure 29, below, shows Rosendale Dairy's residential neighbors.

Figure 29 - Residential Neighbors

III.B.c.02. Private wells

Approximately 46 private wells are located within one mile of the facility. Figure 30, below, shows the closest wells. The wells draw water from either the Galena-Platteville, St. Peter or both aquifers. They range in depth from 66 to 248 feet and are located between 250 and 11,000 feet from the property boundary.

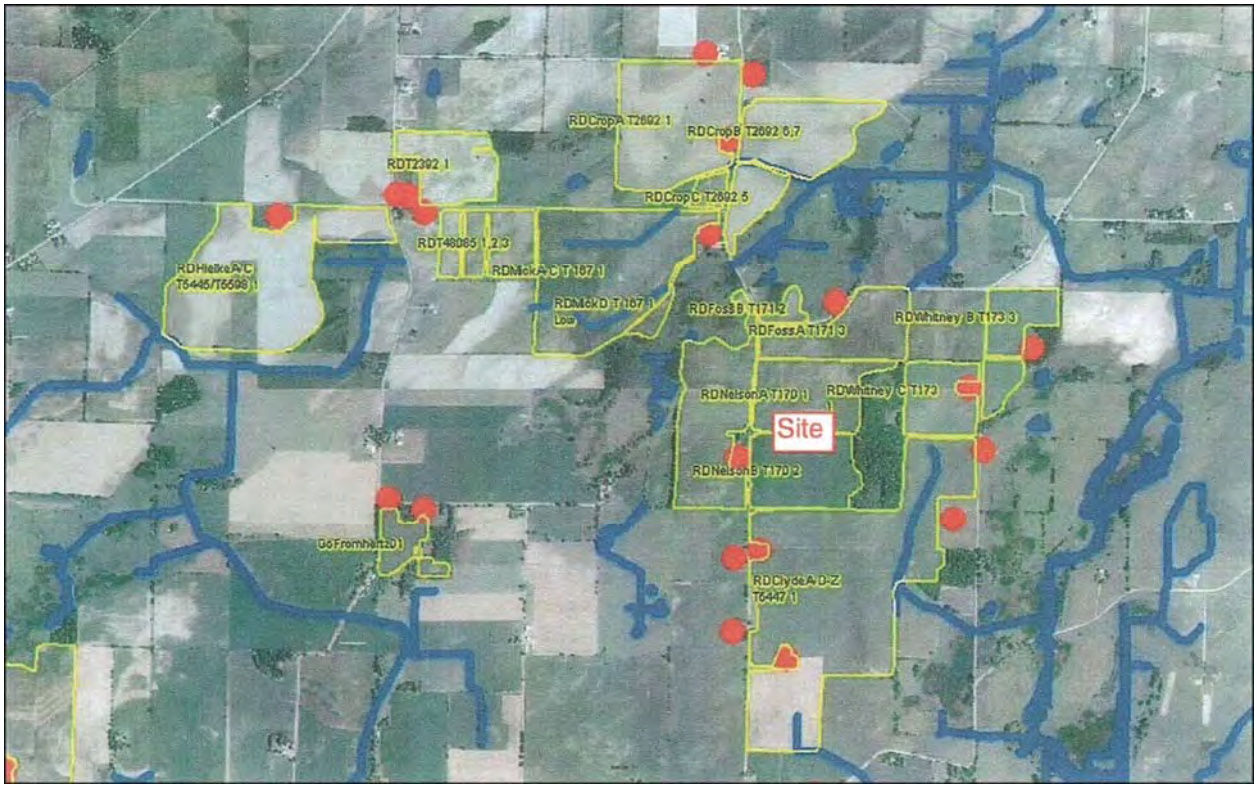


Figure 30 - Nearby Wells

Figure 31, below, shows typical well construction in the western part of Fond du Lac County.

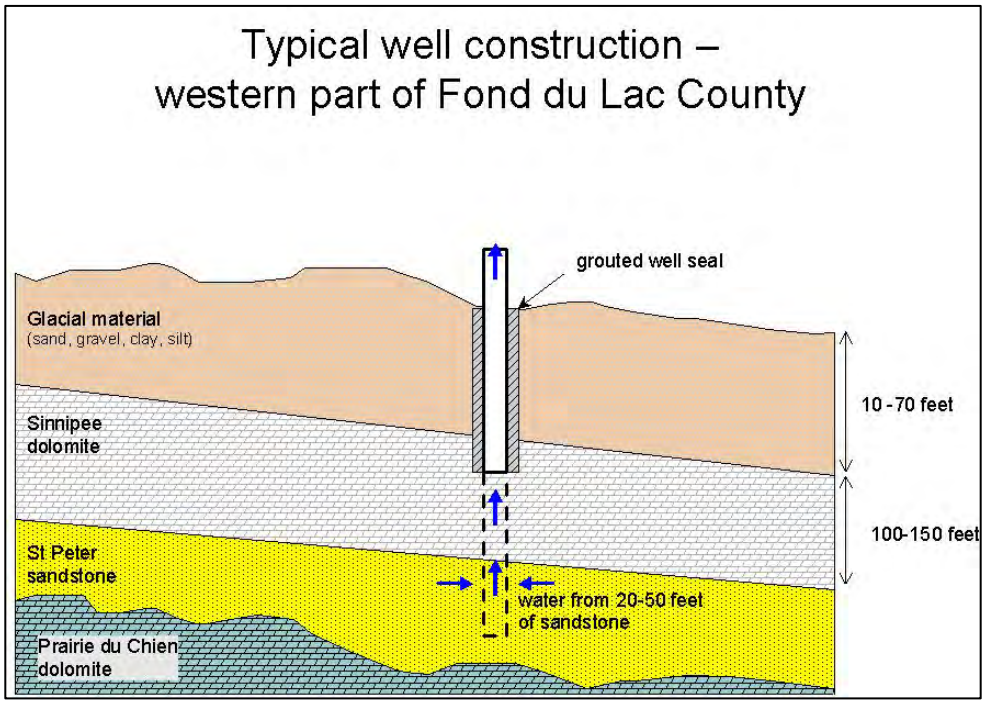


Figure 31 - Typical well construction in western Fond du Lac County

IV. Environmental Effects

Pursuant to s. NR 150.22(2)a.1, this chapter of the EIS presents an analysis of the extent of short–term and long–term environmental effects including secondary effects that may result from the proposed action.

IV.A. Physical environment

IV.A.1. Production site

IV.A.1.a. Topography

Changes to topography for Phase I construction activities involved moving existing material around on the site to provide a level surface for construction. There will be no additional changes to topography during Phase II.

IV.A.1.b. Soils

For Phase I construction activities, topsoil at the site was stripped and stockpiled, then used for finish grading and landscaping at the site. There was no need to bring additional topsoil from off-site. There will be no need for additional topsoil during Phase II.

IV.A.1.c. Geology

The Geology of the site will not change.

IV.A.1.d. Hydrography & surface water quality & quantity

IV.A.1.d.01. Wetlands

No wetlands were impacted during construction of Phase I, and none will be impacted due to construction during Phase II. Discussion of effects of production site stormwater and other discharges on off-site wetlands is found in the following section.

IV.A.1.d.02. Surface water

The large amount of impervious surfaces at site post-development will decrease the amount of precipitation infiltration into the soil. Instead of infiltrating, most of the precipitation will be directed to stormwater detention basins. Some of the water in the detention basins may eventually infiltrate into the soil, but the relative proportion compared to pre-development conditions is unknown.

It is likely that the agricultural fields which occupied the site prior to development contributed to runoff pollution generated from this portion of the Fond du Lac River Watershed. It is possible that there will be less sediment leaving the stormwater control basins than there was leaving the site when it was in cropped fields.

The production site covers only a small portion of the West Branch Watershed. Therefore, the alteration of infiltration and runoff patterns will likely not have a discernable impact on the hydrology or water quality of the nearby intermittent and perennial streams or wetlands

The primary potential impacts to water quality due to the Rosendale Dairy project are associated with the production and handling of manure and process wastewater at the proposed operation. Nitrogen, phosphorous, and pathogens associated with manure and process wastewater produced at livestock operations can have detrimental impacts on groundwater, surface waters and wetlands if not properly stored, handled, and land applied. Phosphorus and nitrogen in manure and other sources of nutrients that are applied to cropland to produce feed for livestock can also be a source of detrimental impacts to groundwater, surface waters and wetlands. Forms of nitrogen are toxic to fish (ammonia) and can impact human health, primarily in fetuses and young children, when present in drinking water (nitrate). Phosphorus in surface waters promotes algae growth (known as eutrophication), which can result in decreased oxygen levels, fish kills, and reduced recreational opportunities.

Biochemical oxygen demand (BOD) associated with manure and process wastewater can consume oxygen in surface waters and contribute to fish kills. Soil erosion associated with crop production can result in sedimentation in roadside ditches and wetlands. Soil erosion can also alter streambed elevations which can increase the probability and severity of floods. Sediment can also destroy or degrade aquatic wildlife habitat and damage commercial and recreational fisheries.

The basis of the WPDES permit program is to require CAFOs, such as Rosendale Dairy, to implement Best Management Practices (BMPs) to avoid or minimize potential impacts to the environment, including surface water quality and quantity. This is accomplished through: 1) the review of structures and systems associated with manure and process wastewater storage/handling; 2) the review of an operation's Nutrient Management Plan (NMP) that details how, when, where and in what amounts manure and process wastewater from the operation will be landspread: 3) issuance of a WPDES permit that outlines operational requirements for the storage, handling and land application of manure and process wastewater; and 4) review and oversight of the CAFO once it is operating, which includes conducting oversight inspections and pursuing enforcement action when needed to obtain permit compliance and address water quality impacts.

CAFOs are not allowed to discharge pollutants from the CAFO production area (e.g., manure and process wastewater storage structures, feed storage areas, animal housing areas) to navigable waters, except under certain conditions where additional protection for surface waters is provided. In order to prevent discharges and protect surface waters, means of collecting manure and process wastewater, leachate, and runoff from feed storage areas along with runoff and stormwater from impervious surfaces must be designed to meet or exceed the applicable regulatory requirements.

Stormwater basins

Figure 4 on page I-7 shows the post-project property hydrography. Storm water runoff from the general production area, the feed storage pad, rooftops, and driveways is directed to one of two stormwater management basins. The "first flush" of storm water (the stormwater resulting from the first 0.1 inch of rainfall) coming from the feed storage pad is collected and pumped to Waste

Storage Facility (WSF) #2. After the first flush, all stormwater from the feed storage pad is directed into the North Stormwater Basin, which is in the northeast corner of the site and is designed to capture runoff from the large feed storage pad and areas north of that feed pad. The basin in the southeast corner of the site (South Stormwater Basin) is designed to capture runoff from the north side of the North Freestall Barn to the south side of the South Freestall Barn.

Each stormwater basin is constructed with a forebay and main bay. The forebay is designed to provide for removal through settling of a majority of any sediment or other suspended solids that might be in the runoff. The main bay is designed to provide additional settling and retention of some of the runoff. Following the main bay, the north stormwater basin discharges to a vegetated treatment area east of the basin, then into cropland to the northeast. The south stormwater basin discharges to a grass-lined waterway which has three check dams in it.

Leachate and manure collection and storage

All runoff from the sweet corn silage pad is collected and directed into WSF #3. The floor and walls of the sweet corn silage pad are designed as watertight concrete structures in accordance with Table 5, NRCS Standard 313 and NR 243.15, Wis. Adm. Code. The pad and walls are constructed of concrete with water seal between the floor joints and between the floor and wall. Wall joints are bolted together and sealed with an elastomeric sealant. Additionally, a tile drain system lies between the concrete pad and a 1.5 foot thick clay layer. This tile system is designed to collect leachate that may pass through any cracks in the concrete floor. The tile line system drains to a fully contained poly-lined containment system.

The feed storage pad has a concrete liner designed in accordance with NRCS Standard 629 and NR 543.15(9), Wis. Admin. Code. The liner is sloped according to NR213 to facilitate collection of leachate and runoff in order to direct it to a single sump. The leachate and first flush of runoff are collected and transferred to WSF #2. Runoff that occurs after the first flush is directed into the north stormwater basin.

The sand and solids stacking pad is also a water tight containment meeting all the criteria of NRCS Standard 313 - Waste Storage Facility. Precipitation that falls on the sand and solids stacking pad will be collected and discharged into WSF #1.

All livestock at the Rosendale Dairy will be totally confined within the barns. The barns include concrete alleys and concrete walkways to the milking parlor. The alleys hold the manure until it is moved into the transfer system. The alleys will be scraped three times a day. The gutter and manure transfer components have been designed and installed to meet the criteria of NRCS Practice Standard 634 – Manure Transfer. Manure from these barns is transferred into WSF #1.

All manure transfer systems and storage facilities are constructed, at a minimum, in accordance with USDA Natural Resource Conservation Service Standards 313 (Waste Treatment Facility), 634 (Manure Transfer), and 629 (Waste Treatment) plus applicable sections of NR 151, 213, 216, and 243, Wis. Adm. Code. The NRCS standard requires an extensive site assessment to determine area soils and depth to groundwater and bedrock to ensure structures are properly designed and constructed. NRCS Standard 313 specifies concrete thickness, reinforcement and

other design requirements for these structures, as well as separation distances between the bottom of the structure and groundwater/bedrock to minimize potential leaching from these structures that could contaminate groundwater.

Rosendale Dairy must install permanent markers in each waste storage facility to indicate the margin of safety (MOS - the level which is vertically one foot below the lowest point of the top of the storage structure) and the mean operating level (MOL – the level measured vertically from the lowest point of the top of the storage structure that is the sum of the MOS and the level necessary to contain the precipitation and runoff resulting from a 25-year, 24-hour rain event). This requirement is intended to help avoid potential overflows and discharges. Design requirements also protect against potential catastrophic failures of these structures. Design and construction in accordance with these requirements should ensure adequate protection of groundwater and surface waters.

Additionally, WPDES permits require that all CAFOs develop and adhere to an Operation and Maintenance (O&M) schedule and an emergency response plan. The O&M schedule requires the facility to monitor and inspect at various frequencies components of the waste storage facilities, manure transfer, leachate collection, runoff controls and stormwater collection systems, record findings, and submit reports to the Department to document proper operation and maintenance of these systems as well as compliance with the Nutrient Management Plan (NMP) requirements. If the operation conducts landspreading in accordance with its NMP and WPDES CAFO permit, maintains an adequate land base for landspreading, and properly inspects and maintains manure storage facilities and runoff control systems, the threat to groundwater, wetlands and surface water should be minimal under normal operating and climatic conditions.

Rosendale Dairy has developed an emergency response plan and employee training plan to address potential spills, storage facility overflows, and other unexpected events from both the CAFO production area and land application areas. This plan will be reviewed as part of the WPDES permit process. The advance planning associated with an emergency response plan can help to minimize or altogether avoid environmental impacts associated with unexpected problems.

The only change in Phase II which affects runoff is the addition of the North Freestall barn. Potential runoff from this building was included in calculations for designing the south stormwater basin.

IV.A.1.e. Groundwater quality & quantity

<u>Groundwater quality</u>

There is a potential for increased nitrate and bacteria contamination in private wells in the vicinity of the dairy and spreading sites. Available private well construction reports show that the upper dolomite (Galena-Platteville) the St. Peter sandstone are the main source of drinking water for the area and the county. In western Fond du Lac County, the glacially deposited sediments are relatively thin, overlying the dolomite. Groundwater flow in the dolomite is via fractures and bedding planes with very little attenuation of contaminants. Once contamination reaches the

dolomite it will be able to move quickly to the St. Peter sandstone. In the St. Peter, contamination will be pulled into the lower aquifers by strong downward gradients that exist in this area. Once this happens, contamination could become widespread.

The DNR recommends that groundwater around the manure storage lagoons be monitored for leaking using monitoring wells constructed as per chapter NR 141, Wis. Adm. Code. It is also recommended that residents be given information on DNR well testing recommendations and have their wells inspected. It is also recommended that the Dairy inventory all wells near their operations.

The facility will require a private on-site domestic sewage system to serve the employees. Improperly designed or maintained on-site systems have the potential to impact local groundwater. County permit conditions are in place to assure proper design, construction and maintenance of such systems. Thus far, no permit has been issued by Fond du Lac County for the private sewage system. It has been determined this site is not suitable for a conventional septic system. The other options are construction of a mound septic system or installation of a holding tank. Fond du Lac County does not allow the construction of mound septic systems on disturbed sites and currently does not issue permits for holding tanks. The owners plan to provide portable toilets for on-site human waste disposal until such time as Fond du Lac County issues a permit for the mound system or holding tank.

Groundwater quantity

According to the high capacity well application there will be some drawdown in the lower aquifer. Pumping information will be submitted to the DNR. It is recommended that drawdown in the wells be monitored prior to Phase II to determine if the permitted high capacity wells will provide sufficient water for the facility. It is also recommended that they consider water conservation measures to reduce stress on the aquifer.

IV.A.1.f. Air quality

Airborne contaminant emissions emanating from concentrated animal feeding operations (CAFO) include gases and particulates. A combination of gases or particulates of sufficient concentration and chemical composition may also be perceived as an irritant odor downwind of a CAFO. The generation rate of these gases, organisms and particulates varies depending on time of year and day, species, type of housing, manure handling system, feed type and management system. Odor emissions can vary widely throughout the day. Once these contaminants are generated they can be emitted through the barn's ventilation system or by natural weather forces. After these materials are emitted and become airborne they are transported downwind. Travel distance can vary greatly due to size of particles, weather conditions and surrounding topography and vegetation. These variations have made it extremely difficult for researchers and regulators to form a clear picture of the expected emissions from CAFOs.

Even when using best management systems and mitigation techniques, some airborne contaminants may be generated. Concentrations may build up inside livestock buildings that result in animal and human health concerns. Most concerns are associated with chronic or long-

term exposure. However, some human and animal health concerns or safety hazards can result from acute or short-term exposures.

Although a great number of volatile chemicals and other substances are emitted from animal wastes, research and public concerns have focused primarily on hydrogen sulfide (H_2S), ammonia (NH_3), odors, particulate matter (PM), and volatile organic compounds (VOC). Diesel exhaust particulate matter emissions from semi-trucks, manure spreading, and associated farm operations are also associated with CAFOs.

Based on 2002 National Emissions Inventory data, dairy operations contribute 89% of Wisconsin's total ammonia emissions from animal agricultural operations. The same emission inventory data indicates that Wisconsin contributes 14% of the national dairy-related ammonia emissions.

The Department has not adopted the methodology or programs of other states with regard to dairy and air quality permitting. Instead, the Department has made a conscious decision to coordinate its work in this area with the outcome of the national monitoring effort described below. The potentially applicable permit thresholds may be those contained in s. NR 406.04(2)(c), Wis. Adm. Code for VOCs and s. NR 407.02(4), Wis. Adm. Code for ammonia major source.

EPA is currently in the middle of a 2 year study designed to measure emissions from a variety of confined animal operations around the country, with the intention of developing verifiable emission factors to be applied to the industry. Their timeline is to be done with data collection in late 2009, and to have evaluated the data and released final reports and emission factors by July 2011.

Despite the lack of established emissions factors for animal agricultural operations at the federal level, some states have addressed air quality issues at animal agricultural operations. Both California and Idaho have been issuing air quality permits to larger dairy operations and have taken different approaches based on many factors including air quality nonattainment issues for California's major dairy production areas. Both states (and others) have focused efforts on developing and evaluating best management practices (BMPs) to mitigate impacts to air quality. BMPs have addressed odor, ammonia, VOC and/or PM control practices.

Based on information from Rosendale Dairy, a number of BMPs will be implemented at the facility which may mitigate air emissions relating to odor, VOC, and/or ammonia (including diet manipulation, solids separation, frequent scraping, mechanical sand separation). There are other BMPs which have been mentioned by Rosendale Dairy such as covering lagoons and/or implementing a biogas anaerobic digester. Implementation of any of these practices could potentially mitigate air quality impacts. Additional BMPs are discussed in the "Alternatives" section.

The Department has not issued air quality permits to agricultural operations based on language contained in s. NR 445.08(6) (d), Wis. Adm. Code. Agricultural waste as defined in ch. NR 445, Wis. Adm. Code (Control of Hazardous Pollutants) means "livestock manure, wastewater

contaminated with livestock manure, animal waste byproducts and litter and bedding material contaminated, derived or mixed with livestock manure." While Wisconsin has delayed application of NR445 to agricultural operations until the EPA emission factors are released, the DNR has been involved in a study examining the effect of a handful of best management practices (BMPs) on nearby odors and concentrations of ammonia and hydrogen sulfide. The final stages of this project will occur in Spring of 2009, with the final report released in July. An interim report will be available in January 2009.

Emissions of criteria pollutants (PM_{10}, nitrogen oxides, sulfur dioxide, carbon monoxide, total VOCs) from agricultural waste are not covered under ch. NR 445, Wis. Adm. Code. Other emission units at agricultural operations such as Rosendale Dairy may be subject to ch. NR 445, Wis. Adm. Code because they might not meet the definition of agricultural waste or be covered by another exemption. Air pollution control permits are issued for industrial sources emitting more than 25 tons per year (tpy) of VOC, 100 tpy of particulate matter, or 100 tpy of ammonia.

Wisconsin's fugitive dust rule, s. NR 415.04, Wis. Adm. Code, establishes general limitations on fugitive dust and sets specific precautions for limiting fugitive dust emissions. Examples of fugitive dust from Rosendale Dairy include particulate from grain and feed handling and dust from truck traffic. Rosendale Dairy will reduce the impact of roadway dust through their plan to apply water to unpaved roads during Phase I and to pave roadways with asphalt during Phase II. Rosendale Dairy will reduce the impact from grain and feed handling dust by mixing grain within the Commodity Building.

Wisconsin Administrative Code requires all sources of air emissions to regulate objectionable odors (s. NR 429.03, Wis. Adm. Code). This rule establishes general limitations on objectionable odor, defines the tests for what constitutes objectionable odor, and sets abatement or control requirements. Rosendale Dairy has developed an odor management plan that identifies management practices that will be followed to reduce odor issues. These measures include cleaning the housing facilities frequently, conserving water, covering feed, removing dead animals from the property within 24 hours, and notifying neighbors before agitating or spreading manure.

Over the past several years, in response to complaints about air pollution associated with livestock operations, the Department has conducted a limited amount of ambient air monitoring for hazardous air pollutants near a variety of livestock operations. Measurements in the vicinity of farms within Wisconsin have shown peak hourly concentrations of ammonia downwind from large dairies ranging from 1 $\mu g/m^3$ to 1000 $\mu g/m^3$. However, the monitored concentrations have not exceeded the daily acceptable ambient concentration standard (418 $\mu g/m^3$) established in ch. NR 445, Wis. Adm. Code. In addition, hydrogen sulfide has been measured downwind of dairies at levels near 100 $\mu g/m^3$, as compared to the daily standard of 335 $\mu g/m^3$.

The actual off property concentrations associated with the operation of Rosendale Dairy will depend on a wide variety of conditions, including physical layout, temperature, humidity, feeding regime, and a variety of manure management practices. The Department will continue ambient monitoring at livestock operations and developing best management practices. Another air related impact from the facility is the increased nitrogen deposition from airborne ammonia.

This has been documented in studies in the Netherlands, North Carolina, and Idaho. Effects include increased soil acidification, plant nitrogen fortification, and a tendency within the ecosystem towards nitrogen-loving plants.

As established in ch. NR 445, Wis. Adm. Code, the ambient concentration ammonia and hydrogen sulfide cannot exceed 418 and 335 micrograms per cubic meter, respectively, both on a 24 hour average basis, measured at the property line boundary. Preliminary modeling performed by BAM in support of the Environmental Assessment determined that the ammonia ambient air standard for both Phase I and II could be exceeded at the property boundary. This analysis was based on BAM assumptions on the nature of the Rosendale Operation.

Subsequent to the EA, Rosendale Dairy supplied additional data that detailed the nature of the emissions from the two barns and provided different physical parameters. Rosendale Dairy submitted modeling information that demonstrated compliance with the ammonia and hydrogen sulfide standards at and beyond the company property. BAM staff reviewed the information and performed an independent analysis with the newly submitted data that confirmed the Rosendale analysis. The main difference between the EA analysis and the EIS analysis is in the parameterization of the emissions from the two barns. For the earlier EA analysis, it was assumed that the barns would be open on all sides and emissions were modeled as a ‘volume’ source. Rosendale Dairy has indicated that the barns will actually be enclosed with ventilation fans used to maintain air flow inside the buildings. These fans were modeled as ‘point’ sources within the EIS analysis to better reflect the nature of the emission.

IV.A.1.g. Flora

Phase I impacts to the flora at the production site should be minimal since the site has been constructed on land that was formerly used to grow agricultural crops. The flora acclimated to these land use practices, agricultural crops and weedy annual and perennial plants, are capable of tolerating these disturbed conditions. In the short-term, the land use change at the CAFO site will not alter the associated flora significantly in the surrounding area since the primary land use in the area is agricultural based. Over the long-term, agricultural crops will still be a dominant in the area in addition to the associated weeds as agriculture is the dominant type of land use in the immediate and surrounding area of the CAFO. Phase II should result in no new impacts at the production site, since construction and operations will remain on that site.

IV.A.1.h. Fauna

The impact of losing 100 acres of cropland will have very little impact to the local wildlife species because of the abundance of similar cropland habitat in addition to the more desirable habitats in the area.

The presence of Rosendale Dairy will tend to maintain the rural, agricultural character of this area as rural residential development would likely not occur in this area. Agricultural open lands do support common species of wildlife..

Uncontrolled run-off from the site into nearby wetlands could have severe impacts on species using these areas.

The potential greatest impact to wildlife species would be the occurrence of a large manure spill at the facility. Manure spill impacts may include: high ammonia concentration, high phosphorous concentration, bacterial contamination, oxygen depletion, nutrient enrichment which promotes excessive vegetative growth which can eventually lead to oxygen depletion by aerobic organisms breaking down the decaying vegetation. Direct negative impacts would be mortality of any animals in that area and a decline in the number and species of aquatic invertebrates and herptiles that utilize these wetlands for all or part of their life cycle. These wildlife species are the foundation of the food chain for all of the wetland dependent wildlife species, especially waterfowl, reptile and amphibians which would also affect higher level wildlife species in the food chain, such as mink, muskrat, raccoon, and otter.

Lighting of the site would attract more insects consequently attracting foraging bats to the site. Primary bat species would include both little brown bat and big brown bat. It would be more attractive to insectivorous passerine bird species such as the common nighthawk.

Wildlife contact with livestock, especially local white-tailed deer population, could lead to possible disease transmission such as bovine tuberculosis. The facility could construct perimeter fence (ideally 10 feet high) around entire site for biosecurity reasons and secure all livestock feed so it is inaccessible to wildlife to limit potential disease transmission.

Animals entering the production site run the risk of mortality from truck traffic and falling into the manure pits. Mesh fencing about two feet high from ground level would be required to keep wildlife from falling into manure storage pits, especially reptiles and amphibians migrating from their breeding area wetlands to their upland foraging areas. There are nearby wetlands north, east and west of the site.

IV.A.1.i. Rare species

No impacts to listed species are expected as the NHI query indicated that no rare species were present within the project area or surrounding 1-mile buffer.

IV.A.2. Sand and soil borrow and disposal sites

All fill and topsoil for this project grading and construction was obtained from within the construction site. Topsoil was removed prior to construction, temporarily stockpiled at two sites within the property boundary during construction, and then used on site as needed. It is anticipated that all stockpiled topsoil will be used at the farm site. Appropriate erosion control measures were taken to ensure that any runoff from exposed and stockpiled materials did not result in this material leaving the construction site. Gravel for subgrade or final grading was obtained off-site from four commercial sites owned by Michels Materials (Hughes, Schmokers, Bencarrie, and Edmunds). Sand for bedding will be purchased from Michels Materials – Meyer Pit located in Sections 35 & 36 in the town of Oasis, Waushara County (see Figure 5, page I-11). A spokesperson for Michels Materials informed the Department that they have at least 10 million tons of sand in inventory so the amount needed for bedding at Rosendale

IV.A.2.a. Topography
The changes to the topography of the commercial pits will be negligible as a result of this project. .

IV.A.2.b. Soils
The changes to the soils of the commercial pits will be negligible as a result of this project..

IV.A.2.c. Geology
The changes to the geology of the commercial pits will be negligible as a result of this project.

IV.A.2.d. Hydrography & surface water quality & quantity
The changes to the hydrography of the commercial pits will be negligible as a result of this project.
.

IV.A.2.e. Groundwater quality & quantity
The changes to the groundwater in the area of the commercial pits will be negligible as a result of this project.

IV.A.2.f. Air quality
The changes to the air quality in the area of the commercial pits will be negligible as a result of this project.

IV.A.2.g. Flora
The changes to the flora of the commercial pits will be negligible as a result of this project.

IV.A.2.h. Fauna
The changes to the fauna around the commercial pits will be negligible as a result of this project..

IV.A.2.i. Rare species

No impact.

IV.A.3. Manure spreading/irrigation sites

IV.A.3.a. Topography

Manure spreading sites (fields) listed in the Rosendale Dairy NMP (Phase I) are not expected to have any direct or long term effects on topography. Short term effects to field topography, however, will occur during spring or fall tillage or manure application activity (i.e. incorporation).

To address negative effects to topography caused by manure spreading, the NMP requires implementation of erosion controls to ensure all fields managed to meet Tolerable Soil Loss (T) for the rotation [NRCS 590 V.A.2]. Ephemeral field erosion is minimized or eliminated via best management practices (e.g., contour strips, filter strips, maintaining > 30% crop residue on soils after planting, and fall cover crops) [NRCS 590 V.C.1].

IV.A.3.b. Soils

Manure spreading sites (fields) listed in the Rosendale Dairy NMP (Phase I) are not expected to have any short or long term negative effects to soils because the project is required to comply with its NMP and WPDES permit requirements. These requirements are written to protect the physical, chemical and biological condition of the soil. The only expected short term effects to soils will be from spring or fall tillage or application activity (i.e., incorporation).

The NMP describes liquid manure and process wastewater from the milking parlor will be pumped from storage lagoons into manure spreaders, and land applied. The project estimates manure applications will occur twice a month, for 3-4 day periods in May, July, October and November. This spreading will occur in spring before planting and fall after harvest or after harvest of alfalfa, wheat or other crops. In fall and spring, liquid manure will be injected as much as possible, or incorporated within 48 hours of application, whichever is safer. Incorporation will be completed using a disk till. In the summer, liquid manure is top dressed on alfalfa and applications will also occur on fields after wheat harvest.

The NMP for Phase I (see item 1 in appendix A in the NMP) has been reviewed by the Department and determined to be in compliance with applicable NRCS 590 criteria and all NR 243 requirements. The NMP addresses the application and budgeting of nutrients (e.g., manure and process wastewater) for plant production and soil fertility on a field by field basis.

The NMP describes, in specific detail, crops, tillage, nutrient application rates, locations, and methods implemented in order to protect surface water and ground water resources while maintaining the physical, chemical and biological condition of the soil. The NMP requires implementation of soil erosion controls to ensure:

- All fields managed to meet Tolerable Soil Loss (T) for the rotation [NRCS 590 V.A.2].

- Ephemeral field erosion is minimized or eliminated via best management practices (e.g., contour strips, filter strips, maintaining > 30% crop residue on soils after planting, and fall cover crops) [NRCS 590 V.C.1].

- All nutrient applications consistent with NRCS 590 nutrient management criteria (yield goals attainable under average conditions) and soil fertility recommendations found in UW-Extension Publication A2809 [NRCS 590 V.A.1].

The NMP accounts for all nutrient sources, including soil reserves, commercial fertilizer, manure, organic byproducts, and crop residues to ensure proper utilization and protect water quality.

IV.A.3.c. Geology

Manure spreading is not expected to have any short or long term negative effects to area geology.

IV.A.3.d. Hydrography & surface water quality & quantity

Discharges of manure to water bodies has the potential to cause direct, lethal effects on aquatic organisms and both short and long term shifts in habitat quality and biodiversity, public health threats from pathogens, and water quality impairments.

Manure releases associated with land application typically occur in four different ways: accidents in route to a spreading site, equipment failure at the site, or runoff from misapplication of manure.

One potential way for a discharge to occur is for a truck hauling manure to have an accident, resulting in a manure spill. However, depending on the site characteristics, volume spilled, and timeliness of emergency response, this does not necessarily pose an immediate risk to the aquatic environment. If the spill is not near a waterway, wetland, or flowing ditch and the manure is promptly contained and removed, there may be very little or no off-site environmental risk. On the other hand if the spill discharges into a stream, wetland, or flowing ditch, it may be difficult to contain and could pose a serious risk to water quality and aquatic organisms.

Once at a spreading site, another potential way for a manure spill to occur is from stuck or broken valves or transfer piping, and human error. Again the level of environmental risk from such a spill is determined by the volume of spill, site characteristics, and adequacy of emergency response.

Manure can also reach surface waters as a result of field runoff. Typically manure is either surface applied and tilled into the soil or directly injected into the soil six to eight inches below the surface. These methods of manure incorporation significantly reduce the potential for it to be picked up by surface runoff and delivered to nearby surface waters. Under some circumstance manure can be surface applied without incorporation.

If manure is applied in a manner inconsistent with the nutrient management plan, the risk of discharge to nearby water bodies increases. Land application of manure as part of the Rosendale Dairy nutrient management plan is more fully discussed elsewhere in this document.

Opportunities for containing manure discharged from field runoff are limited since it usually isn’t detected until the manure reaches a stream where its odor, color, and possibly the presences of dead or stressed fish, are observed and reported.

Finally, while it is a rare situation, manure releases can occur from failure of the manure storage structure itself. A properly engineered, constructed, and managed manure storage structure poses little risk to water quality. However, as with any man made structure, there is a remote possibility of failure.

A failure of bottom integrity could result in contamination of groundwater that may go undetected for a number of days or weeks. Potential impacts of manure on groundwater quality are discussed elsewhere in this document.

Another even more unlikely situation would be the structural failure of a side wall of a manure storage lagoon. A catastrophic failure of this sort could result in a large volume of manure reaching the intermittent and perennial stream channels near the facility.

Direct Effects

Regardless of whether manure is released in a spill or from field runoff, there is a strong potential for significant, direct, negative impacts to the aquatic environment. The greatest concern is from acute ammonia toxicity and high Biochemical Oxygen Demand (BOD), which results in rapid depletion of dissolved oxygen, causing asphyxia of aquatic organisms.

Ammonia toxicity and oxygen depletion typically associated with manure spills is lethal to fish, aquatic insects, snails, crayfish, mussels, and certain life stages of amphibians at the discharge site and for some distance downstream.

Due to the low gradient wetland stream channels common across the area, most of the manure solids would likely be trapped within the wetlands closest to the discharge site. The liquid portion moving downstream could still contain high levels of ammonia, dissolved phosphorus, pathogens, and BOD. Dilution and degradation of the toxic components of the spill will occur as it moves downstream.

The downstream extent of direct, acute impacts depends on the volume of manure, rate of stream flow, the volume of uncontaminated runoff water contributing to dilution, and water temperature. Department personnel have documented a number of large manure releases which had lethal effects on fish miles from the initial point of discharge.

Discharge of manure into a water body can be a human health threat from pathogens such as e-coli bacteria and microscopic parasites such as giardia and cryptosporidium. These pathogens can cause severe gastrointestinal distress and may be fatal to children, the elderly, and immuno-compromised individuals. The greatest threat is from contaminated drinking water.

In Wisconsin, almost all rural residences and many communities rely on groundwater as their source of domestic drinking water. Lake Winnebago is the source of drinking water for the cities of Oshkosh, Neenah, Menasha, and Appleton. Potential impacts of manure contamination of drinking and groundwater are discussed below.

Individuals may also inadvertently come into contact with pathogen contaminated surface water through swimming, wading, hunting, boating or trapping. These individuals may also be at risk for infection. For further information on public health threats from these pathogens please consult your local county health department or the Federal Centers for Disease Control and Prevention at: www.cdc.gov.

Another direct impact is phosphorus enrichment of water bodies. Phosphorus stimulates the growth of algae and other aquatic plants. When a water body becomes overly phosphorus enriched, algae can cloud the water in dense blooms, reducing light penetration so that rooted aquatic plants, which provide good fish habitat, struggle to survive.

The dense algae blooms seen on Lake Winnebago are the result of excessive nutrient enrichment. Some blooms are harmless green algae blooms but sometimes the excessive nutrients in the lake stimulate a blue-green algae (cyanobacteria) bloom. Blue-green algae can produce a variety of different toxins which can make the water unsafe for humans, pets, and wildlife. More information on blue-green algae can be found at:
http://dnr.wi.gov/lakes/bluegreenalgae/

In streams the algae can from dense blooms or form mats on the stream bottom, making it unsuitable for many organisms. When nuisance algae blooms die and decompose dissolved oxygen depletion can occur.

Secondary or Indirect Effects

Secondary or indirect effects are those resulting as a consequence of the initial, direct impacts. For example, many of the organisms directly impacted by a manure discharge are food for other organisms. Altering the food chain may produce secondary impacts on a number of other species.

Secondary impacts will be more obvious for terrestrial organisms, such as raccoons, that feed on aquatic organisms like mussels and crayfish. This issue is addressed in more detail in the portion of this document addressing Wildlife.

Short Term Effects

Acute toxicity for aquatic organisms is the most obvious short term effect resulting from a manure release. Once the toxic components are no longer in the system, aquatic organisms will begin to recolonize the impacted area. In most situations there will be nearby unimpacted areas that serve as a source of organisms for recolonization. The length of time it takes to recolonize will vary depending on the degree of initial impact and proximity of refuge areas. Organisms most tolerant of poor water quality and habitat will be the first to recolonize, while other less tolerant species will take longer to become reestablished-. It could take from a few months to several years to fully recolonize an area impacted by a manure release.

Water-based recreation will also sustain short term impacts. Since water containing manure will be very unappealing and may pose a health threat, people will likely choose to pursue water-based recreation elsewhere.

Long Term Effects

Long term impacts from a single acute spill are unlikely to persist for more than one or two years, depending on the degree initial of impact and the kind of organisms affected.

With a single release event, the manure and its resultant impacts will pass through the system or degrade in place to a level that is no longer detrimental to aquatic organism or water quality. As noted in the prior section, aquatic organisms will begin to recolonize the impact zone as soon as water quality begins to improve.

The deposition of organic matter from a single manure release can result in long term impact through on-going suppression of dissolved oxygen concentrations and from deposits of soft organic matter on stream beds. As the organic portion of the manure decomposes over time, dissolved oxygen is consumed and phosphorus formerly bound in cellular material is released. This can then serve as a long term nutrient source for the receiving water bodies.

Another kind of long term effect is from continual, low level, chronic discharges of manure or its constituents. The slow, steady, or episodic discharge of ammonia, BOD, and phosphorus has more potential to cause long term impacts than a single manure release.

Many of the waters in the vicinity of Rosendale Dairy are already phosphorus enriched. The network of intermittent and perennial stream channels constitutes a delivery system for dissolved and suspended material washed from the rural landscape. Phosphorus typically slowly works its way into stream channels attached to soil particles, organic matter (manure or other plant material), dissolved in runoff, and through drain tile discharges. Stream flows flush the phosphorus downstream to enrich receiving water bodies. While storm events flush large quantities of phosphorus downstream, phosphorus released from bottom sediments also flows downstream during low flow conditions. This process can result in nutrient enrichment of downstream water bodies.

Long term changes in aquatic species can result from chronic discharges of phosphorus and sediment by producing conditions that favor pollution tolerant organisms. These organisms can tolerate phosphorus enriched, low dissolved oxygen environments.

Ultimately, chronic discharges of phosphorus, sediment, and oxygen demanding materials can produce long term impairment of water quality, habitat, and the biological community of water bodies.

Finally, good water quality draws more people to recreate on the water than poor water quality. Therefore, water-based recreation typically declines as water quality and the biological communities they support, decline. This can result in long term changes in way people utilize the water resources of an area.

Strict adherence to the nutrient management plan will minimize the risk of a manure discharge to surface waters. All of the potential impacts on water quality, habitat, and biological communities described above will not be increased above current conditions if there are no new acute or chronic releases of manure associated with the activities of Rosendale Dairy.

IV.A.3.e. Groundwater quality & quantity

Groundwater quality

There is a potential for increased nitrate and bacteria contamination in private wells in the vicinity of the manure spreading sites. Available private well construction reports show that the upper dolomite (Galena-Platteville) the St. Peter sandstone are the main source of drinking water for the area and the county. In western Fond du Lac County, the glacially deposited sediments are relatively thin, overlying the dolomite. Groundwater flow in the dolomite is via fractures and bedding planes with very little attenuation of contaminants. Once any contamination reaches the dolomite it will be able to move quickly to the St. Peter sandstone. In the St. Peter, contamination will be pulled into the lower aquifers by strong downward gradients that exist in this area. Once this happens, contamination could become widespread.

The DNR recommends that groundwater around the manure storage lagoons be monitored for leaking using monitoring wells constructed as per chapter NR 141, Wis. Adm. code. It is also recommended that residents be giving information on DNR well testing recommendations and well inspections.

Because so little is known about depth to groundwater around the spreading sites, the DNR also recommends that additional information on soils for each spreading field be provided to the Department. Because of the vulnerability of the groundwater to contamination in the County it is recommended that field verification of soil surveys be done prior to spreading animal waste. Verification should include but not be limited to soil type, soil thickness, depth to water table if less than two feet, and distance to wetlands and wells. DNR recommends that wells near spreading sites be field located prior to spreading to insure that separation distances are in compliance with chapter NR 243, Wis. Adm. Code and NRCS 590.

Groundwater Quantity

According to the high capacity well application there will be some drawdown in the lower aquifer. Pumping information will be submitted to the DNR. It is recommended that drawdown in the wells be monitored prior to Phase II to determine if the permitted high capacity wells will provide sufficient water for the facility. It is also recommended that they consider water conservation measures to reduce stress on the aquifer.

IV.A.3.f. Air quality

Wisconsin Administrative Code requires all sources of air emissions to regulate objectionable odors (s. NR 429.03, Wis. Adm. Code). This rule establishes general limitations on objectionable odor, defines the tests for what constitutes objectionable odor, and sets abatement or control requirements. Rosendale Dairy has developed an odor management plan that identifies management practices that will be followed to reduce odor issues. These measures include conserving water and notifying neighbors before agitating or spreading manure.

IV.A.3.g. Flora

If the nutrient management plan is implemented correctly Phase I impacts to the flora should be minimal since the acreage being used for land spreading is currently active agricultural land. These areas should continue to be cropped in conjunction with land spreading at appropriate times. Any changes in vegetation are not expected to be significant as a result of land spreading manure. With the addition of the manure, weedy species that thrive in high nutrient environments may increase but would likely be eliminated through the process of preparing the fields for future crops. We assume that Phase II impacts would be similar, but this cannot be addressed as the Department has not been provided with Phase II spreading site locations at this time.

The over application of manure during land spreading could lead to offsite runoff of nutrients to the wetland and drainage systems which would negatively impact the wild rice production in the Fond du Lac River watershed. Excess algal blooms would reduce or eliminate germination of wild rice seed.

IV.A.3.h. Fauna

Rosendale has purchased and contracted to use over 5000 acres of land for the project. Preserving and protecting Fond du Lac County agricultural land base will provide habitat to those wildlife species that have evolved and adapted to this particular land use. This open landscape is very important to wildlife species such as northern harrier, upland sandpiper and short-eared owl. Loss of agricultural land would have negative consequences to wildlife species such as ring-necked pheasant, white-tailed deer, vesper sparrow, mourning dove, horned lark and killdeer. Wildlife primary use of agricultural fields is for foraging for food, such as insects, weed seeds and waste grains.

The over application of manure during land spreading could lead to offsite runoff of nutrients to the wetland and drainage systems which would negatively impact the wild rice production in the Fond du Lac River watershed. Excess algal blooms would reduce or eliminate germination of wild rice seed. This would have negative consequences to wildlife species that utilize these wild rice beds as part of their life cycle. Wild rice beds provide excellent brood-rearing habitat for mallard, wood duck and blue-winged teal because it provides cover and habitat for aquatic invertebrates which the ducklings utilize for their high protein life requirements.

IV.A.3.i. Rare species

Results from the NHI database query on the manure spreading sites indicated that there are a number of rare species found to occur within the properties or within the 1-mile buffer. At the Bartz Farms-complex found two historic plant hits were found on four of the properties in this group. Based on the search, the state threatened, woolly milkweed and state endangered, harbinger of spring were found to occur within the BaBUTTKE, BaMASHOCK, and BaWALTENBERRY properties and within the 1-mile buffer of the BaBREMER property. Woolly milkweed is a prairie species occurring on dry, gravelly hills while harbinger of spring is a woodland spring ephemeral. While these plants are known to have been present in the area historically, it is highly unlikely that they currently exist here; first, the last observation date for

each plant was 1938 and 1940 respectively. Second, these lands are currently active agricultural areas and have been farmed for many years. Third, the occurrences may be outside of the project area. Fourth, both plants species tolerate disturbance poorly and would have been eliminated by plowing or logging practices.

At the Rosendale Dairy-complex woolly milkweed and harbinger of spring were found to occur within the 1-mile buffer of Rd19, RdHIELKE and within the RdRU property. A third species, small white lady's-slipper orchid was also found to occur within the 1-mile buffer of the RdHIELKE property. The potential for impacts to woolly milkweed and harbinger of spring are highly unlikely on these parcels per the reasons stated above. The record for small white lady's-slipper came from the Rush Lake area. The lady slipper orchid is found in wet prairies and likely would have already been eliminated from the RdHIELKE property if appropriate habitat ever existed there through agricultural conversion. Four bird hits also occur within the 1-mile buffer of the RdHIELKE property. The state special concern common moorhen, black tern and least bittern, and state endangered Caspian tern were documented on Rush Lake. Two additional bird hits were found within the 1-mile buffer for Rd16_17 and RdZIM properties. The state special concern Black-crowned night heron and state endangered red-necked grebe were observed at the Oakridge hunting club. These species are highly associated with shorelines and open water areas surrounded by natural vegetation. No impacts to these species are expected since no suitable open water habitat is located on these farms. Finally, there should be no impacts to wet prairie natural community hit found within the 1-mile buffer of Rd16_17 and RdZIM as this occurrence is outside of the project area.

At the Goeden Farms-complex, woolly milkweed and harbinger of spring were found to occur within the 1-mile buffer for the GoGEISE_HAGE, GoHOCH_ROST_ENG, GoM_L_S_H, GoMOODIE, GoPOMMERING, GoSMOODY and GoLEITZ properties and within the search area for the GoBRANDEL_LEHMAN, GoLANGE, and GoWALTERS. The potential for impacts to woolly milkweed and harbinger of spring are highly unlikely on these parcels per the same reasons stated under the query results for Bartz Farms-complex. At the GoLEITZ property, a hit for the state endangered red-tailed leafhopper and dry prairie natural community were found to occur within the 1-mile buffer. The leafhopper is highly dependant on prairie dropseed (its sole host plant), a native dry prairie grass. In degraded dry prairies where dropseed has been eliminated red-tailed leafhoppers cannot survive. No impacts to the leafhopper or the prairie are expected since these hits occur outside of the project area at the Ripon Prairie State Natural Area. Finally, as above, there should be no impacts to wet prairie natural community hit found within the 1-mile buffer of GoPOMMERING as this occurrence is outside of the project area.

In summary, there should be no Phase I impacts to the listed species found to occur within the project area as the lands do not support the habitat or land conversion has already occurred through decades of farming. Phase II impacts cannot be addressed as the Department has not been provided with Phase II manure spreading sites at this time.

IV.A.4. Area

IV.A..4.a. Hydrography & surface water quality & quantity

Town of Rosendale

The production site occupies only a small portion of the overall watershed and runoff controls are employed across the site. While there is an alteration of infiltration and runoff, there will likely not be any discernable impacts on the hydrology or water quality of the nearby intermittent and perennial streams or wetlands.

Potential water resource impacts associated with manure management are described in Section IV.A.3.d. However, many of the waters resources in the Town of Rosendale are already impacted by runoff pollution. If there are no new acute or chronic releases of manure associated with the Dairy, the direct, secondary, short term, and long term impacts described in that section would either not occur or not be increased over current conditions.

Regional

The potential for impacts on the water resources of the region from Rosendale Dairy largely depends on the management of manure from cow to crop. The agricultural fields that will receive manure as part of the Dairy's nutrient management plan already receive manure and fertilizers. The nutrient management plan for Rosendale Dairy will provide a level manure management equal to or better than the current level of management on these fields.

Ultimately, barring any catastrophic failure of the storage facility or an accidental, unrecoverable spill, there should be no additional degradation of water quality or habitat beyond what already exists in the lakes, streams, and wetlands of the region.

IV.A..4.b. Groundwater quality & quantity

Groundwater quality

There is a potential for increased nitrate and bacteria contamination in private wells in the vicinity of the dairy and spreading sites. Available private well construction reports show that the upper dolomite (Galena-Platteville) the St. Peter sandstone are the main source of drinking water for the area and the county. In western Fond du Lac County, the glacially deposited sediments are relatively thin, overlying the dolomite. Groundwater flow in the dolomite is via fractures and bedding planes with very little attenuation of contaminants. Once any contamination reaches the dolomite it will be able to move quickly to the St. Peter sandstone. In the St. Peter, contamination will be pulled into the lower aquifers by strong downward gradients that exist in this area. Once this happens, contamination could become widespread.

The DNR recommends that groundwater around the manure storage lagoons be monitored for leaking using monitoring wells constructed as per chapter NR 141, Wis. Adm. code. It is also

recommended that residents be giving information on DNR well testing recommendations well inspections.

Because so little is known about depth to groundwater around the spreading sites, the DNR also recommends that additional information on soils for each spreading field be provided to the Department. Because of the vulnerability of the groundwater to contamination in the County it is recommended that field verification of soil surveys be done prior to spreading animal waste. Verification should include but not be limited to soil type, soil thickness, depth to water table if less than two feet, and distance to wetlands and wells.

Groundwater Quantity

According to the high capacity well application there will be some drawdown in the lower aquifer. Pumping information will be submitted to the DNR. It is recommended that drawdown in the wells be monitored prior to Phase II to determine if the permitted high capacity wells will provide sufficient water for the facility. It is also recommended that they consider water conservation measures to reduce stress on the aquifer.

IV.A..4.c. Air quality

According to 2002 National Emission Inventory data, Wisconsin contributed 14% of all dairy-related ammonia emissions in the United States.

The maximum air concentrations expected from Rosendale Dairy will occur along the property line, and the magnitude of the impact will decrease with distance. Due to the fugitive nature of the emissions combined with the short release heights of the barn fans, the impact of the air emissions from Rosendale Dairy should be indistinguishable from background conditions within 10 kilometers from the site.

Ammonia emissions can contribute to secondary formation of $PM_{2.5}$ (particulate matter with 2.5 micrometer diameter or less) through complex chemical reactions taking place over several hours. $PM_{2.5}$ concentrations may increase in the area around Rosendale Dairy, but the fugitive nature of the emissions combined with the short release heights will minimize the long-range transport.

Agriculture in general, and livestock operations in particular, are anthropogenic sources of greenhouse gas (GHG) emissions with well established links to climate change. The July 2008 report of the Governor' Task Force on Global Warming reports that the agriculture sector is responsible for 9% of 2003 state greenhouse gas emissions. A 2006 report by United Nation's Food and Agriculture Organization states that the production of livestock contributes nearly 18% of worldwide GHG emissions through the production of commercial fertilizer, the production of grain for feed, land use changes, transportation emissions, and the direct emission of greenhouse gasses by animals, animal waste, and other production processes. The Governor's Task Force report includes several recommended policies for the agriculture sector on reducing GHG emissions. Among these recommendations are nutrient and manure management to reduce emissions of nitrous oxides and methane, and the production, capture and use of animal methane.

IV.A..4.d. Flora

Direct impacts to the local area (townships of Rosendale, Springvale, and Ripon) should be minimal since the majority of the lands in these townships are used for agriculture. The dominant flora in the area is comprised of common agricultural crops and associated weeds. The remaining areas that have not been impacted by farming are too wet, too rocky, or too steep. These areas are mostly small wood lots and wetlands located near cropped areas. Plants typical of these areas are common species that are capable of thriving in moderately disturbed areas such as include green ash, cottonwood and black willow, ironweed, joe-pye weed, and asters. If the nutrient management plan is implemented properly, short-term effects to the flora should be negligible since management practices such as land spreading manure will occur on lands currently used for agricultural purposes. However, long-term effects to the area flora are more challenging to predict as the cumulative impacts of land spreading aren't easy to qualify or quantify. Phase II impacts cannot be addressed as the Department has not been provided with the Phase II manure spreading site locations at this time.

IV.A..4.e. Fauna

Fond du Lac County continues to lose its agricultural land base to urban/rural residential development and transportation projects. Long term, Rosendale Dairy will protect and preserve the local agricultural land base and slow rural residential development. The area's mosaic of cropland, grassland, wetland and woodland provides habitat for a rich diversity of wildlife species. It is essential to maintain the quality and quantity of these habitat types. Proper management of habitat types will ensure future generations enjoyment of this wildlife resource.

Impact to the local wildlife resource is a result of the loss and/or degradation of the quality of the different habitat types. Should excess nutrient and sediment runoff occur, the quality of the area wetlands will degrade as a consequence wildlife species diversity will decline.

It may become more difficult for the GHRA staff to acquire or ease additional acreage for the GHRA project since agricultural land would be tied up to support Rosendale Dairy operation. It will be more difficult to reach the grassland and wetland restoration acreage goals for the project in Rosendale Township.

IV.A..4.f. Rare species

There will be no direct impacts to the historic plant records in the area as they are largely reminders of what use to be present in the area prior to agriculture becoming the dominant land use practice. The conversion of native prairies and wetlands to productive farm lands is one of the primary reasons for the decline of rare species. Some small areas of wet prairie still exist in the Springvale township area as well as one example of dry prairie at Ripon Prairie State Natural Area. In the short-term, it is unlikely that any practices associated with the Phase I operation will negatively impact the rare plants or natural communities in the area as the last time the plants were observed was in 1938 and 1940 and the natural communities are located in the 1-mile buffer of the project. However, it is difficult to know what long-term impacts, if any, may occur

to the natural communities as a result of CAFO operation, particularly the practice of land spreading manure. Phase II impacts cannot be addressed as the Department has not been provided with Phase II manure spreading site locations at this time. The rare bird species known to occur in the area are located within the 1-mile buffer of the project and are closely associated with open water wetlands. The birds were documented from wither Rush Lake or the Oakridge hunting club. As with the plants, in the short-term, it is unlikely that any practices associated with the Phase I operation will negatively impact the rare birds as they are located in the 1-mile buffer of the project. Potential long-term impacts, if any, are not known. Phase II impacts cannot be addressed as the Department has not been provided with Phase II manure spreading site locations at this time.

IV.B. Socioeconomic environment

IV.B.1. Production site

IV.B.1.a. Land use

Fond du Lac County continues to lose its agricultural land base to urban/rural residential development and transportation projects. Long term, Rosendale Dairy will protect and preserve the local agricultural land base and slow rural residential development. The land use at the production site has changed from open agricultural land, to more intensive industrial agriculture use.

IV.B.1.b. Zoning

There are no required or planned changes to current zoning as a result of this project.

IV.B.1.c. Prime farmlands

No impact. Contact with the Fond du Lac County Parks and Planning Department revealed that prime farmland has not been identified in Fond du Lac County to date.

IV.B.1.d. Archaeological & Historical

There should be no effects or impacts on any archaeological or historical resources due to the project. There are no known resources on the production site or adjacent lands.

IV.B.1.e. Light

Since the production site was changed from agricultural fields to a large CAFO, there will be significantly more lighting at this site which was not present in the past. This is needed to provide for safe operation during non-daylight times.

Travis Longcore and Catherine Rich, in their article “Ecological Light Pollution” (http://www.urbanwildlands.org/Resources/LongcoreRich2004.pdf) make a distinction between “astronomical light pollution”, which is defined to obscure the view of the night sky, and “ecological light pollution”, which defined as that which alters natural light regimes in terrestrial and aquatic ecosystems. Regarding the “astronomical light pollution” effect of this project, there is no data available to indicate the degree of change in lighting due to this project, so it is uncertain if it will have any impact to the area’s night sky. Additional information about light

pollution effects and mitigation related to the night sky can be found at: http://darkskywisconsin.uwex.edu/about/index.html

In the realm of "ecological light pollution", one of the documented consequences of night lighting is the deaths of migratory birds around tall lighted structures. Since birds migrate at altitudes of several hundred to several thousand feet and the facilities at this site are not this tall, lighting at this site is not expected to have any impact on migratory birds. The effect of artificial night lighting on the behavior and ecology of other species is not as thoroughly studied so it is unknown if there might be any effect on other species from night lighting at this site. Sources of additional information about the biological and ecological effects of night lighting can be found at: http://www.flap.org/new/Effect%20of%20Light%20Reduction%20on%20Collision%20of%20Migratory%20Birds.pdf or http://www.urbanwildlands.org/nightlightbiblio.html

IV.B.1.f. Noise

When this site was used for agricultural crop growing, there would have been equipment used to till the land, to spread fertilizers, and to harvest. In their place, construction and general farm equipment will be generating noise as well as the trucks and other equipment performing services in the normal course of this facility's operations.

Normal operations will be conducted Monday through Friday with some activities taking place on the weekends during harvest time. Whenever possible, transportation will occur during daylight hours, unless unavoidable due to weather, the needs of the animals, or an emergency.

There would be additional noise and dust associated with the transportation of livestock, milk, feed, and manure. At completion, it is expected there will be ten semi-tanker loads of milk leaving the facility each day, nine loads of protein feed supplements being delivered each day five days per week, 6500 loads of haylage and silage delivered during harvest seasons (approximately 54 loads per day if figured over a variable four months harvest season using 30 days per month), and 13,000 semi-truck loads of manure leaving the facility on an annual basis.

Truck traffic will be especially heavy during in the spring as the operation applies most of its manure and process wastewater prior to planting of crops and during crop harvest. There will also be some applications of manure that occur during the fall. Most truck traffic will occur during daylight hours. However, during crop harvesting, traffic will occur whenever necessary to bring in the crop. Vendors are instructed to follow standards related to truck routes and engine braking. Courtesy to neighbors signs will be installed at property exits to remind drivers.

IV.B.1.g. Visual

Because of the scale of the proposed operation, the physical changes at the site due to converting agricultural fields to animal housing, manure storage and process wastewater storage, and feed storage represented a dramatic change from the open agricultural row crop landscape that had existed prior to construction. Additional visual changes for Phase II include paving driveways

and roads on the site, and the construction of the second barn. While agricultural in function, Rosendale Dairy appears to be an industrial site.

The production site facilities are visible from County Highway "M". The large buildings are closest to the road, and tend to obscure the view of the lagoons to the east and north. The woodlot on the eastern property boundary will be retained. This will prevent views of the production site for neighbors located to the east.

IV.B.2. Sand and soil borrow and disposal sites

IV.B.2.a. Land use

No changes to the land use at the commercial pits.

IV.B.2.b. Zoning

No changes to the zoning at the commercial pits.

IV.B.2.c. Prime farmlands

Not applicable.

IV.B.2.d. Archaeological & Historical

Bedding sand and borrow material for Rosendale Dairy will be provided by the Michels Corporation. The six sites in Waushara and Winnebago Counties are all existing commercial pits. There are no known archaeological or historical resources any of the locations. There should be no effects or impacts to archaeological sites or historical structures

IV.B.2.e. Light

Sand needed for bedding will be obtained from the Michels Materials – Meyers site. The amount of sand needed will not require any changes to normal operational procedures, including no additional or out-of-the-ordinary lighting requirements.

IV.B.2.f. Noise

No changes to the noise at the commercial pits as a result of this project.

IV.B.2.g. Visual

No changes to the visual setting at the commercial pits.

IV.B.3. Manure spreading/irrigation sites

IV.B.3.a. Land use

Agriculture is the current land use at, and adjacent to, a majority of fields used by Rosendale Dairy for manure spreading. The project will continue agricultural land use at these locations.

Maps and other documents that describe manure spreading locations (fields) and sizes (acreage) are in the Rosendale Dairy Nutrient Management Plan (NMP) (see item 1 in appendix A). The NMP is written only for Phase I of the project and must be amended over time on, at least, an annual basis. The NMP will be amended to reflect Phase II of the project before Phase II herd size expansion occurs. All NMP amendments must be reviewed and approved by the Department.

Phase I reflects the following herd size and acreage: 4000 milking/dry cows, 150 steers (combined 5,750 Animal Units) and 5,631 spreadable acres. 1831 acres are owned and 3800 acres are rented or have been included in formal agreements with other landowners.

Phase II, as provided by the applicant, shows the following total herd size and acreage: 8000 milking/dry cows and 300 steers (combined 11,200 Animal Units) and additional acres above existing land base (5,631 acres) will be obtained in year two of operation to support herd size expansion.

The NMP describes liquid manure and process wastewater from the milking parlor will be pumped from storage lagoons into manure spreaders, and land applied. The project estimates manure applications will occur twice a month, for 3-4 day periods in May, July, October and November. This spreading will occur in spring before planting and fall after harvest or after harvest of alfalfa, wheat or other crops. In fall and spring, liquid manure will be injected as much as possible, or incorporated within 48 hours of application, whichever is safer. Incorporation will be completed using a disk till. In the summer, liquid manure is top dressed on alfalfa and applications will also occur on fields after wheat harvest.

The Department has reviewed the NMP for Phase I and determined it to be in compliance with applicable NRCS 590 criteria and all NR 243 requirements.

The NMP describes how the following NR 243 requirements will be met on a field by field basis:

- Applications near navigable waters, wetlands and their conduits [referred to as SWQMA restrictions in NR 243.14.(4)].

- Applications near private or community wells, direct conduits to ground water, and fields containing drain tiles [NR 243.14(2)(b)].

- Timing of manure and process wastewater [saturated soils, forecasted precipitation, frozen or snow covered ground, and areas of fields with depth to ground water of less than 24 inches [NR 243.14(2)(b)].

- Nutrient Crediting [NR 243.14(3)].

- Phosphorus-based nutrient management and managing for nutrient impaired waters [(NR 243.14(5)].

- All fields managed to meet Tolerable Soil Loss (T) for the rotation [NRCS 590 V.A.2].

- Ephemeral field erosion is minimized or eliminated via best management practices (e.g., contour strips, filter strips, maintaining > 30% crop residue on soils after planting, and fall cover crops) [NRCS 590 V.C.1].

- All nutrient applications are consistent with NRCS 590 nutrient management criteria (yield goals attainable under average conditions) and soil fertility recommendations found in UW-Extension Publication A2809 [NRCS 590 V.A.1].

The manure spreading sites proposed for Phase I (5,631 acres), and additional acres expected with Phase II, will increase the following factors above current conditions:

- Truck traffic frequency and weight load on roads (for transport and manure application to fields).

- Manure application frequency and volumes (most fields are currently farmed using commercial fertilizer and receive no manure).

- Odors (little or no manure is currently applied to fields listed in NMP).

- Noise levels (from truck traffic and manure applications).

- Risk for manure spills on roadways, on fields, or into surface or ground water.

- Risk for bacterial and nutrient pollution of surface and ground water.

The project's manure spreading activities will increase the risk for the negative socioeconomic impacts listed immediately above to people who live or work nearby manure spreading sites. Compliance with the NMP and manure spreading requirements listed above is expected to reduce or eliminate most negative socioeconomic environmental impacts caused by the projects proposed manure spreading for both Phase I and Phase II.

IV.B.3.b. Zoning

The Department did not complete a detailed review to assess potential zoning changes associated with the projects manure application fields. The Rosendale Dairy NMP contains maps and other

documents that describe manure spreading locations (fields) and sizes (acreage). Because the Town of Rosendale is nearly all zoned agriculture, it appears unlikely that zoning changes may be needed.

The following local governments have information that describe current zoning at & adjacent to main dairy and also for fields used by Rosendale Dairy for manure spreading:

(1) Fond du Lac County:
(http://gis.fdlco.wi.gov/Website/FondduLacIMS/viewer.htm)

(2) Townships of Rosendale (North of Hwy 23) and Springvale (S of Hwy 23):
http://www.fdlco.wi.gov/Index.aspx?page=622

Reviewing zoning maps and NMP field maps may provide specific zoning determinations for main dairy and for specific fields that receive manure applications. Local governments have jurisdiction and expertise to make legal zoning determinations.

IV.B.3.c. Prime farmlands

No impact. Contact with the Fond du Lac County Parks and Planning Department revealed that prime farmland has not been identified in Fond du Lac County to date.

IV.B.3.d. Archaeological & Historical

Fond du Lac County and the Town of Rosendale have archaeological and historical resources scattered about the local landscape. There are several known sites on parcels identified in the Nutrient Management Plan (NMP) for land spreading manure. Land application of manure, or other normal or routine agricultural practices would not normally cause adverse impacts or effects to existing archaeological or historical resources. Adverse impacts that would trigger further investigation would those activities which would entail extensive soil disturbance or excavation in areas of recorded sites, or ones that would impact significant historic structures. Any proposed activities of this nature related to either farm expansion or the NMP should be reviewed by the Department.

IV.B.3.e. Light

The size and scope of the projects manure spreading activities may require an increase in artificial lighting above current conditions.

Maps and other documents describing the main dairy and all manure spreading locations (fields) and sizes (acreage) are in the Rosendale Dairy Nutrient Management Plan (NMP). The NMP is written only for Phase I of the project and must be amended over time on, at least, an annual basis. The NMP will be amended to reflect Phase II of the project before Phase II herd size expansion occurs. All NMP amendments must be reviewed and approved by the Department.

The NMP describes liquid manure and process wastewater from the milking parlor will be pumped from storage lagoons into manure spreaders, and land applied. The project estimates manure applications will occur twice a month, for 3-4 day periods in May, July, October and November. This spreading will occur in spring before planting and fall after harvest or after harvest of alfalfa, wheat or other crops. In fall and spring, liquid manure will be injected as much as possible, or incorporated within 48 hours of application, whichever is safer. Incorporation will be completed using a disk till. In the summer, liquid manure is top dressed on alfalfa and applications will also occur on fields after wheat harvest.

This schedule does not specify what time land spreading will occur. It is expected, however, the project will select daylight hours only, versus applying at dusk or at night, in order to ensure compliance with the NMP and CAFO WPDES permit conditions.

The Department has reviewed the NMP for Phase I and determined it to be in compliance with applicable NRCS 590 criteria and all NR 243 requirements.

IV.B.3.f. Noise

The size and scope of the projects proposed manure spreading activities will increase truck traffic and corresponding noise and decibel levels above current conditions. However, the Department did not complete a review, nor was information submitted by Rosendale Dairy to determine specific decibel level changes associated with the projects manure application activities. Because no review was completed, the Department cannot specifically assess how much direct, secondary, or short and long term noise and decibel level changes the project may have.

Maps and other documents describing the main dairy and all manure spreading locations (fields) and sizes (acreage) are in the Rosendale Dairy Nutrient Management Plan (NMP) (see item 1 in appendix A). The NMP maps may provide an indication of which roads may receive more truck traffic, and noise, than others.

The NMP describes liquid manure and process wastewater from the milking parlor will be pumped from storage lagoons into manure spreaders, and land applied. The project estimates manure applications will occur twice a month, for 3-4 day periods in May, July, October and November. This spreading will occur in spring before planting and fall after harvest or after harvest of alfalfa, wheat or other crops. In fall and spring, liquid manure will be injected as much as possible, or incorporated within 48 hours of application, whichever is safer. Incorporation will be completed using a disk till. In the summer, liquid manure is top dressed on alfalfa and applications will also occur on fields after wheat harvest.

This schedule does not specify what time land spreading will occur. It is expected, however, the project will select daylight hours only, versus applying at dusk or at night, in order to ensure compliance with the NMP and CAFO WPDES permit conditions. The schedule may correspond with the daytime activities of other people who live or work nearby manure application sites.

The Department has reviewed the NMP for Phase I and determined it to be in compliance with applicable NRCS 590 criteria and all NR 243 requirements.

IV.B.3.g. Visual

Little to no change to the visual condition of the landscape is expected at the manure spreading sites. Some minor improvements to driveways may be needed for some fields to allow for adequate manure spreading equipment access.

There may also be visual changes due to the potential need to improve some local roads to handle the increased trucking traffic to and from Rosendale Dairy. Such improvements could involve lane and shoulder widening, changes to vertical and horizontal alignment, and changes to intersection geometry. Such changes may also involve tree cutting and changes to roadside ditches. These kinds of road improvements tend to create a more open landscape with less complex topography along the affected roadways.

IV.B.4. Local community

IV.B.4.a. Community features

IV.B.4.a.01. Municipal & non-community public wells

The closest municipal well to the site, is Ripon at 5.7 miles away. There are 12 municipal well systems in Fond du Lac County. Six of 12 municipal water systems in Fond du Lac County have a wellhead protection plan: Campbellsport, Fairwater, Mary Hill Park, Oakfield, St. Cloud and Waupun. Five of 12 municipal water systems in Fond du Lac County have a wellhead protection ordinance: Campbellsport, Mary Hill Park, Oakfield, St. Cloud and Waupun. The non-community public wells are listed in Table 7, below.

Table 7 Non-community Public Wells

Well Type	Nearest	distance	direction
MC	BF814	5.7 mi	SW
OC			
NN	WH691	4.8 mi	SSE
TN	JC649	14,800 ft	N
PR	TP444	250 ft	W
Hicap	BE233	3 mi	W
JC649	TN	2.8	N
BP037	TN	4.6	NE
GU893	TN	5.7	SE
EU111	TN	5.7	SE
GO118	TN	5.7	SE
BE493	NN	4.3	SSE
BE494	NN	4.3	SSE
MY131	TN	4.8	SSE
BO980	TN	4.8	SSE
GU860	TN	4.8	SSE
GU853	TN	4.8	SSE
GU822	TN	4.8	SSE
WH691	NN	4.5	SSE
SE608	NN	4.7	SSE
BO988	TN	5	SSE
BO920	TN	5	SSE
MH849	TN	3.7	SSW
GP967	TN	3.7	SSW
BF814	MC	5.7	SW
KY576	MC	6	SW
BF815	MC	6.4	WSW
BF817	MC	7	WSW
BH636	NN???	2	N

IV.B.4.a.02. Schools

No direct impacts to either the Rosendale or Ripon Schools from Rosendale Dairy operations are anticipated.

IV.B.4.a.03. Hospitals, clinics & nursing homes

The hospitals and clinics may see an increase in caseload due to accidents directly related to the Rosedale Dairy operations. No impacts to nursing homes are anticipated.

IV.B.4.a.04. Parks & recreation areas & facilities

No direct impacts to the Glacial Habitat Restoration Area recreational are anticipated. However, secondary impacts may be expected. For example, Rosendale Dairy indicates that they own approximately 2500 acres of land. This will decrease the amount of land available for this program or other set aside programs. This may impact wildlife populations and recreational

opportunities to harvest wildlife. Conversely, this land may provide feed for wildlife and will remain undeveloped for the life of the dairy.

No direct, secondary, short and long-term impacts to the North Woods County Park and neighboring urbanized parks are anticipated.

IV.B.4.b. Local roads and use

IV.B.4.b.01. Description

Once Phase II is fully operational there will be an additional 23,000 heavy trucks coming or going from Rosendale Dairy. The application did not estimate additional passenger car and light truck traffic or the amount and size of additional farm equipment using the local road system.

County Trunk Highway M already has a crash rate 73% higher than the state average. This may in part be due to the narrow pavement and shoulders on CTH M, poor vertical and horizontal alignment, and poor intersection geometry. The additional traffic due to Rosendale Dairy will no doubt cause an increase in accidents on CTH M between STH 44 and STH 23.

Much of the heavy truck traffic will be seasonal. Hauling of corn and hay silage, sweet corn silage, and manure will be done when the crops are ripe, or the fields available for manure application. This short-term increase in traffic will have more effect on the crash rate than the routine, day to day, traffic.

The addition of approximately 23,000 heavy trucks a year, plus additional large farm machinery will accelerate wear and deterioration of the local road system, primarily CTH M and heavily used town roads. This will place a financial burden on the county and town to repair or reconstruct the roads.

CTH M is already in poor shape, with older pavement, very narrow shoulders, unknown sub-structure. According to county highway officials, the increased heavy traffic will lead to a rapid deterioration of the existing roadway, requiring frequent repairs. CTH M also has a higher than average accident rate. Any improvements must also include design/construction features to improve the safety and decrease the accident rate.

IV.B.4.b.02. School bus routes

Both the Rosendale and Ripon School Districts have bus routes that will likely overlap with the haul routes and landspreading routes of the Rosedale Dairy. There is a potential for safety conflicts with the additional truck traffic that will be introduced as a result of this dairy operation.

The Rosendale school bus route closest to the Dairy uses Olden Road – CTH M – Center Road – Hill Road – Rose-Eld Road – Hwy 23 – Hwy 26.

The Ripon school bus route closest to the Dairy uses STH 23 – Silver Creek – Silver Creek Road – Springbrook Road – Forest Lane Road – Springbrook Road – Fletcher Road – CTH M – Zoar Road – Triangle Road – Oak Road.

IV.B.4.b.03. Safety

Once Phase II is fully operational there will be an additional 23,000 heavy trucks coming or going from Rosendale Dairy. The application did not estimate additional passenger car and light truck traffic or the amount and size of additional farm equipment using the local road system.

County Trunk Highway M already has a crash rate 73% higher than the state average. This may in part be due to the narrow pavement and shoulders on CTH M, poor vertical and horizontal alignment, and poor intersection geometry. The additional traffic due to Rosendale Dairy will no doubt cause an increase in accidents on CTH M between STH 44 and STH 23.

IV.B.4.b.04. Emergency vehicles

The Fond du Lac GIS On-line Mapping tool identifies the Rosedale Fire Response District and the Ripon Ambulance Responses District services the Town of Rosendale. Accidents and incidents on Rosendale Dairy farmland may result in more ambulance and fire response services being utilized.

IV.B.4.c. Residential neighbor wells

There are 6 known private wells within a mile of the Rosendale dairy facility. Because this area of Fond du Lac County is vulnerable to groundwater contamination, DNR recommends that owners of private wells near the facility and spreading sites have their wells inspected and sampled for baseline drinking water quality.

IV.B.5. Area

IV.B.5.a. Demographics

The proposal should have little overall effect on demographics of the local area or Fond du Lac County. The economic stimulus of project construction and operation may result in up to 70 new households in the county and/or surrounding area.

<u>Employment</u>

Rosendale Dairy proposes to employ 70 people (35 for Phase I and an additional 35 for Phase II). This is a very small percentage (0.12%) of the estimated workforce of 57,500 (WDWD 2008) in the county. Population centers in Fond du Lac, Oshkosh, Ripon and the Village of Rosendale are all within reasonable driving distance.

Rosendale Dairy expects their annual payroll to exceed $1.3 million upon the completion of Phase I, and $2.6 million upon the completion of Phase II.

Additional employment opportunities may result from the feed, supply, and trucking needs of Rosendale Dairy. They predict annual expenses to vendors to be $20,000,000 for Phase I, and $40,000,000 for Phase II.

Health

A Minnesota study evaluated various aspects of CAFOs, including human health. The report concluded that there are human health issues of concern, but hard conclusions are difficult to reach. The following is a summary of that report's findings.

> *Animal agriculture can have a variety of both positive and negative impacts on human health through occupational exposure, other environmental exposures, and exposures through consuming the product.*
>
> *While human health risks can be associated with different types of animal production systems, it is difficult to make direct comparisons between systems. Most of the human health literature reviewed was not explicit about the type of production system studied. There are countless variations of animal production systems, making all but general classifications of systems nearly impossible in a project of this scope. In addition, there is a preponderance of research focused on confinement production systems and very little research focused on outdoor, alternative, and other types of systems. For these reasons, there is little information contained in this report that compares the human health effects of different types of animal production systems. Unfortunately, this leaves key systems-level questions, especially important in the search to prevent or mitigate human health risks in animal agriculture, unanswered.*
>
> *Substantial scientific literature exists that human health is adversely affected by the transmission of a number of toxic and noxious agents via the air. Large animal production units are a source of air transmission of toxic and noxious agents, such as gases, dust, odors, and biogenic particles. Those generated within animal and poultry confinement facilities can adversely affect health of people working in those environments and potentially the health of people living or working near such facilities. Acute health effects are particularly common and frequently involve the respiratory system. Some chemicals have been documented to cause fatalities such as hydrogen sulfide in manure pits. The effects of odors are potentially serious and include loss of appetite, poor respiration, nausea, vomiting and mental distress.*
>
> *Water-, soil-, and fly-borne pathogens and nutrients are also a concern. Pathogens may be transmitted to humans from animal wastes through contaminated surface drinking water supplies, contaminated ground water supplies, or direct contact with contaminated environment e.g., recreational use of water. Some incidents of human disease attributable to contact with livestock waste have been reported. Water-borne nitrate represents a health*

risk to infants under the age of six months, because it can cause an acute and potentially fatal condition called methemoglobinemia. Insects, especially flies, are a potential vehicle for the transmission of human disease from manure, dead animal carcasses, and other animal wastes. Escherichia coli (E. coli), Salmonella spp. and Campylobacter jejuni are candidates for transmission by flies. However, the literature on this subject is ambivalent. More research is needed to determine the extent to which flyborne microorganisms are transmitted to humans and cause illness, and on the control of flies in farming.

In terms of which segments of the population are most susceptible to health problems related to animal agriculture, for occupational injuries it is obviously farm workers, especially those who are new and untrained. For airborne contaminants, workers and neighbors are most at risk where geographical factors increase their exposure. For food borne microbial diseases, the young, elderly and immunocomprimised are the most likely to develop severe symptoms and serious consequences. They are also potentially most vulnerable to pathogens transmitted by water, soil, and flies; and to resistant strains.

Rosendale Dairy will need to make every effort to protect the health of their workforce, and to comply with permitting requirements in order to avoid health concerns for neighbors and the surrounding community. The setback of the manure lagoons from the road and residential neighbors, as well as maintaining the woodlot, should help to minimize air-borne contaminant concerns. Strict adherence to dust control and odors management plans will also be needed.

IV.B.5.b. Land use

The development of large scale dairy operations, or other CAFOs, often can result in a variety of real or perceived land use conflicts. Significant issues include (U of MN Generic EIS on Animal Agriculture, 1999):

- Environmental concerns (odor, air and water pollution, manure handling and storage),
- human health concerns,
- nuisances (ag use versus non-ag-use, large versus small),
- differing rural aesthetics,
- threat to traditional rural culture,
- use of land for agriculture versus use for tourism/recreation,
- fear of property value reduction,

- fear of rural “brownfields” (contaminated sites that cannot be reused for other purposes without significant cleanup).

Some of these issues may be addressed by developing or updating a land use plan and zoning ordinance to head off land use conflicts in the future. Environmental and human health issues can be avoided or minimized by adherence to appropriate permit conditions.

IV.B.5.c. Transportation

Once Phase II is fully operational there will be an additional 23,000 heavy trucks coming or going from Rosendale Dairy. The application did not estimate additional passenger car and light truck traffic or the amount and size of additional farm equipment using the local road system.

County Trunk Highway M already has a crash rate 73% higher than the state average. This may in part be due to the narrow pavement and shoulders on CTH M, poor vertical and horizontal alignment, and poor intersection geometry. The additional traffic due to Rosendale Dairy will no doubt cause an increase in accidents on CTH M between STH 44 and STH 23.

Much of the heavy truck traffic will be seasonal. Hauling of corn and hay silage, sweet corn silage, and manure will be done when the crops are ripe, or the fields available for manure application. This short-term increase in traffic will have more effect on the crash rate than the routine, day to day, traffic.

The addition of approximately 23,000 heavy trucks a year, plus additional large farm machinery will accelerate wear and deterioration of the local road system, primarily CTH M and heavily used town roads. This will place a financial burden on the county and town to repair or reconstruct the roads.

Additional traffic may also cause congestion at heavily used intersections with STH 44, STH 23 and STH 26.

IV.B.5.d. Zoning

A large portion of the Township of Rosendale is designated as Agricultural District Farm Preservation. Rosendale Dairy as proposed appears to meet the intent of this zoning designation as defined by the Township.

The proposal should not have much impact on existing zoning. Rosendale Dairy selected this site because to the large amount of Ag 1 zoning and the likelihood it would remain the same. In the long term the presence of Rosendale Dairy may result in fewer parcels being rezoned or given conditional use permits to allow non-compatible use.

IV.B.5.e. Economy

There will be a positive short-term impact to contractors and vendors during construction of Rosendale Dairy. Anticipated construction costs are $70 million.

Long-term positive impacts will be generated by wages for the 70 employees at Phase II with an estimated annual payroll of $2.6 million. The dairy's annual operating budget will add another $40 million in economic activity to vendors, suppliers, and maintenance contractors over the length of operation.

Several studies presented in the Pew Commission study on Industrial Farm Animal Production indicate that local purchasing patterns of large dairy operations in Wisconsin result in declining rural communities, and the percentage of dairy feed purchased locally decreased as herd size increased. So, while the dairy may add significantly to the economy in Wisconsin, there may be little or no positive impact on the local economy other than wages and field crops.

The applicant provided information from the Wisconsin Milk Marketing Board which found a 5x multiplier effect on dairy investments. The applicant claims that each dairy cow generates more than $17,000 a year in economic activity. At this rate, with 4,000 cows, the annual economic impact of Rosendale Dairy would be about $68 million.

IV.B.5.f. Property values & taxes

Property values of the farm facility itself will go up due to the physical improvements to the site, and should hold that value as long as the farm is in operation and is maintained.

Property values on adjacent residential parcels may decrease due to proximity to the farm operation and associated concerns about odor, noise, traffic, groundwater degradation, viewscape, etc. If the farm is properly managed and uses the best available technologies for dealing with waste and odor the drop in value may be short-term. (Purdue Extension).

The value of land needed for raising crops, and perhaps more importantly, acreage needed for manure spreading may increase due to the demand for suitable sites close to the farm.

The tax base in the area may go up in response to the increase in property values and improvements at the production site. Property values may also go up for parcels used for growing crops and application of manure. The value nearby residential property may go down due to the close proximity of the dairy. On a large scale there may be little or no change in the tax base due to the presence of the dairy. (Purdue Extension)

IV.B.5.h. Agriculture

The only change is that a new CAFO will operate on what used to be a 100-acre crop field in an existing agricultural area. About one third of the land needed for crops and land application of manure in Phase I is owned by Rosendale Dairy while the remaining two thirds is used based on landowner agreements.

This project involves construction of a new farm in an existing agricultural area. The majority of land in the township is farmed for crops. Crops will continue to be grown to provide feed for animals. The farm animals being brought onto this site will generate a large volume of manure. Disposal of this manure will provide for an alternative to purchasing commercial fertilizers to

enhance the soil and grow crops. The Nutrient Management Plan will require certain conditions be met for land application of that manure. Those requirements include separation distances from water resources and other land features to ensure increased protection of water resources. Since not all farms have NMPs, this should result in more protection of water quality conditions

Based on current information, Phase II consists of building the North Freestall Barn and adding a second 80-cow rotary milking carousel to the milking parlor to accommodate doubling of the herd. This will make it necessary to provide for approximately twice as much land for land application of manure in Phase II. At this time, it is anticipated that about the same proportions of land will be owned and managed by agreement with Rosendale Dairy. The amount of land needed for land application of manure could be reduced if the farm were to add equipment that reduces the volume of manure.

There are two WPDES permitted CAFOs within a 10 mile radius of Rosendale Dairy – both to the east - Rickert Brothers and Thistle. There are also several smaller farms scattered throughout the area. It is unknown if the presence of the Rosendale Dairy will have an effect on these larger dairies or any non-CAFO farms (see Figure 22, page III-46).

Since the inception of Rosendale Dairy, much of the area farm land has increased in value substantially. 2006 farm land values in the area were approximately $2000 - $3000 per acre. Recent land appraisals are approaching $4500 per acre. Two factors driving this increase: the recent commodities boom caused by ethanol and, more locally, the demand for land created by Rosendale Dairy itself. The dairy has purchased approximately 2500 acres since February 2008.

An additional estimated $70 million of investment is being made in the project constituting real estate improvements on the property. This will result in reassessment and an increase in the local tax revenues directly traceable to this project.

Some of the land parcels will now be owned by Rosendale Dairy but there will be no change to the type of activity occurring on those properties, which is raising crops for feed.

IV.B.5.i. Archaeological & historical

Fond du Lac County and the Town of Rosendale have archaeological and historical resources scattered about the local landscape. None are located at the production site, nor at any of the six sand and borrow sites.

There are several known sites on parcels identified in the Phase I Nutrient Management Plan (NMP) for land spreading manure. Any new parcels proposed for Phase II of the NMP will need to be reviewed for the presence of the cultural resources.

Land application of manure, or other normal or routine agricultural practices would not normally cause adverse impacts or effects to existing archaeological or historical resources. Adverse impacts that would trigger further investigation would those activities which would entail extensive soil disturbance or excavation in areas of recorded sites, or ones that would impact

significant historic structures. Any proposed activities of this nature related to either farm expansion or the NMP should be reviewed by the Department.

IV.B.5.j. Visual

Little change to the visual condition of the landscape is expected in the area. Most of the construction-related visual changes at the production site have already occurred. Driveway paving and a second barn will be additional changes for Phase II. Some minor improvements to driveways may be needed for some fields to allow for manure spreading equipment access.

There may also be visual changes due to the potential need to improve some local roads to handle the increased trucking traffic from Rosendale Dairy. Such improvements could involve lane and shoulder widening, changes to vertical and horizontal alignment, and changes to intersection geometry. Such changes may also involve tree cutting, and changes to roadside ditches. These kinds of road improvements tend to create a more open landscape with less complex topography along the affected roadways.

V. Evaluation

V.A. Cumulative effects

V.A.1. Industry

There is a trend in the livestock industry towards larger-scale facilities in Wisconsin and the nation as a whole. In some instances, larger-scale dairy operations have rapidly become an economic necessity due to changing pricing structures and the need to reduce capital inputs while maximizing production. Economies of scale associated with CAFOs have allowed producers to increase production without increasing costs.

If numerous projects of this type are proposed in this area, there is a concern that the land base available for landspreading manure could be overwhelmed and would make a number of such projects nonviable. This is due primarily to costs associated with hauling manure and process wastewater long distances for landspreading.

The Department is unaware of additional projects of this type in this area that would impact the availability of land for Phase I of the Rosendale Dairy project.

According to the National Agricultural Statistics Service, livestock numbers in Fond du Lac County peaked in 1985 at approximately 120,000 head of cattle. From 1986 through 1999, livestock numbers experienced a steady decline, reaching 90,000 head in 1999. Beginning in 2000, livestock numbers in the county began to climb steadily to 100,500 head in 2008. With the addition of animals from Rosendale Dairy, animal numbers will still be below the peak in 1985.

There are currently nine other permitted CAFOs in Fond du Lac County, all of which are dairy operations. Rosendale Dairy has submitted information as part of their development of a NMP that indicates that land base for Phase I of the operation is adequate to comply with NR 243 and a WPDES permit. Figure 28, below, shows the location of Rosendale Dairy, and the distribution of existing CAFOs in Fond du Lac County.

V.A.2. Manure management

The basis of the WPDES permit program is to require CAFOs such as Rosendale Dairy to implement Best Management Practices (BMPs) to avoid or minimize potential impacts to the environment, including surface water quality and quantity. This is accomplished through (1) the review of structures and systems associated with manure and process wastewater storage/handling (2) the review of an operation's Nutrient Management Plan that details how, when, where and in what amounts manure and process wastewater from the operation will be landspread, (3) issuance of a WPDES permit that outlines operational requirements for the storage, handling and land application of manure and process wastewater, and (4) review and oversight of the CAFO once it is operating, which includes conducting oversight inspections and pursuing enforcement action when needed to obtain permit compliance and address water quality impacts.

CAFOs are not allowed to discharge pollutants from the CAFO production area (e.g., manure and process wastewater storage structures, feed storage areas, animal housing areas) to navigable waters except under certain conditions where additional protection for surface waters is provided. In order to prevent discharges and protect surface waters, the means of collecting manure and process wastewater, leachate, and runoff from feed storage areas along with runoff and stormwater from impervious surfaces were designed to meet or exceed the applicable regulatory requirements.

The NMP for Phase I has been reviewed by the Department and determined to be in compliance with applicable NRCS 590 criteria and all NR 243 requirements. The NMP addresses the application and budgeting of nutrients (e.g., manure and process wastewater) for plant production and soil fertility on a field by field basis.

The NMP describes, in specific detail, the crops, tillage, nutrient application rates, locations, and methods implemented in order to protect surface water and ground water resources while maintaining the physical, chemical and biological condition of the soil. The NMP accounts for all nutrient sources, including soil reserves, commercial fertilizer, manure, organic byproducts, and crop residues to ensure proper utilization and protect water quality.

Strict adherence to the NMP will minimize the risk of a manure discharge to surface waters. All of the potential impacts on water quality, habitat, and biological communities described in Section IV will not be increased above current conditions if there are no new acute or chronic releases of manure associated with the activities of Rosendale Dairy.

V.A.3. Surface waters & wetlands

The primary potential impacts to water quality due to the Rosendale Dairy project are associated with the production of manure and process wastewater at the proposed operation. Nitrogen, phosphorous, and pathogens associated with manure and process wastewater produced at livestock operations can have detrimental impacts on groundwater, surface waters and wetlands if not properly stored, handled, and land applied. Phosphorus and nitrogen in manure and other sources of nutrients that are applied to cropland to produce feed for livestock can also be a source of detrimental impacts to groundwater, surface waters and wetlands. Nitrogen in the form of ammonia is toxic to fish. When present in drinking water, nitrogen in the form of nitrate can impact human health, primarily in fetuses and young children. Phosphorus in surface waters promotes algae growth which can result in decreased oxygen levels, fish kills, and reduced recreational opportunities. Biochemical oxygen demand (BOD) associated with manure and process wastewater can consume oxygen in surface waters and contribute to fish kills. Soil erosion associated with crop production can result in sedimentation in roadside ditches and wetlands. Soil erosion can also alter streambed elevations which can increase the probability and severity of floods. Sediment can also destroy or degrade aquatic wildlife habitat and damage commercial and recreational fisheries.

The potential for impacts on the water resources of the region from Rosendale Dairy largely depends on the management of manure from cow to crop. The agricultural fields that will receive manure as part of the applicant’s NMP already receive manure and fertilizers. The nutrient

management plan for Rosendale Dairy will provide a level of manure management equal to or better than the current level of management on these fields.

Ultimately, barring any catastrophic failure of the storage facility or an accidental, unrecoverable spill, there should be no additional degradation of surface water quality or habitat beyond what already exists in the lakes, streams, and wetlands of the region.

V.A.4. Groundwater

There is a potential for increased nitrate and bacteria contamination in private wells in the vicinity of the production facility and landspreading sites.

Available private well construction reports show that the upper dolomite (Galena-Platteville) and the St. Peter sandstone are the main sources of drinking water for the area and the county. In western Fond du Lac County, the glacially deposited sediments are relatively thin, overlying the dolomite. Groundwater flow in the dolomite is via fractures and bedding planes with very little attenuation of contaminants. Once contamination reaches the dolomite it will be able to move quickly to the St. Peter sandstone. In the St. Peter, contamination will be pulled into the lower aquifers by strong downward gradients that exist in this area. Once this happens, contamination could become widespread.

The DNR recommends that groundwater around the manure storage lagoons be monitored for leaking using monitoring wells constructed as per chapter NR 141, Wis. Adm. Code. It is also recommended that the Dairy inventory all wells near their operations. and provide the residents information on DNR well testing and inspection recommendations.

Because so little is known about depth to groundwater around the manure spreading sites, the DNR also recommends that additional information on soils for each spreading field be provided to the Department. Because of the vulnerability of the groundwater to contamination in the County, it is recommended that field verification of soil surveys be done prior to spreading animal waste. Verification should include but not be limited to soil type, soil thickness, depth to water table if less than two feet, and distance to wetlands and wells. DNR recommends that wells near spreading sites be field located prior to spreading to insure that separation distances are in compliance with chapter NR 243, Wis. Adm. Code and NRCS 590.

According to the high capacity well application there will be some drawdown in the lower aquifer. Pumping information will be submitted to the DNR. It is recommended that drawdown in the wells be monitored prior to Phase 2 to determine if the permitted high capacity wells will provide sufficient water for the facility. It is also recommended that they consider water conservation measures to reduce stress on the aquifer.

V.A.5. Air emissions

Airborne contaminant emissions emanating from CAFOs include gases and particulates. A combination of gases or particulates of sufficient concentration and chemical composition may also be perceived as an irritant odor downwind of a CAFO. The generation rate of these gases,

organisms and particulates varies depending on time of year and day, species, type of housing, manure handling system, feed type and management system. Odor emissions can vary widely throughout the day. Once these contaminants are generated they can be emitted through the barn's ventilation system or by natural weather forces. After these materials are emitted and become airborne they are transported downwind. Travel distance can vary greatly due to size of particles, weather conditions and surrounding topography and vegetation. These variations have made it extremely difficult for researchers and regulators to form a clear picture of the expected emissions from CAFOs.

Even when using best management systems and mitigation techniques, some airborne contaminants may be generated. Concentrations may build up inside livestock buildings that result in animal and human health concerns. Most concerns are associated with chronic or long-term exposure. However, some human and animal health concerns or safety hazards can result from acute or short-term exposures.

Although a great number of volatile chemicals and other substances are emitted from animal wastes, research and public concerns have focused primarily on hydrogen sulfide (H_2S), ammonia (NH_3), odors, particulate matter (PM), and volatile organic compounds (VOC). Diesel exhaust particulate matter emissions from semi-trucks, manure spreading, and associated farm operations are also associated with CAFOs.

Based on 2002 National Emissions Inventory data, dairy operations contribute 89% of Wisconsin's total ammonia emissions from animal agricultural operations. The same emission inventory data indicates that Wisconsin contributes 14% of the national dairy-related ammonia emissions.

Over the past several years, in response to complaints about air pollution associated with livestock operations, the Department has conducted a limited amount of ambient air monitoring for hazardous air pollutants near a variety of livestock operations. Measurements in the vicinity of farms within Wisconsin have shown peak hourly concentrations of ammonia downwind from large dairies ranging from 1 $\mu g/m^3$ to 1000 $\mu g/m^3$. However, the monitored concentrations have not exceeded the daily acceptable ambient concentration standard (418 $\mu g/m^3$) established in ch. NR 445, Wis. Adm. Code. In addition, hydrogen sulfide has been measured downwind of dairies at levels near 100 $\mu g/m^3$, as compared to the daily standard of 335 $\mu g/m^3$.

The actual off property concentrations associated with the operation of Rosendale Dairy will depend on a wide variety of conditions, including physical layout, temperature, humidity, feeding regime, and a variety of manure management practices. The Department will continue ambient monitoring at livestock operations and developing best management practices.

The maximum air concentrations expected from Rosendale Dairy will occur along the property line, and the magnitude of the impact will decrease with distance. Due to the fugitive nature of the emissions combined with the short release heights of the barn fans, the impact of the air emissions from Rosendale Dairy should be indistinguishable from background conditions within 10 kilometers from the site.

Ammonia emissions can contribute to secondary formation of $PM_{2.5}$ (particulate matter with 2.5 micrometer diameter or less) through complex chemical reactions taking place over several hours. $PM_{2.5}$ concentrations may increase in the area around Rosendale Dairy, but the fugitive nature of the emissions combined with the short release heights will minimize the long-range transport.

Wisconsin Administrative Code requires all sources of air emissions to regulate objectionable odors (s. NR 429.03, Wis. Adm. Code). This rule establishes general limitations on objectionable odor, defines the tests for what constitutes objectionable odor, and sets abatement or control requirements. Rosendale Dairy has developed an odor management plan that identifies management practices that will be followed to reduce odor issues. These measures include conserving water and notifying neighbors before agitating or spreading manure.

V.A.6. Wildlife & habitat

Generally speaking, the impact of losing 100 acres of cropland would have very little impact to the local wildlife species because of the abundance of cropland in the area.

As an agricultural operation, Rosendale Dairy will tend to maintain the rural, agricultural character of this area which is important for wildlife. On the other hand, it will become more difficult for the GHRA staff to acquire or ease additional acreage for the GHRA project since agricultural land would be tied up to support Rosendale Dairy operation. It will be more difficult to reach the grassland and wetland restoration acreage goals for the project in Rosendale Township.

More intensive row crop production could increase sediment and nutrient runoff leading to greater wetland degradation of the existing wetland community, especially the remnant sedge meadow marshes. Rosendale Dairy should put into place conservation practices to minimize the potential of offsite sediment and nutrient runoff.

The potential greatest impact to wildlife species would be the occurrence of a large manure spill or over application of manure during land spreading operations. Manure spill impacts may include: high ammonia concentration, high phosphorous concentration, bacterial contamination, oxygen depletion, nutrient enrichment which promotes excessive vegetative growth which can eventually lead to oxygen depletion by aerobic organisms breaking down the decaying vegetation. Direct negative impact would be a decline in the number and species of aquatic invertebrates and herptiles that utilize these wetlands for all or part of their life cycle. These wildlife species are the foundation of the food chain for all of the wetland dependent wildlife species, especially waterfowl, reptile and amphibians. A collapse at the foundation will have direct negative impact on the higher level wildlife species in the food chain, such as mink, muskrat, raccoon, and otter.

Preserving and protecting Fond du Lac County agricultural land base will provide habitat to those wildlife species that have adapted to this particular land use. This open landscape is very important to wildlife species such as northern harrier, upland sandpiper and short-eared owl. Loss of agricultural land would have negative consequences to wildlife species such as ring-

necked pheasant, white-tailed deer, vesper sparrow, mourning dove, horned lark and killdeer. Wildlife primary use of agricultural fields is for foraging for food, such as insects, weed seeds and waste grains.

The over application of manure during land spreading could lead to offsite runoff of nutrients to the wetland and drainage systems which would negatively impact the wild rice production in the Fond du Lac River watershed. Excess algal blooms would reduce or eliminate germination of wild rice seed. This would have negative consequences to wildlife species that utilize these wild rice beds as part of their life cycle. Wild rice beds provide excellent brood-rearing habitat for mallard, wood duck and blue-winged teal because it provides cover and habitat for aquatic invertebrates which the ducklings utilize for their high protein life requirements. Adherence to the NMP should prevent these concerns.

V.A.7. Traffic, roads & safety

Once Phase II is fully operational there will be an additional 23,000 heavy trucks coming or going from Rosendale Dairy. County Trunk Highway M already has a crash rate 73% higher than the state average. This may in part be due to the narrow pavement and shoulders on CTH M, poor vertical and horizontal alignment, and poor intersection geometry. The additional traffic due to Rosendale Dairy will no doubt cause an increase in accidents on CTH M between STH 44 and STH 23.

Much of the heavy truck traffic will be seasonal. Hauling of corn and hay silage, sweet corn silage, and manure will be done when the crops are ripe, or the fields available for manure application. This short-term increase in traffic will have more effect on the crash rate than the routine, day to day, traffic.

The addition of approximately 23,000 heavy trucks a year, plus additional large farm machinery will accelerate wear and deterioration of the local road system, primarily CTH M and heavily used town roads. This will place a financial burden on the county and town to repair or reconstruct the roads.

Both the Rosendale and Ripon School Districts have bus routes that will likely overlap with the haul routes and landspreading routes of the Rosedale Dairy. There is a potential for safety conflicts with the additional truck traffic that will be introduced as a result of this dairy operation.

V.A.8. Economics

It is expected there will be a positive impact to the economy, tax base, and employment as a result of this project. There will be a positive short-term impact to contractors and vendors during construction of Rosendale Dairy. Anticipated construction costs are $70 million. Long-term positive impacts will be generated by wages for the 70 employees at Phase II with an estimated annual payroll of $2.6 million. The dairy’s annual operating budget will add another $40 million in economic activity to vendors, suppliers, and maintenance contractors over the length of operation. Farms that currently only market crops such as grains will now have the

option to market forage. Also, the farms will have the chance to reduce their expenditures by entering into contracts for acceptance of manure nutrients, potentially in exchange for crops for animal feed.

Property values on adjacent residential parcels may decrease due to proximity to the farm operation and associated concerns about odor, noise, traffic, groundwater degradation, viewscape, etc. If the farm is properly managed and uses the best available technologies for dealing with waste and odor, any drop in property values may be short-term. The value of land needed for raising crops, and perhaps more importantly, acreage needed for manure spreading may increase due to the demand for suitable sites close to the facility. As land values increase due to demand for crops and manure disposal, the smaller dairy operator may be priced out of purchasing or renting additional land, or lose existing leased or rented property.

There may also be socio-economic concerns such as animal confinement issues, the trend towards large-scale farming in the state, impacts larger-scale farming may have on the viability of smaller operations, and concerns of smaller operations and non-farming rural inhabitants regarding changes in the agricultural landscape associated with CAFOs. The socio-economic issues are difficult to quantify and there is significant disagreement as to the validity of these concerns.

These local, regional, statewide, national, and international socio-economic issues associated with CAFOs and livestock production are beyond the scope of the proposed WPDES CAFO permit and the Department's overall regulatory authority. At this point, these issues can be addressed through local zoning and through implementation of comprehensive land use planning by the local unit of government. Larger policy debates will continue on the national and international levels.

V.B. Degree of risk or uncertainty

A significant concern with an operation the size of Rosendale Dairy is potential impacts to surface water and groundwater quality associated with designed structures such as manure lagoons and feed storage. Avoidance of these impacts is heavily dependant on proper design and construction and adherence to approved operation and maintenance plans. Ensuring the manure storage facilities and runoff control systems meet currently accepted standards is intended to address possible adverse impacts to groundwater, wetlands and surface waters.

Rosendale Dairy has indicated that the proposed manure storage and runoff control facilities at this operation are designed in accordance with currently accepted standards to minimize the risks of groundwater and surface water contamination. The Department has reviewed submitted plans and specifications for designed structures. The plans and specifications have also undergone extensive review by Fond du Lac County through the requirements of the county's manure storage ordinance.

It is sometimes difficult to assess actual groundwater impacts from an operation's manure and feed storage structures because it is often difficult to identify excessive leakage to groundwater. The operation has indicated that subsurface monitoring is possible for WSF 1 and 2 and the

sweet corn silage pad. The Department will be evaluating the need for monitoring of these system and other structures at the site as part of the WPDES permitting process.

How well a CAFO permittee will comply with its WPDES permit and associated NMP are often difficult to assess prior to permit issuance. The Department has a compliance record for the other two operations owned by the applicant (Milksource) and has not had significant noncompliance issues at these two sites. The WPDES permit regulations have a number of monitoring and reporting requirements that are intended to assess levels of permittee compliance.

There are a number of potential unknowns related to land application practices that can create uncertainty when dealing with environmental impacts. For example, the nutrient content of manure temporarily stored in the storage facility may vary. Unidentified variations in nutrient content may result in over-application of nutrients (nitrogen in particular) that could impact groundwater. A WPDES CAFO permit requires periodic manure and soil testing to ensure this does not occur. In addition, weather conditions can create potential uncertainty when it comes to manure and process wastewater applications on cropped field. Rosendale Dairy has proposed to avoid application during winter periods which avoids potential impacts associated with varying conditions and timing associated with snowmelt. The operation has also proposed to avoid surface application when certain rainfall events are forecasted.

There is also the potential for unknown field characteristics that increase the potential for groundwater impacts to occur in this area. This proposed operation is located in an area of the state with relatively shallow soils over groundwater and is also close to areas where karst topography has been identified as a significant concern. These conditions create a greater potential for impacts to groundwater to occur than in other areas of the state, even if the restrictions in NR 243 are followed. The Department will be evaluating the need for additional restrictions on land application activities as part of the WPDES permit issuance process.

Animal housing, roads and other structures increase the amount of impervious area at the site and change infiltration and runoff patterns. Standard modeling and engineering calculations are utilized to design stormwater management features to be protective of nearby water resources. It is not known how potential increases in the volume of stormwater runoff from the site and decreases in infiltration will impact groundwater and surface water levels in the area.

Possible operating problems that could impact the environment include (1) failure of manure handling and storage facilities due to improper maintenance or severe weather conditions, (2) improper operation or maintenance of runoff control systems, or (3) poor manure land application practices. These problems could lead to discharges of pollutants to surface waters, wetlands or groundwater. Some of these problems could be severe and could result in groundwater contamination or fish kills.

The WPDES permit program has a number of provisions that are intended to avoid the likelihood and severity of these problems. Department review of proposed storage facilities and runoff control systems helps to ensure that they are appropriately designed which significantly decreases the probability of failure of designed structures or systems under most conditions. In addition, WPDES permitted operations are required to inspect water lines on a daily basis,

manure storage structures and runoff control systems on a weekly basis, outdoor animal areas on a quarterly basis, and conduct period inspections of landspreading equipment. If the operation detects a problem as a result of these inspections, they are required to take corrective action. Operations must also conduct visual inspections and take preventative maintenance actions under "Ancillary Service and Storage Area" requirements that address potential runoff from debris piles, tracking of manure on access roads and pesticide and fuel storage.

Massive failure of a manure storage facility at the site would likely be formally defined as a spill under Ch. NR 706, Wis. Admin. Code. Chapter NR 706 describes requirements for immediate notification of the Department in the case of a spill. Inappropriate or inadequate responses (i.e., time frame of response and action taken to eliminate or mitigate environmental impact) to spills and associated environmental impact are subject to Department enforcement. However, Department and permittee action is contingent on a case-by-case evaluation of actual environmental impact and corrective actions taken by the operation.

Department inspections based on complaints or general compliance efforts will help in evaluating whether the operation is properly addressing minor spills and other operational problems. Manure and process wastewater must be landspread in accordance with a Department approved NMP, which requires certain land application and management practices. While these practices do not eliminate the possibility that impacts will occur, they do significantly reduce the risk of impacts under most conditions. These practices also cannot anticipate all scenarios under which problems can occur. Producers must also exercise their judgment in some instances to avoid water quality impacts. Failure to take appropriate actions to avoid discharges is subject to Department enforcement.

WPDES permitted operations are also required develop an Emergency Response Plan which provides an additional level of protection when malfunction or spills occur under typical and atypical operating and weather conditions (massive rains, flooding, etc.). While an Emergency Response Plan may not allow an operation to predict when a problem will occur, it does facilitate better decision making when problems occur.

V.C. Degree of precedence

This proposed CAFO is not precedent setting. As shown in Figure 32, below, there are currently 180 permitted CAFOs in the state of Wisconsin, of which 140 are dairy operations. There are nine permitted CAFOs in Fond du Lac County, all of which are dairy operations (see Figure 22, page III-46).

Figure 32 - Wisconsin CAFOs

The general trend in the dairy industry is toward more large farms and fewer total farms. The following numbers are from: Wis. Data - Dairy Milk Cows by Size Groups: Operations; USDA National Agricultural Statistics Service.

Wisconsin averaged 14,400 milk cow operations during 2007, down 500 from a year earlier. The most common size in Wisconsin continued to be 50-99 head, with 6,100 herds. There were 200 fewer herds in this group than in 2006, but it still accounted for 42 percent of all herds. The second largest category was 30-49 head, with a count of 3,600 farms. Farms with 1-29 head accounted for 1,900 milk operations, 13 percent of the total.

The total number of dairy herds with 100 or more cows, at 2,800, has not changed since 2003. These larger farms account for 19 percent of all dairy operations in the state. There were 1,800 operations with 100-199 head, 50 fewer than a year ago. The number of farms with 200-299 head increased to 750, and farms with 500 or more head rose to 250.

Almost one-third of all milk cows in Wisconsin are found on farms with 50-99 head, and they account for 29 percent of the state's milk production. The largest farms, those with 500 or more head, have shown the most growth in cow numbers and milk production. Five years ago, they had only 13 percent of the state's milk cows, whereas in 2007, they accounted for 18 percent. The amount of milk they contribute to the state's total has steadily risen from 15 percent in 2003 to 22 percent in 2007.

The growth trend for CAFOs in Wisconsin is shown by Figure 33, below.

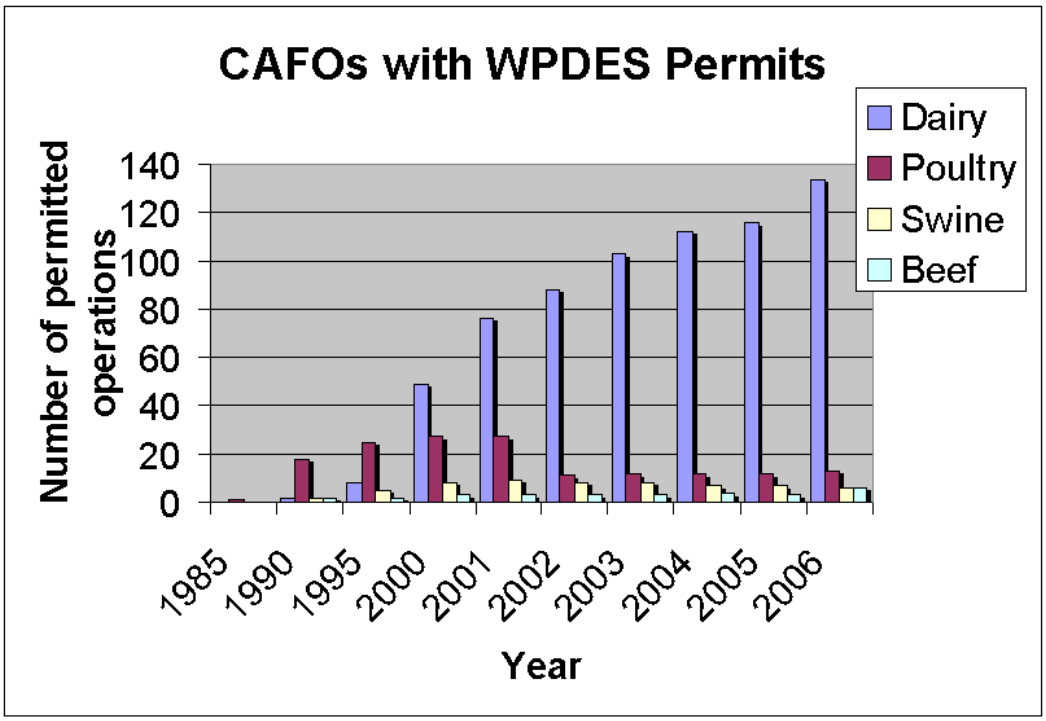


Figure 33 - CAFO Trends (from: http://dnr.wi.gov/runoff/ag/stats.htm)

At the Phase I stage, Rosendale Dairy would be one of the largest dairy operations in the state. At Phase II, it would become the largest dairy operation in the state.

Options for other land uses are foreclosed for the foreseeable future at the production site due to the construction and use of project buildings and other facilities. Sites for manure spreading will not be available by others so long as they are owned by, or under contract to, Rosendale Dairy. The spreading sites will remain in agricultural row crop use as long as Rosendale Dairy is in operation and is using the sites for manure spreading.

This proposed project is not in conflict with plans or policies of state, local or federal agencies.

V.D. Environmental effects summary

The Department anticipates the general environmental effects shown in Table 8, below.

This analysis assumes that permitting conditions and requirements will be fully met by the applicant.

Table 8 - Potential Environmental Effects Summary

Rosendale Dairy Potential Environmental Effects Summary				
Effects expressed as Negative or Positive and Degree (Low, Moderate, High)				
Impact Category	**Production Site Short-term Effects**	**Production Site Long-term Effects**	**Nutrient Mgt Plan Area Short-term Effects**	**Nutrient Mgt Plan Area Long-term Effects**
Surface Waters	Negative-Low	Negative-Low	Negative-Low	Negative-Low
Wetlands	Negative-Low	Negative-Moderate	Negative-Low	Negative-Moderate
Recreation Areas	No impact	No impact	Negative-Low	Negative-Low
Groundwater & Wells	Negative-Low	Negative-Moderate	Negative-Low	Negative-Low
Air Quality	Negative-High	Negative-Moderate	Negative-Moderate	Negative-Low
Flora & Fauna	No impact	Positive-Low	Negative-Low	Positive-Low
Economic	Positive-Moderate	Positive-Moderate	Positive-Low	Positive-Low
Noise	Negative-High	Negative-High	Negative-Moderate	Negative-Low
Roads & Safety	Negative-High	Negative-Moderate	Negative-Moderate	Negative-Low

V.E. Degree of controversy

This project has generated a great deal of public controversy. Concerned citizens from the project area and beyond have submitted comments to the Department on the environmental assessment, and during the EIS scoping period.

Concerns have been expressed concerning impacts to surface waters, groundwater and wells, flora, fauna, and air quality. Public concerns have also been expressed regarding noise, lighting, health and safety, project scale, project management, dairy industry trends, and lifestyle issues.

The applicant and other Wisconsin dairy industry organizations have expressed concern to the Department and through news releases regarding the Department's decision to follow the EIS review process. The project and the Department's EIS process decision have also been the subject of news articles and editorials in several state news papers and media outlets.

The Department decided to follow the EIS process for the Rosendale Dairy project because we felt it was the best process to allow for public involvement and for disclosing information. A public hearing on the EIS and the WPDES permit will be held. All interested members of the public will be given the opportunity to comment on this project and the EIS during the public comment period and at the public hearing.

VI. Alternatives

VI.A. Department alternatives

VI.A.1. Department review of plans & specifications for proposed structures

The Department's alternatives for review of plans and specifications for a CAFO are as follows:

- Deny the plans and specifications for the design of the proposed facilities based on water quality concerns and require resubmittal of plans and specifications.

- Approve the plans and specifications for the design of the proposed facilities without conditions.

- Approve the plans and specifications for the design of the proposed facilities, but with conditions requiring additional components to the facilities' design or operation based on water quality concerns.

The operation has already constructed the majority of structures without prior Department approval. This essentially eliminates Department alternatives with regard to review of plans and specifications for proposed structures. The operation has indicated that it has designed and constructed all structures in accordance with applicable design standards. The Department has not received post-construction documentation for those structures which have been built.

In a letter to the applicant dated November 21, 2008, the Department indicated a number of concerns regarding the submitted plans and specifications (see Appendix VII.A.4).

Based on review of post-construction documentation, the Department may require additional restrictions as part of the proposed WPDES permit to address design concerns with potential impacts to water quality (see discussion below).

VI.A.2. Department WPDES permit review

The WPDES permit program is intended to protect water quality by setting operational requirements and then monitoring and enforcing compliance with permit conditions .Within the constraints of the Department's existing WPDES permitting authority for CAFOs, the Department has limited alternatives to the issuance of a WPDES permit for the operation. Possible options include:

VI.A.2.a. Deny issuance of the WPDES permit

Denial of the permit would require that Rosendale Dairy either not populate its operation with animals or that it populate the operation with fewer than 1,000 animal units. This would eliminate or reduce potential impacts (less noise, dust, light issues, traffic, odor and air emissions and potential for pathogen impacts on area groundwater and surface waters) and maintain the

quality of the human environment more closely to its current state. If the operation were to populate the operation below the WPDES permit threshold level, land application of manure and process wastewater from the site would not be subject to the more stringent requirements of NR 243, allowing, for example, applications of liquid manure on frozen or snow-covered. In addition, there would not be the potential economic benefits and water quality benefits associated with nutrient management planning on acreage planned to receive Rosendale Dairy manure and process wastewater.

VI.A.2.b. Issue a WPDES permit for just Phase I

While the Department is evaluating both Phase I and II as part of this Environmental Impact Statement, the Department is considering issuance of a WPDES permit only for Phase I of Rosendale Dairy. This will make future expansion plans as part of Phase II subject to WPDES permit modification and public comment.

Such an approach essentially delays potential impacts associated with Phase II until such a time as Rosendale Dairy chooses to implement Phase II and the Department modifies its WPDES permit to include the animals for Phase II. In order to develop Phase 2, the applicant will have to demonstrate to the Department that adequate land is available in an amendment to the Nutrient Management Plan, as part of the permit modification process.

Permitting the development of Phase 1 and Phase 2 would result in all the impacts identified. However, for reasons outlined above, permitting of Phase 2 is not possible at this time..

VI.A.2.c. Include additional water-quality based restrictions as part of the WPDES permit

Ch. NR 243, Wis. Adm. Code, was revised in July of 2007 to require certain best management practices to protect groundwater, surface waters and wetlands for all operations covered under a WPDES permit. The Department does have authority to require more restrictive best management practices on a case-by-case basis where these practices are deemed necessary to provide additional levels of groundwater quality protection. The Department has limited authority to require more restrictive practices as it relates to surface water quality protection.

The Department is not aware of surface water resources in the area that are unique to the extent that best management practices specified in NR 243 are not adequate. Primary water quality concerns as identified in this Environmental Impact Statement are associated with shallow soils with respect to groundwater and bedrock in the area. Shallow depth to groundwater and bedrock are both an issue at the operation's production area. Shallow depth to groundwater is the primary concern in fields where the operation is land applying manure and process wastewater.

For structures associated with manure and process handling (e.g., manure and feed storage), potential options include requiring additional separation distances from groundwater, bedrock or surface waters, increased thickness of clay or concrete liners in storage facilities or secondary containment for above ground storage facilities in case of overflow or failure. Most of the manure and process wastewater handling structures have already been constructed at the site. If the Department were to determine additional requirements were necessary, the Department could

require reconstruction of structures where it is deemed necessary. In lieu of or in addition to such requirements, the Department could require groundwater monitoring around structures where there are water quality concerns.

Including additional design requirements reduces the potential for leakage from designed structures to impact groundwater (e.g., pathogens, nitrates). Requiring installation of groundwater monitoring provides an indication of whether or not structures have been designed and built properly to protect groundwater. The need for either of these actions would be evaluated as part of the permit issuance process and included as requirements of the WPDES permit.

For land application activities, the Department could include additional or more restrictive best management practices beyond s. NR 243.14, primarily to ensure additional levels of protection for groundwater resources. The operation has submitted a Nutrient Management Plan that conforms with s. NR 243.14. The Department could require additional best management practices in the WPDES permit.

EPA has recently promulgated Federal CAFO rules that identify storage and land application (as opposed to digestion) as Best Available Technology (BAT) for avoiding CAFO impacts on water quality. Implementation of these additional requirements would further reduce potential impacts to water quality beyond what is required in NR 243, but does not completely eliminate potential impacts.

VI.A.2.d. Require manure/process wastewater treatment

There are an increasing number of technologies that have the potential to address potential water quality impacts associated with livestock operations. Generally, these technologies fall into categories of (1) manure/process wastewater digestion and (2) solid/liquid separation (including membrane filtration).

Digestion technologies provide reductions in pathogens present in materials that are land applied and creates a more stable organic material that has less of biochemical oxygen demand should it get into surface waters during land application. In addition, digestion technologies can have added benefits of providing for energy production and odor reduction. The Department is currently developing a report that outlines the regulations and potential positive and negative impacts of anaerobic digesters. This document will be available to the public in 2009.

Solids separation technologies help to recycle materials (e.g., sand) and/or concentrate nutrients in solids or liquids that help reduce the volume of wastewater that needs to be land applied. This can help to reduce potential for runoff or leaching to groundwater by allowing decreased volumes of water that are subject to potential runoff directly or as a result of precipitation. Neither of these technologies significantly reduces the amount of nutrients that need to be land applied. In some instances, these two technologies can be combined to create a liquid portion that is treated to the point that it could be discharged to surface waters, spray irrigated or seeped to groundwater in compliance with state water quality standards.

The authority for requiring additional technologies under a WPDES permit are limited to those providing water quality benefits, and are not based on other potential benefits such as odor reduction and/or energy production. While these technologies may offer incremental decreases in the potential for water quality impacts associated with the storage and land application of manure/process wastewater at Rosendale Dairy, the actual decrease in impact potential is difficult to asses. For example, following the land application restrictions in ch. NR 243 reduces the potential for pathogen contamination of groundwater associated with Rosendale Dairy's land application activities. Treatment technologies exist that may reduce or eliminate pathogens in manure (e.g., anaerobic digestion), thus further reducing the potential for pathogen contamination of groundwater associated with land application practices. Another option to reduce impact potential is to require additional best management practices that are more restrictive than the specific requirements contained in NR 243 (e.g., additional field investigative work prior to land application, increased setbacks from areas of concern, further restrictions on timing of manure applications). As a matter of current and past practice when issuing WPDES permits for CAFOs, the Department has relied on the implementation of best management practices rather than requiring treatment technologies when additional levels of water quality protection are determined to be necessary

It should be noted that US EPA recently promulgated additional revisions to its federal CAFO rule and has upheld proper storage and land application of manure as best conventional technology (BCT) for CAFOs. In addition, federal CAFO rules and ch. NR 243 have only recently provided allowances for "treat and discharge" from CAFOs which are considered "voluntary" under state and federal law.

VI.B. Applicant alternatives

VI.B.1. Production site

Rosendale Dairy has indicated that they reviewed three alternatives as part of its decision to build at the proposed site:

(1) No build

The no build or no action alternative would result in some of the impacts outlined in this document, as the construction activities have already occurred on the production site and some animals have already been delivered. The no action alternative would thus have some impacts currently experienced by local residents , but these would be less than impacts associated with the full Phase 1 or proposed Phase 2. According to information provided by Rosendale Dairy, the "No build" alternative would not have provided for economic development, additional employment opportunities, or tax revenue at the local and state levels.

(2) Expand at one of its existing facilities

With current manure handling technologies and the need to secure additional cropland, expansion at Tidy View Dairy or Omro Dairy was determined to be not feasible. Future

improvements in manure handling technologies and the ability to secure additional cropland may allow expansion at these sites in the future.

(3) Select a location other than the proposed site

Rosendale Dairy has indicated it spent about a year and a half exploring other sites in north central and northeast Wisconsin for this project. Other sites were eliminated due to either the presence of other large dairies in the vicinity, lack of adequate cropland for feed production and/or manure application, topography, or an inadequate infrastructure for agri-business supplies or services.

Potential alternatives that could at this time be pursued by Rosendale Dairy include the following.

VI.B.1.a. Abandon current site

Since the operation has already constructed many of the structures at the site, this alternative would be the equivalent of the "no build" option and would entail not populating existing structures with animals. The operation could still use the site for feed storage (sweet corn silage, haylage) and there would be traffic associated with the placement of these materials in the storage areas. Land application of leachate from sweet corn silage would be regulated in accordance with the general permit for Land Application of Liquid Industrial Wastes (WI-0055867).

While this option would avoid identified potential negative impacts associated with the population of animals of at the site (traffic, odor, noise, lighting, water quality impacts), it would also negate potential positive impacts that would otherwise occur (economic development, additional employment opportunities, or tax revenue at the local and state level). The number of cropped fields under a nutrient management plan in Fond du Lac would likely gradually increase under county efforts to implement nutrient management plans, although this may be dependent on the ability of the county or state to offer cost-share funds for nutrient management planning. This option also does not foreclose the possibility of other, potentially smaller, livestock operations from starting in the area that would not fall under the additional storage and land application requirements associated with NR 243.

VI.B.1.b. Decrease the number of animals proposed for the site

The operation could voluntarily choose to stay below the 1,000 animal unit threshold (under NR 243) or it could exceed the 1,000 animal unit threshold but not populate to the maximum sizes indicated (e.g., limit animal units at the site to Phase I animal numbers or lower). Lower animal numbers would reduce identified potential negative impacts associated with the site (traffic, odor, noise, lighting, water quality impacts) but it would also negate potential positive impacts that would otherwise occur (economic development, additional employment opportunities, or tax revenue at the local and state level). If the operation were to stay below the 1,000 animal unit threshold, the additional water quality protection restrictions in NR 243 for CAFOs would not apply.

VI.B.1.c. Voluntarily implement new production area technologies

Rosendale Dairy has evaluated numerous manure technologies for treating/handling manure and process wastewater, which includes work done by a consultant evaluating the various technologies. Rosendale Dairy has indicated that a number of these technologies will be evaluated for implementation, but only as part of Phase II of the operation. Of the technologies being evaluated, anaerobic digestion and nitrification/denitrification reactors were deemed to not be viable alternatives to storage and land application at this time. Possible technologies that could be implemented either alone or in concert with others as part of Phase II include (1) covering manure storage facilities to sequester emissions and reduce odor, (2) mechanical solids separation (3) use of a rotary drum thickener to improve solids recovery, (4) centrifuge/cyclone solids separation, (5) ultra filtration (using reverse osmosis to filter liquid manure into cleaner water form, and (6) dissolved air floatation (using proven municipal water treatment technology, solids are 'floated' out of manure using dissolved air and polymers).

Each of these has a cost associated with the construction and operation (including energy consumption) of the given technology.

There are many BMPs which focus on odor, VOC, H2S and/or ammonia control practices and have been implemented at dairy operations in Wisconsin and elsewhere. These include, but are not limited to the use of biofilters (and other air filtration techniques) on building exhaust fans or other controllable emissions; other types of covers for manure lagoons/storage; sequencing-batch reactors, lagoon nitirifcation/denitirification systems, fixed-media aeration systems; forced aeration composting with biofilter; BMPs addressing land application including soil injection or incorporation of manure within a set number of hours. In some cases, BMPs focused on control practices specific for one air quality parameter may contribute to an increase in other air emissions or to environmental problems with other media (for example, soil injection potentially contributing to impacts on groundwater quality). Not all BMPs will be appropriate to any given situation.

The Department currently has a Green Tier program designed to create incentives for operations to go “beyond compliance” and implement additional practices, technological or otherwise. The program encourages operations to look at reducing impacts across all media, beyond that required under current rules, in exchange for certain regulatory benefits. The DNR has signed a Green Tier charter with the Dairy Business Association that is designed to facilitate Green Tier participation in the livestock industry.

VI.B.2. Manure spreading sites

Based on Department review of the operation’s nutrient management plan, the operation has submitted a plan that complies with the water quality based restrictions in NR 243. The operation could voluntarily implement additional best management practices, particularly related to land application of manure and process wastewater in order to address potential water quality, air, odor and other potential impacts on the environment. The NMP Rosendale Dairy has submitted

includes some best management practices which go beyond NR 243 requirements. Examples include:

- Not surface applying solid manure on frozen or snow-covered ground. Solid manure sources are going to be mixed and stored with liquid manure. No manure is planned for application (surface applied or otherwise) during frozen or snow-covered conditions.

- The operation has identified certain soil types with highly permeable characteristics (e.g., gravel) within two feet of the surface and has chosen not to apply to these soils.

Other practices proposed to be used by the operation such as primarily using injection or incorporation within 48 hours of application when applying manure and process wastewater will help to minimize odors associated with land application activities.

VI.B.4. Operations

VI.B.4.a. Production management

Rotational grazing or pasturing of animals is a potential option for herd management at dairy and beef operations. While a grazing operation with the numbers of animals proposed at Rosendale Dairy is theoretically possible, there are likely operational problems that would make such an operation impractical. This is particularly an issue for dairy operations which require that animals have access to a centralized milking area two to three times a day. If a grazing operation were proposed at the Rosendale site, land available at the site for grazing would significantly decrease the potential size of the operation. Such an option would also require that Rosendale Dairy essentially abandon many of the structures currently constructed at the site. Properly managed grazing at the site would likely result in decreased impacts associated with odors, noise and traffic at the site, and potentially decreased risk of water quality impacts. However, the economic benefits associated with the operation would be decreased in some proportion to the decrease in animals that could be sustained by grazing at the site. Increasing the size of the operation would require the acquisition of additional land and may be difficult based on availability and cost of land for grazing.

As with any type of livestock operation, proper management of grazing operations is critical to avoiding potential water quality impacts. Failure to keep stocking densities at proper levels and managing livestock access to water resources can result in significant impacts to water quality, particularly given issues in the area related to depth to groundwater.

VI.B.4.b Transportation management

The Rosendale Dairy is currently served by a long established network of state, county and local roads. The type and volume of traffic generated by the proposal may require that design and structural improvements to the existing roads be carried out to maintain the integrity of the system and public safety. Improvements may include:

- Reconstruct CTH M from STH 44 to STH 23. CTH M is already in poor shape, with older pavement, very narrow shoulders, unknown sub-structure. According to county highway officials, the increased heavy traffic will lead to a rapid deterioration of the existing roadway, requiring frequent repairs. CTH M also has a higher than average accident rate. Any improvements must also include design/construction features to improve the safety and decrease the accident rate.

- Reconstruct frequently used intersections to accommodate traffic volume, and heavier and wider equipment.

- Agreements with town and county officials regarding designated haul routes, and paying for repairs to the local system caused by increased traffic, and heavier and wider equipment.

- Coordinate with local government, emergency services and school districts to avoid conflicts during periods of heavy traffic.

Construction of new roads on new locations would be very costly, would not provide better service, and could have other impacts to natural resources and agricultural uses of the land.

VI.B.4.c. Other environmental management & monitoring

The DNR recommends that groundwater around the manure storage lagoons be monitored for leaking using monitoring wells constructed as per chapter NR 141, Wis. Adm. Code. It is also recommended that the Dairy inventory all wells near their operations. and provide the residents information on DNR well testing and inspection recommendations.

VI.B.5. Mitigation

Possible wildlife impact mitigation measures:

Construct perimeter fence (ideally 10 feet high) around entire site for biosecurity reasons. Secure all livestock feed so it is inaccessible to wildlife to limit potential disease transmission.

Install mesh fencing about two feet high from ground level to keep wildlife from falling into manure storage pits, especially reptiles and amphibians migrating from their breeding area wetlands to their upland foraging areas.

Construct a secondary containment area on east side in the event of a major manure spill or breach on site. This would minimize environmental damage to wetlands and wetland dependent wildlife east and southeast from the site.
Rosendale Dairy should implement its odor management plan that identifies management practices that will be followed to reduce odor issues. These measures include conserving water and notifying neighbors before agitating or spreading manure.

VII. Appendices

VII.A. Correspondence

VII.A.1. February 05, 2008 Letter - Coverage Under WPDES General Permit No. WI-S067831-3: Construction Site Storm Water Runoff

State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

Jim Doyle, Governor
Matthew J. Frank, Secretary
Ronald W. Kazmierczak, Regional Director

Northeast Region Headquarters
2984 Shawano Avenue
P.O. Box 10448
Green Bay, WI 54307-0448
Telephone (920) 662-5100
FAX (920) 662-5159
TDD (920) 662-5112

February 05, 2008

Jim Ostrom
Rosendale Dairy
N3569 Vanden Bosch Road
Kaukauna, WI 54130

SUBJECT: Coverage Under WPDES General Permit No. WI-S067831-3: Construction Site Storm Water Runoff

Permittee Name: Rosendale Dairy
Site Name: Rosendale Dairy
FIN: 38419

Dear Permittee:

The Wisconsin Department of Natural Resources received your Construction Project Consolidated Permit Application or Notice of Intent, on January 25, 2008, for the Rosendale Dairy site and has evaluated the information provided regarding storm water discharges from your construction site. We have determined that your construction site activities will be regulated under ch. 283, Wis. Stats., ch. NR 216, Wis. Adm. Code, and in accordance with Wisconsin Pollutant Discharge Elimination System (WPDES) General Permit No. WI-S067831-3, Construction Site Storm Water Runoff. All erosion control and storm water management activities undertaken at the site must be done in accordance with the terms and conditions of the enclosed general permit.

The **Start Date** of permit coverage for this site is February 05, 2008. The maximum period of permit coverage for this site is limited to 3 years from the **Start Date**. Therefore, permit coverage automatically expires and terminates 3 years from the Start Date and storm water discharges are no longer authorized unless another Notice of Intent and application fee to retain coverage under this permit or a reissued version of this permit is submitted to the Department 14 working days prior to expiration.

A copy of the general permit along with extensive storm water information including technical standards, forms, guidance and other documents is accessible on the Department's storm water program Internet site. The Department's Internet site is: **http://www.dnr.state.wi.us/org/water/wm/nps/stormwater.htm**

To obtain a copy of the general permit, please download it and the associated documents listed below.

- Construction Site Storm Water Runoff WPDES general permit No. WI-S067831-3: **http://dnr.wi.gov/org/water/wm/nps/pdf/stormwater/permits/construction/construction_permit_S067831-3.pdf**

- Construction site inspection report form:
  http://www.dnr.state.wi.us/org/water/wm/nps/pdf/stormwater/3400187_Construction_Site_Inspection_Report.pdf

- Notice of Termination form:
  http://www.dnr.state.wi.us/org/water/wm/nps/pdf/stormwater/3400162.pdf

If, for any reason, you are unable to access these documents over the Internet, please contact me and I will send them to you.

To ensure compliance with the general permit, please read it carefully and be sure you understand its contents. Please take special note of the following requirements (This is not a complete list of the terms and conditions of the general permit.):

1. The Construction Site Erosion Control Plan and Storm Water Management Plan that you completed prior to submitting your permit application must be implemented and maintained throughout construction. Failure to do so may result in enforcement action by the Department.

2. The general permit requires that erosion and sediment controls be routinely inspected at least every 7 days, and within 24 hours after a rainfall event of 0.5 inches or greater. Weekly written reports of all inspections must be maintained. The reports must contain the following information:

   a. Date, time, and exact place of inspection;
   b. Name(s) of individual(s) performing inspection;
   c. An assessment of the condition of erosion and sediment controls;
   d. A description of any erosion and sediment control implementation and maintenance performed;
   e. A description of the site's present phase of construction.

3. A **Certificate of Permit Coverage** must be posted in a conspicuous place on the construction site. The Certificate of Permit Coverage (WDNR Publication # WT-813) is enclosed for your use.

4. When construction activities have ceased and the site has undergone final stabilization, a Notice of Termination (NOT) of coverage under the general permit must be submitted to the Department.

It is important that you read and understand the terms and conditions of the general permit because they have the force of law and apply to you. Your project may lose its permit coverage if you do not comply with its terms and conditions. The Department may also withdraw your project from coverage under the general permit and require that you obtain an individual WPDES permit instead, based on the Department's own motion, upon the filing of a written petition by any person, or upon your request.

If you believe that you have a right to challenge this decision to grant permit coverage, you should know that the Wisconsin statutes and administrative rules establish time periods within which requests to review Department decisions must be filed. For judicial review of a decision pursuant to ss. 227.52 and 227.53, Wis. Stats., you have 30 days after the decision is mailed, or otherwise served by the Department, to file your petition with the appropriate circuit court and serve the petition on the Department. Such a petition for judicial review must name the Department of Natural Resources as the respondent.

To request a contested case hearing pursuant to s. 227.42, Wis. Stats., you have 30 days after the decision is mailed, or otherwise served by the Department, to serve a petition for hearing on the Secretary of the Department of Natural Resources. All requests for contested case hearings must be made in accordance with s. NR 2.05(5), Wis. Adm. Code, and served on the Secretary in accordance with s. NR 2.03, Wis. Adm. Code. The filing of a request for a contested case hearing is not a prerequisite for judicial review and does not extend the 30-day period for filing a petition for judicial review.

Thank you for your cooperation with the Construction Site Storm Water Discharge Permit Program. Please notify me 10 days prior to construction start date via e-mail or phone. If you have any questions concerning the contents of this letter or the general permit, please contact Casey Jones at (920) 662-5497.

Sincerely,

Casey J. Jones

Casey Jones
Northeast Region
Storm Water Management Specialist

ENCLOSURE: Certificate of Permit Coverage

CERTIFICATE OF PERMIT COVERAGE

UNDER THE
WPDES CONSTRUCTION SITE STORM WATER RUNOFF PERMIT
Permit No. WI-S067831-3

Under s. NR 216.455(2), Wis. Adm. Code, landowners of construction sites with storm water discharges regulated by the Wisconsin Department of Natural Resources (WDNR) Storm Water Permit Program are required to post this certificate in a conspicuous place at the construction site. This certifies that the site has been granted WDNR storm water permit coverage. The landowner must implement and maintain erosion control practices to limit sediment-contaminated runoff to waters of the state in accordance with the permit.

EROSION CONTROL COMPLAINTS

should be reported to the WDNR Tip Line at

1-800-TIP-WDNR (1-800-847-9367)

Please provide the following information to the Tip Line:

WDNR Site No. (FIN): 38419

Site Name: Rosendale Dairy

Address/Location: E of Hwy M, north Town of ROSENDALE

Additional Information:

Landowner: Rosendale Dairy

Landowner's Contact Person: Jim Ostrom

Contact Telephone Number: (920) 766-5335

Permit Start Date: February 05, 2008

By: Casey J. Jones

WDNR Publication # WT-813 (10/06)

VII.A.2. May 22, 2008 Letter - Conditional Permit for Two High Capacity Wells

State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

WISCONSIN
DEPT. OF NATURAL RESOURCES

Jim Doyle, Governor
Matthew Frank, Secretary

101 S. Webster St.
Box 7921
Madison, Wisconsin 53707-7921
DG/2 Telephone 608-266-0821
DG/2 FAX 608-267-7650
TTY 608-267-6897

OK to use Grout & bot
6/6/08
Phone Call
Mk

May 22, 2008

File Reference: **20-3-0030**

FILE

ATTN TODD WILLER
ROSENDALE DAIRY INC
N3569 VANDEN BOSCH ROAD
KAUKAUNA WI 54130

SUBJECT: **Conditional Approval for a New High Capacity Property With four Requested Wells, two Wells approved, Each Well With a Capacity 250 Gallons Per Minute, (gpm) Located in the Town of Rosendale, Fond du Lac County**

Dear Mr. Willer:

The Department of Natural Resources (department), Division of Water, Bureau of Drinking Water and Ground water, received an application for four 250 gpm high capacity dairy farm wells on March 13, 2008. The application was submitted by Ann-Perry Witmer of Crispell-Synder Inc. The application requested department approval for the construction and operation of the four proposed potable high capacity wells on a new high capacity property.

Due two geologic concerns the Department is approving only two wells at this time. The first well to be approved is the North Well #1. Dependent upon results of a pump test from Northb Well #1 a second well either North Well #2 or South Well #2 will be relocated and constructed. The two approved wells are subject to all parts of this approval, which includes the Conditions of Approval.

This review and approval is specific to regulatory compliance with Chapter NR 812, Wisconsin Administrative Code. The department has not performed any review for structural integrity, for regulatory requirements of other departmental programs or for regulatory requirements of other agencies.

According to Chapter NR 812, Wisconsin Administrative Code, a high capacity well must be approved prior to construction and operation. The definition of a high capacity well is any well on a high capacity property. A high capacity property is one property that has or will have one or more wells with a combined capacity of 70 gallons per minute (gpm) or more. Therefore, all and proposed wells on the property are high capacity wells. The department recommends that you retain a copy of this approval for future reference.

High capacity well approvals are issued to the property owner and are not valid after the property is sold. In the event that the property is sold, the new owner will have to apply to have this approval re-issued to the new owner.

Permanent high capacity well number 69601 has been issued as part of this approval for the proposed North Well #1. High capacity well number 69602 has been issued for the optional North Well #2 well as well as high capacity well

number 69600 for the optional South Well #2. Only one of the optional wells are allowed to be installed at this time.

Based on information from you, Rosendale Dairy expects to employee 50 people working three shifts. Thus, the department is of the opinion that this water supply will be a non-transient non-community public water supply. The department notes that currently the proposed wells will have more than 100 feet of casing.

PROPOSAL SUMMARY

Operator and Property Owner: Rosendale Dairy Inc.
N3569 Vanden Bosch Road
Kaukauna WI 54130

Officials: Todd Willer

Telephone: (920) 766-5335

Property Location: The contiguous property is an irregularly shaped parcel of land within Sections 4, 5, 8, 9, 10, and 16 all in Township T16N, Range R15E, Town of Rosendale, Fond du Lac County. A plat book map outlining the contiguous property was submitted as part of the application and will be retained in the department's permanent file for this site. If additional property is added to the contiguous property that the wells are on, then notify the department of the additions and resubmit an updated plat book map.

Existing Water Supply, Proposed Modifications to the Water Supply, Proposed Pumping Capacities and Proposed Daily Water Usage Rates: According to the applicant, there is no existing water supply wells on the property of the proposed well(s). A summary of proposed wells with pertinent well numbers is attached as Table 1 at the end of this approval. Note, only two wells are approved at this time. The location of the North Well #1 is approved provided all conditions of this approval are met. The second well to be approved will be either the North Well #2 or the South Well #2 and the proposed location of this well will be dependent upon information from pump testing the North Well #1. This approval is for a maximum pumpage of 250 gpm from each well for a total of 500 gpm for this approval.

LOCATION CRITERIA

The department has not inspected the proposed well site and the department may not have fully evaluated the distance from the proposed well or wells to all potential contaminant sources for compliance with Chapter NR 812, Wisconsin Administrative Code. It is the responsibility of the owner to provide a complete description of potential contaminant sources to the driller and it is the responsibility of the driller to ascertain that the proposed well or wells is located and constructed in compliance with NR 812 and this approval. The well or wells shall be installed and maintained in accordance with the requirements of Section NR 812.08, Wisconsin Administrative Code.

Proximity to Landfills: There are no reported landfills within 1,200 feet of the proposed wells. Even with potential relocation of the second approved well it is expected that the 1200 foot separation distance will be maintained.

Contamination Sites: There were no reported ground water contamination sites regulated by the department's Remediation and Redevelopment Program within a

quarter mile of the site as of December 1, 2005, based on the database maintained by that program.

Ground Water Management Areas: The department has established ground water management areas in accordance NR 820 Wis. Adm. Code. The well site will be located in an area that has a potentiometric surface that has been drawn down by less than 150 feet when compared to historic levels, so at this time, no management in this area is expected.

Proximity to Nearby Springs: The department believes that the proposed well or wells will not have an adverse impact on any springs, as a spring is defined in s. 281.34(1)(f), Wisconsin Statutes.

Ground Water Protection Areas: The proposed well or wells are located more than one mile from the water body that forms the core of the nearest ground water protection area, as a ground water protection area is defined in s. 281.34(1)(a), Wisconsin Statutes. The nearest ground water protection area is Silver Creek a Class 2 trout fishery and it is estimated to be 4.5 miles from the site.

Proximal Public Utility Well: The nearest well serving a public utility within the State of Wisconsin is the Ripon waterworks Well #5 which is located approximately 5.7 miles southwest of the proposed well. No impacts to this municipal well are expected from the operation of the proposed wells.

Other Potential Contaminant Sources: Chapter NR 812.08 Wisconsin Administrative Code, Table A, lists minimum separation distance requirements between individual wells and sources of contamination. Review the complete Table A. The well driller shall confirm the separation distance between the proposed well, and any other potential sources of contamination, and maintain the required minimum separation distances from these sources as stated in Table A on NR 812.08 Wisconsin Administrative Code. The property owner and the engineer, shall assist the well driller with the confirmation of these potential sources of contamination. For the North Well #1, the department notes that the minimum separation distance from an Animal Shelter is 50 feet and that the two proposed free stall barns are very large structures. Also, the proposed wells shall be 25 feet from the edge of a ditch. There are other setback requirements in Table A, (temporary manure stack) that you, the engineer, and the well drill shall review, and measure the distances, to confirm the minimum separation distances are being met. If the wells are to be constructed prior to the physical establishment of the potential sources of contamination, then use the developed plans to stake out the locations of the potential sources of contamination prior to drilling any well so that separation distances can be met and maintained.

PROPOSED WELL, PUMP AND DISCHARGE DETAILS

Special Construction and Operation Requirements: Section NR 812.09(4), Wisconsin Administrative Code states the following:

> "... ... *When deemed necessary and appropriate for the protection of public safety, safe drinking water and the groundwater resource, the department may specify more stringent well location, well construction or pump installation specifications for existing and proposed high capacity, school or wastewater treatment plant water systems requiring approval by this subsection ... ...*"

The department has determined that the following requirements are all necessary to protect the ground water resource:

- Although the proposed wells are not in Winnebago or Outagamie County, the department is requiring that high capacity private supply wells in this area be constructed with the procedures and methods outlined in Option B in the attached document titled: *Special Well Casing Pipe Depth Area" (Arsenic Area) - Outagamie County (Entire County) and Winnebago County (Entire County)*, Which is dated September 10, 2004. A copy of this information is attached, including the Special Well Construction & Disinfection Specifications & Methods information. Additional information on this situation was also supplied in a Department letter dated September 10, 2004. This letter is also attached.

- The pumping level in the well shall remain within the casing during operation of the well over the long term. This is intended to prevent air (which contains oxygen) from reaching the aquifer material. The department may also require additional hardware regarding this requirement.

- The well may not be developed with air.

More information on these items follow in the sections below.

Proposed Well Construction: The two proposed wells are expected to be drilled to identical specifications. All wells at the facility are to be constructed to potable high capacity well standards. It is anticipated that the geologic materials will be unconsolidated deposits to a depth of approximately 15 feet below ground surface (bgs)followed by a dolomite bedrock, a Cambrian sandstone bedrock and lastly a Precambrian bedrock which may be encountered at about 500 feet bgs.

The well shall be constructed using rotary mud drilling methods to construct an upper enlarged drillhole of 14 inches in diameter to a depth of approximately 260 to 280 feet bgs which is the area where the Cambrian sandstone aquifer is expected. The upper enlarged drillhole shall extend a minimum of ten feet into the Cambrian sandstone aquifer from the point where it is first encountered. A casing that is ten inches in diameter and has a wall thickness of inches 0.365 inches will be set to a depth which is a minimum of ten feet into the Cambrian sandstone aquifer. The casing shall meet the requirements of Section NR 812.17, Wisconsin Administrative Code. The casing to casing joints will be welded according to the requirements of Section NR 812.18.

The annular space between the drillhole wall and the casing will be sealed with neat cement grout which is the only annular space material that is allowed for potable high capacity wells. The cement grout will be placed using the Bradenhead pressure grouting method as specified in Section NR 812.20, Wisconsin Administrative Code. If a temporary casing is used to maintain an open upper enlarged drillhole before grouting, that temporary casing shall be removed before the grout has set. The department recommends that the temporary casing be partially pulled before grouting to assure that the driller has equipment on site that is capable of pulling the casing before the grout is placed. The grout shall be allowed to set for at least 24 hours before the lower bedrock drillhole construction is commenced.

Below the casing, a drillhole in bedrock that is a nominal ten inches in diameter shall be advanced to a well termination point not to exceed the surface of the Precambrian bedrock which may start at approximately 500 feet bgs.

At completion, the well casing shall terminate a minimum of 12 inches above finished ground grade or a minimum of 24 inches above the 100 year flood elevation, whichever is the higher elevation.

Refer to the Special Well Construction & Disinfection Specifications & Methods which is part of the Option B information. Where there appears to be a conflict between the proposed well construction and the Option B information the proposed well construction information shall govern. For example, the Option B information provides an option for grouting of either Bradenhead or Grout shoe but in this case the Bradenhead method shall be used.

Well Development - Develop the wells using a mechanical surging method and not an air surging method. 6/6/08 ok to revise use air lift and keep in casing method PLK

Proposed Pump Installation: Each proposed well is approved to be equipped with a submersible pump with a capacity of up to 250 gpm. The pump will discharge through a pitless adapter to the building plumbing system. A sampling faucet shall be installed on the discharge line from the well and prior to the pressure tank. A pitless adapter may be installed on the proposed wells provided that the adapters are pressure tested in accordance with the requirements of Section NR 812.31(2)(c), Wisconsin Administrative Code.

A meter that measures cumulative hours of pump operation or a meter that measures cumulative gallons that were pumped shall be installed on each well that operates at a capacity of more than 70 gallons per minute. The rate of water usage will be calculated from the recorded hours of pump operation or read from a direct reading flow meter that measures the total gallons pumped. If a variable speed pump is used, a meter that measures the cumulative gallons that are pumped is the only acceptable method to determine water usage.

Any piping to any non-potable portions of the plumbing system shall either be protected from backflow by an air gap or by a backflow preventer in accordance with Dept. of Commerce Wisconsin Administrative Codes and if applicable, Section ATCP 60.08(2), Wisconsin Administrative Code. The backflow preventer shall meet ASSE Standard Number 1013 or a standard that is deemed equivalent in accordance with Chapter Comm 84, Wisconsin Administrative Code. If an RP valve is used, it must comply with Chapters Comm 82 and 84, Wisconsin Administrative Codes. An RP valve includes requirements for plan review prior to installation and periodic testing by a certified cross connection control tester.

Refer to the Conditional Approval Section for additional requirements.

Additional Requirements for Backflow Prevention for Wells with Pitless Adapters Where Multiple Wells Supply a Common Plumbing System: When the discharge from more than one well will supply a common plumbing system, the following are required for each well that has a pitless adapter that will supply that system:

1. The discharge from the submersible pump for each well will flow through one or more check valves located within the well casing. The check valve(s) may be installed within the submersible pump unit, may be installed on the drop pipe, or both.

2. The discharge after the above mentioned check valve(s) will flow through the pitless unit/adapter and through a buried line to a pressure tank.

3. There shall be a sample faucet on this line prior to the pressure tank, but there shall not be any check valves on the line between the pressure tank and the pitless.

4. The pressure switch or sensor that controls pump operation for each pump shall be located at the tank that is supplied by the pump that is controlled by that switch or sensor.

5. The discharge after each pressure tank shall pass through a separate check valve, before the water from that tank(s) enters the common plumbing system. At the first point in the common plumbing system install a sample faucet for public water supply entry point sampling, unless a different type of water supply for human consumption is used. See the Department recommendations for consideration Section below. Each check valve shall be located above ground after the pressure tank in a location where it may be visually inspected, repaired and replaced. There may also be an optional manually operated shut-off valve installed at this point, but a shut-off valve is not required.

There may be additional pressure tanks located on the water distribution system after the check valve from each well, if desired. If additional pressure tanks are not installed on the water distribution system, installation of an expansion chamber near each hot water heater is recommended because the check valves that are described above will prevent excess water pressure from being absorbed by the above described pressure tanks. The excess pressure is expected to occur from thermal expansion in the hot water heater, if used.

The reason for prohibiting the check valve between the pressure tank and the pitless is that the buried pipe must be maintained at positive pressure. Refer to Section NR 812.32(4), Wisconsin Administrative Code. If the check valve in the submersible (or drop pipe) leaks an infinitesimally small amount of water but a check valve between the pressure tank and pitless does not leak, the pressure in the buried line can be lost. In this case, the line can experience negative pressure as water in the drop pipe siphons down towards the submersible.

PUBLIC WATER CONSIDERATIONS

According to the applicant, water from the facility wells will be used as a public water supply system. The definition of your type of potential public water supply system is as follows:

- NON-TRANSIENT NON-COMMUNITY WATER SYSTEM. NR 809.04(48) Non-transient non-community water system means a non-community water system that regularly serves at least 25 of the same persons over 6 months per year. Examples of non-transient non-community water systems include those serving schools, day care centers and factories.

Your original application indicated that all four of your proposed wells were to be interconnected to supply water for human consumption. Currently the department is not sure how many entry point the system will have. Once you have made a final determination of the entry points you shall contact the department to get a Public Water Supply Identification Number(s) and you will need to comply will all sampling and reporting requirements that are associated with this type of public water supply system. Department public water supply staff have also been copied on this document. For additional department recommendations see the Department Recommendations for Consideration Section below.

OPERATOR CERTIFICATION REQUIREMENT

As of March 1, 2005, established Non-transient Non-community water systems are required to have a designated certified operator managing their water system. If the position of certified operator becomes vacant, the department is to be notified immediately. Water systems can return to compliance by contracting with someone who is a certified operator (see the WDNR website for a list of contract certified operators). Written notification to the system's DNR Regional Representative is due within 10 days of contracting with the operator. Indicate in writing the contracted operator's name, water system license number, and the date they began working for the water system. For more information about the operator certification visit http://www.dnr.state.wi.us/org/water/dwg/opcert/opcertindex.htm or contact Phillip Spranger at (608)266-5240.

SAMPLING AND REPORTING REQUIREMENT

The non-transient non-community system operator is required to provide information about the vulnerability of the well by submitting an inventory form. This information will be used to evaluate the possibility of obtaining monitoring waivers for the public water supply system. A Public Water Supply Contamination Source Inventory (form 3300-215) will be mailed to you and it must be completed and returned to Greg Moeller at the DNR's Regional Office. If the inventory is not completed and returned the well will not be eligible for future monitoring waivers. Sampling of the water in accordance with the Safe Drinking Water Act will be required prior to any waivers being issued.

DEPARTMENT RECOMMENDATIONS FOR CONSIDERATION

Your current proposal is to have the four proposed wells interconnected to supply the whole facility from any one of the wells at any time, which includes water for human consumption. It is the department's understanding that only the milking parlor building and the shop building will have service connections for human consumption. To minimize sampling requirements, all four wells should feed into one combined entry point prior to the distribution system. As an additional consideration a smaller separate well could be drilled only for human consumption and it could be used solely for that purpose. A last option may be the installation of a small pump fitted into one of the four wells and piped directly to the milking parlor and shop well for human consumption. Greg Moeller, the Department's regional contact person has talked to you about this issue. If you accept the merits of any of these recommendations then you or your engineer shall notify the department of the proposed changes, so that a revision to this approval can be made.

APPROVED WATER USAGE AND APPROVED PUMPING CAPACITIES

The approved water usage rates and approved pumping capacities in existing and proposed wells is listed in Table 1 at the end of this approval. Only two wells are approved at this time. North Well #1 is approved. Then based upon pump test results either the South Well #2 or the North Well #2 can be constructed. It is possible that the pump test results may indicate that the chosen optional well my have to be sited much further south or much further north so as to avoid depletion of water in either well. The maximum pumpage from the two wells will be 250 gpm each for a total of 500 gpm for this approval.

CONDITIONAL APPROVAL

Because the operation of the high capacity well system is not expected to cause any significant reduction in groundwater availability to the nearest public utility well, the proposed construction and operation of the high capacity well system is approved subject to the conditions noted below. This approval is granted based upon information provided to the department by the well owner or authorized agent. The information provided to the department is assumed to be accurate and this approval is granted based upon that information. Department staff have not inspected the proposed well construction or pump installation at the time of approval. This approval does not guarantee that the proposed system will produce acceptable water quality or quantity.

The department reserves the authority to limit the pumpage in any amount that may be necessary to eliminate excessive drawdown in any public utility well that may be affected. If the operation of the well or wells adversely affects the operation of any private wells on neighboring properties, this department approval will not negate the protection to which private well owners are entitled under Wisconsin case law relating to groundwater. Approval by the department does not relieve the property owner or well operator of any liability which may result from injury or damage suffered by any person upon operation of the well or wells. You should also be aware that the department has the authority to require either the alteration or the decommissioning, relocation, and reconstruction of any existing water supply wells if, during any future inspection of the wells, the department determines such work is required for compliance with the current requirements of Chapter NR 812, Wisconsin Administrative Code.

If construction has not commenced within two years from the date of this letter, this approval shall become void. After two years, therefore, a new application must be made for approval of the plans and specifications before any construction work is undertaken.

1. Table 1 lists the latitude and longitude of the proposed well location for the north Well #1. The proposed location of this well is approved. If the location of this well is moved more than the distance listed in Table 1 as the location tolerance (in feet) from the proposed location, then prior department approval is necessary before construction. It is the responsibility of the well owner and the well driller to confirm that the wells meets all setback distances required in Chapter NR 812, Wisconsin Administrative Code. Refer to the Section entitled "Other Potential Contaminant Sources" above for additional information.

The exact proposed location for the second well is not known at this time. The second well's proposed location will be determined based upon the results of a pump test on North Well #1. Again it is the responsibility of the well owner and the well driller to confirm that the well meets all setback distances required in Chapter NR 812, Wisconsin Administrative Code.

2. The well driller shall determine accurate latitude and longitude coordinates for the final as constructed proposed well locations with a Global Positioning System (GPS) unit and shall include those coordinates on the well construction record. The correct format is degrees and decimal minutes (Example: Latitude 43° 04.517′ Longitude 89° 22.825′). Refer to page four on the guidance for preparing high capacity well applications for more information on GPS units. That guidance document is included in the images file on the compact disk that was provided to licensed well drillers in July 2005 and also on the compact disk distributed in winter 2006.

3. The wells shall be constructed as described in this approval, except that the depth of casing and total depth of well may vary from the specified depths due to unanticipated geological conditions. The drilling method, grouting requirements, and disinfection requirements shall comply with this approval which includes the criteria for the Special Well Construction & Disinfection Specifications & Methods Section, attached. Exception, use only the Bradenhead method for sealing the annular space. The upper enlarged drillhole and casing depth requirements of a minimum of 10 feet into the Cambrian Sandstone Aquifer as specified in the Proposed Well Construction Section above, shall be complied with. Consider the department's recommendations for modification of the well(s) to supply water for human consumption. Air development may not be used, instead use a mechanical surging method.

4. The pumps and discharge from the pumps shall be as described in this approval. Approval was not sought for a pressure tank with a capacity greater than 1,000 gallons and an approval for a tank with that capacity is not granted. Approval was not sought for a non-pressurized storage vessel and an approval for such a vessel is not granted. This approval is contingent upon compliance with the backflow protection requirements for the piping in accordance with Chapters Comm 82, and Comm 84 and Section ATCP 60.08(2), Wisconsin Administrative Codes. The backflow preventer shall meet ASSE Standard Number 1013 or a standard that is deemed equivalent in accordance with Chapter Comm 84, Wisconsin Administrative Code. If a RP backflow preventer is to be installed, this includes requirements for plan review prior to installation and periodic testing by a certified cross connection control tester. One or more check valves can be located in drop pipe but no check valves are allowed between the drop pipe and the first pressure tank. Refer to the Additional Requirements for Backflow Prevention for Wells with Pitless Adapters Where Multiple Wells Supply a Common Plumbing System Section, above. Post a sign stating "This water not for drinking" at all non-potable water discharge locations.

5. A meter that measures cumulative hours of pump operation or a meter that measures cumulative gallons that were pumped shall be installed on each of the proposed wells. If a variable speed pump is used, a meter that measures the cumulative gallons that were pumped is the only acceptable method to determine water usage.

6. The use of chlorine during drilling is limited to appropriate materials and shall be maintained at an appropriate level. Follow the chlorination procedure in the attached Special Well Construction & Disinfection Specification & Methods Sheet, Item #10. For future maintenance of these wells follow a copy of the document entitled "Well Chlorination in Arsenic Sensitive Areas" (Pub DG-069 2002), which is attached.

7. All sampling, reporting and other requirements for both the construction and operation of the well or wells shall be complied with. These requirements include the well driller preparing and submitting a construction report of the well or wells to the department within 30 days after completion of drilling of the well or wells.

8. For the proposed wells, the construction reporting also requires that the well driller collect drill cuttings at 5 foot intervals throughout the depth of the well and at each change in formation. The samples must be sent to the Wisconsin Geological and Natural History Survey for examination and preparation of an accurate geologic log of the well.

9. The department reserves the authority to require any schedule of reporting water levels within high capacity wells that it deems necessary. If a water level measuring device is not permanently installed in any well that the department requires to report water levels, the department's authority shall extend to require the well to be taken out of service until the reporting can be conducted. No water level measuring device is required at this time.

10. Any well that is not used for three (3) or more years shall be abandoned according to the requirements of Section NR 812.26, Wisconsin Administrative Code unless a written approval is obtained from the department for the temporary abandonment of the well. A well abandonment form must be completed and submitted to the department within 30 days of abandoning each well.

11. Notification of the drilling operation shall be given to Paul Kozol of the Department of Natural Resources at (608) 267-9787 or at paul.kozolp@wisconsin.gov not less than 3 business days and not more than 5 business days prior to the beginning of drilling. Provide the file number 20-3-0030 at the time that notification is provided. Notification may be by voice mail. If any schedule changes occur after Mr. Kozol is notified, Mr. Kozol shall be notified as soon as practical of those schedule modifications.

12. Notification of the proposed time of grouting shall be given to Gregory Moeller. His phone number at the time this approval was issued is (920) 662-5147. Provide notification not less than 48 hours prior to the beginning of the grouting operation.

13. The pitless adapter or pitless unit must be pressure tested before the well is placed in service. Notification of the proposed time of pressure testing shall be given to Gregory Moeller. His phone number at the time this approval was issued is (920) 662-5147. Provide notification not less than 48 hours prior to the beginning of pressure testing.

14. As required by Subchapter VIII of Chapter NR 809, Wisconsin Administrative Code, this water system must complete a "Capacity Evaluation" prior to construction. Capacity in this sense refers to a water system's ability to comply with the Safe Drinking Water Act requirements and provide safe drinking water. You will be contacted by Adam DeWeese, Capacity Development Coordinator, regarding this requirement. You may reach the Capacity Development Coordinator by calling (608) 264-9229 or via e-mail at adam.deweese@wisconsin.gov

15. This approval is contingent upon obtaining any and all WPDES permits that the department's wastewater program deems necessary for the facility. And, if a WPDES permit is necessary, approval to operate any of the high capacity wells on the property is contingent upon compliance with all conditions of approval of the plan approval issued by the department's wastewater program and upon all conditions established in the WPDES permit. In addition, the penalties and forfeitures specified in Section 281.98, Wisconsin Statutes shall apply.

16. Drill cuttings shall not be disposed in any ravines, wetlands or near any sensitive environments. Sensitive environments include threatened wildlife species habitat that may exist on the property.

17. In the event that a pumping test is to be performed for the purpose of estimating aquifer transmissivity and obtaining other aquifer characteristics, the department's wastewater program must first be contacted to determine if a short duration WPDES permit is necessary for disposal of the pumped water.

18. A pumping test is required to be designed and performed on the completed North Well #1 to determine drawdown, specific capacity, aquifer transmissivity and any other aquifer characteristics as may be required to help locate the second proposed well. Use available nearby farmstead wells as monitoring points to monitor drawdown during the pump test. Submit one copy of the work plan for the pump test to the department at the address below. Two copies of the raw data and the analysis must be submitted to the department within 15 days after the pumping test is performed. The analysis must be submitted in paper format, the raw data may be submitted in either paper or electronic format. If electronic format is used, use standard 3.5 inch floppy disk(s) and it must be readable by a Windows based computer system, preferably in Excel or Aqtesolv data formats. Submit that data with the high capacity file number 20-3-0030 to:

Paul L. Kozol
WDNR, Mail Code DG/2
P.O. Box 7921
Madison, WI 53707-7921

Do not start the drilling of the second chosen and approved well until your engineering firm has made a recommendation as to the placement location for the second approved well, and the department has received and commented on this recommendation. Submit one copy of the well placement location recommendation to the department at the address listed above. The department anticipates that the second well may have to be placed either much further north or much further south of what was originally proposed in the application.

19. The department requires that the two proposed wells be individually sampled and analyzed for Total Arsenic. Please provide copies of the sample results with the high capacity file number 20-3-0030 to:

Paul Kozol
WDNR, Mail Code DG/2
P.O. Box 7921
Madison, WI 53707-7921

NOTICE OF APPEAL RIGHTS

If you believe that you have a right to challenge this decision, you should know that the Wisconsin statutes, administrative rules and case law establish time periods within which requests to review Department decisions must be filed. To request a contested case hearing pursuant to Section 227.42, Wis. Stats., you have 30 days after the decision is mailed, or otherwise served by the Department, to serve a petition for hearing on the Secretary of the Department of Natural Resources. All requests for contested case hearings must be made in accordance with Section NR 2.05(5), Wis. Adm. Code, and served on the Secretary in accordance with Section NR 2.03, Wis. Adm. Code. The filing of a request for a contested case hearing is not a prerequisite for judicial review and does not extend the time period for filing a petition for judicial review.

For judicial review of a decision pursuant to Sections 227.52 and 227.53, Wis. Stats., you must file your petition with the appropriate circuit court and serve the petition on the Department within the prescribed time period. A petition for judicial review must name the Department of Natural Resources as the respondent.

STATE OF WISCONSIN
DEPARTMENT OF NATURAL RESOURCES
For the Secretary

Paul L. Kozol, P.E.
Private Water Systems Section
Bureau of Drinking Water and Groundwater
(608) 267-9787 FAX (608) 267-7650

Mark F. Putra, R.S., Chief,
Private Water Systems Section
Bureau of Drinking Water and Groundwater
(608) 267-7649 FAX (608) 267-7650

enclosures:
- Table 1, Approved Well Inventory Summary
- Arsenic in Drinking Water Fact Sheet (Pub DG-062 2000)
- Well Chlorination in Arsenic Sensitive Areas (Pub DG-069 2002)
- Memo titled: *Special Well Casing Pipe Depth Area" (Arsenic Area) - Outagamie County (Entire County) and Winnebago County (Entire County)*, which is dated September 10, 2004. From: http://www.dnr.state.wi.us/org/water/dwg/arsenic/sp_cs_areas/Specs.pdf

cc with enclosures:
- Owner - (2 additional copies, 1 for driller and 1 for pump installer)
- Todd Weik, LA - Crispell-Snyder, Inc., W175 N11081, Stonewood Dr.,Suite 103 Germantown, Wis. 53022
- Troy Van de Yacht - Leo Van de Yacht Well Drilling 1267 Lakeview Dr. Green Bay, WI 54313
- Roger Peters, P.G. - WGNHS
- Adam DeWeese - DG/2

electronic cc with enclosures:
- Bob Barnum - NER
- Greg Moeller -NER
- Kyle Burton - NER

TABLE 1
APPROVED WELL INVENTORY SUMMARY

PROPOSED WELL - OPTIONAL SECOND WELL
WELL STATUS: APPROVED NEW WELL
SITE WELL NUMBER: 002
WELL NAME: SOUTH WELL #2
DNR PERMANENT HIGH CAP WELL#: 69600
WUWN: NONE
PWSID NUMBER: NONE
LATITUDE: NONE
LONGITUDE: NONE
LOCATION TOLERANCE (FT): 660
LOCATION: SE 1/4 SW 1/4 S9 T16N R15E
CIVIL TOWN: ROSENDALE
COUNTY: FOND DU LAC
DATE COMPLETED: NONE
WELL DEPTH: NONE
PUMP CAPACITY (GPM): 250
USE: DAIRY FARM EXCLUDES IRRIGATION
AVG USE (GALLONS PER DAY): 300,000
MAX USE (GALLONS PER DAY): 360,000

PROPOSED WELL - FIRST TO BE CONSTRUCTED
WELL STATUS: APPROVED NEW WELL
SITE WELL NUMBER: 003
WELL NAME: NORTH WELL #1
DNR PERMANENT HIGH CAP WELL#: 69601
WUWN: NONE
PWSID NUMBER: NONE
LATITUDE: 43° 52.090′
LONGITUDE: 88° 43.216′
LOCATION TOLERANCE (FT): 660
LOCATION: SE 1/4 SW 1/4 S9 T16N R15E
CIVIL TOWN: ROSENDALE
COUNTY: FOND DU LAC
DATE COMPLETED: NONE
WELL DEPTH: NONE
PUMP CAPACITY (GPM): 250
USE: DAIRY FARM EXCLUDES IRRIGATION
AVG USE (GALLONS PER DAY): 300,000
MAX USE (GALLONS PER DAY): 360,000

PROPOSED WELL - OPTIONAL SECOND WELL
WELL STATUS: APPROVED NEW WELL
SITE WELL NUMBER: 004
WELL NAME: NORTH WELL #2
DNR PERMANENT HIGH CAP WELL#: 69602
WUWN: NONE
PWSID NUMBER: NONE
LATITUDE: NONE
LONGITUDE: NONE
LOCATION TOLERANCE (FT): 660
LOCATION: SE 1/4 SW 1/4 S9 T16N R15E
CIVIL TOWN: ROSENDALE
COUNTY: FOND DU LAC
DATE COMPLETED: NONE
WELL DEPTH: NONE
PUMP CAPACITY (GPM): 250
USE: DAIRY FARM EXCLUDES IRRIGATION
AVG USE (GALLONS PER DAY): 300,000
MAX USE (GALLONS PER DAY): 360,000

Notes:
1. The acronym WUWN means the Wisconsin Unique Well Number.
2. In most cases, all wells on a single high capacity property have the same well classification. This means that for example a farm that uses irrigation wells may also have a residential well that is classified as an irrigation well with a period of operation of April to October, although the residential well likely operates year around for potable uses.
3. The latitude and longitude coordinates for the proposed well are from the applicant.

VII.A.3. November 20, 2008 Letter - Additional Information Needed from Rosendale Dairy for the Draft Environmental Assessment (EIS)

State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

Jim Doyle, Governor
Matthew J. Frank, Secretary

101 S. Webster St.
Box 7921
Madison, Wisconsin 53707-7921
Telephone 608-266-2621
FAX 608-267-3579
TTY Access via relay - 711

November 20, 2008

Mr. Jim Ostrom
Milksource
N3569 Vanden Bosch Road
Kaukauna, WI 54130

Subject: Rosendale Dairy Environmental Impact Statement

Dear Mr. Ostrom:

As you are aware, the Department of Natural Resources completed an Environmental Assessment (EA) on September 16, 2008, for the proposed Rosendale Dairy located at N8997 County Highway M, Picket, WI 54964, in Section 9, Town of Rosendale, Fond du Lac County. The Department accepted public comments through October 14, 2008, on the EA. The department has determined that it will complete an environmental impact statement (EIS) process on the proposal. Additional information is needed in order for the department to complete the EIS. The attached document lists additional information that is needed from Rosendale Dairy. In order to expedite completing the EIS, the department requests that you provide this information at your earliest convenience to James Pardee, Wisconsin Environmental Policy Act Coordinator, (608) 266-0426, WDNR OE/7, PO Box 7921, Madison, WI 53707-7921, james.pardee@wisconsin.gov.

Please be aware that after the EIS is published, there will be a 45-day public comment period and a public hearing will be held. All interested parties will receive notice of the release of the EIS document and the details for the hearing time and location.

Please phone James Pardee if you have questions or require clarifications.

Sincerely,

Gordon R. Stevenson, P.E.
Chief
Runoff Management Section

Attachment

Cc: Laurie Fischer - Dairy Business Association
Christopher Patton - Office of the Governor
David Crass-Michael, Best and Friedrich
Rod Nilsestuen - DATCP
Randy Romanski - DATCP
Dave Jelinski – DATCP
Lynn Matthias – Fond du Lac County
Pat Henderson - DNR
Todd Ambs - DNR
Russ Rasmussen - DNR
Charlie Verhoeven - DNR
Dan Helf - DNR
Liz Spaeth-Werner- DNR
Al Stranz - DNR
Dave Siebert – DNR
James Pardee - DNR

Additional Information Needed from Rosendale Dairy for the Draft Environmental Assessment (EIS)
Wisconsin Department of Natural Resources
November 20, 2008

Please address the item below for phase 1:

- Two statements (last paragraph, page 8, continuing page 9) in the EA are unsubstantiated. Explain how one can add 46 million gallons of manure per year and conclude that this will result in less pollutant runoff and an improvement in water quality because the discharge will be covered under a NMP. One cannot reach such a conclusion unless you know the existing condition of those acres, which we do not.

Please address each item below separately for phase 1 and phase 2:

- Identify sites for fill material and/or soil stockpiling/disposal. Provide map(s).
- Provide stormwater plans and specs. Fully describe stormwater BMP's & explain how they will be used for this project and how well they will work
- Describe all project-related wells location, capacity, operational plans, etc. Provide well logs for constructed wells. Provide pumping test data for all constructed wells.
- Describe how the proposed structures and those already built meet the requirements as discussed in the EA on pages 7 and 8
- Regarding the use of sand for animal bedding: Where will the sand come from? How much?
- What are the plans for environmental monitoring, e.g. groundwater, surface water, stormwater, odors and other air emissions, noise, etc.?
- Fully describe dust control measures.
- Provide an inventory of aquatic species in wetlands and waterbodies immediately downstream from all project-related sites
- What are the expected water quality and biologic impacts of this project on all surface waters downstream from all project-related sites? What is the worst case scenario? Specifically, discuss runoff impacts from nitrogen, phosphorus, BOD, and pathogens such as Cryptosporidium and E. coli. Discuss impacts downstream to Lake Winnebago and Lake Michigan.
- Are there plans for environmental mitigation, e.g. groundwater, surface water, stormwater, odors and other air emissions, noise, etc.?
- Describe in detail how domestic wastewater will be handled and discharged.
- Describe any planned burning activities.
- Describe all truck traffic volumes, materials hauled, timing (daily, weekly, monthly, time of day) and likely routes.
- Identify and map traffic volumes on adjacent road including school bus routes and emergency vehicle routes, nearby schools, daycare centers, medical clinics, hospitals, nursing homes and neighboring residences that may be impacted by increased truck and other traffic volumes created by the facility.
- Identify and map private and public water supply wells in proximity to the facility.
- Identify project property hydrography and map, pre- and post- project.

- Identify archaeological/historical resources at all sand and soil borrow sites, building sites and all other project sites that have been or will be disturbed.
- Provide a detailed economic impact analysis for the proposed project in the area. List information sources. This analysis should include, but not be limited to:
    - -Current land use of existing adjacent parcels
    - -Development potential of adjacent parcels
    - -Economic development in the area that may be prevented or suppressed by the proposed project
    - -Effect on the local tax base
    - -Potential property value effects for properties adjacent to the project site, manure spreading/irrigation sites, and sand and soil borrow and disposal sites
    - -Potential costs to town government, local residents, and others incurred from truck traffic and other transportation issues
    - -Numbers of employees and anticipated payroll
    - -Value of goods and services purchased locally
    - -Value of manure nutrients used agronomically
    - -Any positive or negative multiplier effects

Please address each item below for any planned expansions beyond phase 2:

- Purpose, need, cost
- Changes to existing structures
- Additional Buildings, roads, wells & structures (what/where/size for: operational, stormwater, domestic wastewater, lighting, monitoring, traffic impacts)
- Maximum livestock population, expressed in animal units, contemplated for this site
- Additional suitable acreage needed for livestock populations beyond phase 2
- Analysis of local availability of additional suitable acreage

General information: Please address the following in your response:

- What research information can you provide concerning human health issues related to use of antibiotics, hormones and other drugs on animals as related to milk and meat consumption?
- Describe and quantify the agricultural pesticides and herbicides that would likely be used in the production of animal feeds for Rosendale Dairy. Discuss the potential for these chemicals to pollute surface and ground waters, including well contamination.
- What is the track record of Omro Dairy and Tidy View Dairy for environmental protection, including: surface water, groundwater, air emissions and odors, soil erosion, animal health, human health, etc.
- Are there any planned alternative discharge or treatment systems for or methods proposed or contemplated for either water quality management and air quality management? If so, describe in detail
- If trucking or other activities of Rosendale Dairy results in damage to local roads, who will pay for repairs?
- What general effects may Rosendale Diary have on life styles of local residents? Why? Cite literature.

What construction and operational alternatives exist for the project as a whole, and for individual project components (e.g. manure management)? Please address your response in terms of:

- Manure spreading/irrigation sites
- Operations (alternative methods, processes, routes & schedules)
- Production management
- Alternatives to manure storage and landspreading, such as anaerobic digestion, conventional wastewater treatment,
- Transportation management

VII.A.4. November 21, 2008 Letter -Supplementary Notice of Incompleteness & Request for Information - Plans & Specifications for Proposed Construction of Sweet Corn Silage Feed Storage, & Leachate & Runoff Collection (S-2008-0406); & Manure Storage Facilities & Transfer Systems, & Corn Silage & Haylage Feed Storage, & Leachate Collection & Runoff Control (S-2008-0432)

State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

Jim Doyle, Governor
Matthew J. Frank, Secretary

101 S. Webster St.
Box 7921
Madison, Wisconsin 53707-7921
Telephone 608-266-2621
FAX 608-267-3579
TTY Access via relay - 711

November 21, 2008

FILE REF: S-2008-0406 & S-2008-0432

Mr. Jim Ostrom
Milksource
N3569 Vanden Bosch Road
Kaukuna, WI 54130

Subject: Supplementary Notice of Incompleteness & Request for Information - Plans & Specifications for Proposed Construction of Sweet Corn Silage Feed Storage, & Leachate & Runoff Collection (S-2008-0406); & Manure Storage Facilities & Transfer Systems, & Corn Silage & Haylage Feed Storage, & Leachate Collection & Runoff Control (S-2008-0432) - WPDES Permit not yet issued

Dear Mr. Ostrom:

This letter addresses the plans and specifications submitted for proposed construction of facilities and systems at the proposed Rosendale Dairy, County Rd M, Pickett, Wisconsin, located in Rosendale Township, Fond du Lac County, SE¼ and SW¼ of Section 9, T16N, R15E. If you have questions about this letter, please contact Liz Spaeth-Werner, WDNR Northeast Region, Oshkosh (920-303-5426), or Gretchen Wheat, WDNR Central Office, Bureau of Watershed Management (608-264-6273).

Summary: The Water Division of the Department of Natural Resources (WDNR) has determined the following:

- The plans and specifications specific to the feed storage systems are still incomplete, as described below. Therefore, the maximum 90 day review period under s. 281.41, Stats., for the feed storage systems has not yet begun.

- The plans and specifications specific to the manure storage facilities and their associated transfer systems are complete as of September 15, 2008 (date the last information needed to complete the Environmental Assessment was received by WDNR). Also, the WDNR has accepted the review completed by Fond du Lac County NRCS (assisted by DATCP) for items addressed by local ordinance, including NRCS 313 Waste Storage Facility. However, information regarding the manure storage facilities and their associated transfer systems is requested to determine approvability of certain items under ch. NR 243 that are not addressed by local ordinance.

An attachment lists "Plans & Specifications Submittals Received" by the WDNR specific to the design of the proposed facilities and systems, and submittal numbers in that list are referenced in this letter. The proposed project description and WDNR comments are based on the most recent plans and specifications submitted (Submittals 1.c, 3.d, 7.a., 7.f., 9.a., 9.b., 9.c., 9.d. and 10). The attachment also lists "Fond du Lac County Comments and Rosendale Responses Received" by the WDNR.

Be aware that it is a violation to commence construction of reviewable facilities and systems prior to approval of the plans and specifications. Prior to approval, allowable earth moving activity (in preparation for reviewable structures or systems) is limited to clearing, grubbing and rough grading, in accordance with s. NR 108.03(2), Wis. Adm. Code.

Proposed Project Description (as described the most recent plans & specifications submittals): The Rosendale Dairy will occupy approximately 100 acres, populated in two phases. Phase 1 will include 4,000 dairy cows and 150 beef steers. At Phase 2 the operation will reach 8,000 dairy cows and 300 beef animals, for a total of 11,500 animal units. At full capacity (Phase 2) approximately 79.3 million gal. of manure, litter and wastewater will be generated annually. Bedding will be sand. Prior to Phase 2, more cropland must be secured (for land application of additional manure and process wastewater) or other final disposition or treatment methods must be provided.

Site Assessment: Primary subsurface soils include ML, CL and SM, with lesser prevalence of SP and GP. In certain areas, test pits ended in GM soils, and these areas are generally limited by bedrock at 92.35 ft. Other areas are limited by the regional groundwater table (RWT) ranging from 84-87 ft. Bedrock and RWT limitations are described in a letter from Ryan Rice, Fond du Lac County, dated June 5, 2008 (Submittal 9.a., Exhibit 3), but do not address all areas of the site. The description of surface and subsurface drainage includes the following (Submittal 9.c., p. 2):

> "There are no unusual geographic features such as, karst; surface water features, ERW (exceptional resource waters), ORW (outstanding resource waters) or 303(d) impaired waters that will be impacted by this operation. The site development will be on existing crop acres only, no subsurface drainage or clearing of woods will be done."

A wetland is located east of the site, north of WSF 3 and 600 ft from the end of the corn silage and haylage vegetated treatment area (VTA). Four wells (high capacity) are proposed, and all wells will exceed the required setback distances in NR 213 and NRCS 313. (Submittal 9.a., pp. 7 & 14-15, & Exhibit 4, & Submittal 9.c., p. 10 & Exhibit 5).

Manure Storage: Waste will be stored in three concrete lined liquid-tight waste storage facilities, with 83 million gal. combined capacity. Greater than 270 days storage will be provided (for all wastes, manure, wastewater, and feed leachate and runoff collected). The waste storage facilities are identified as follows:

- WSF1 (10.8 million gal., floor elevation 86 ft).
- WSF2 (27.2 million gal., floor elevation 86 ft).
- WSF3 (25.8 million gal., floor elevation 88 ft and 95 ft).

Manure Solids Separation & Solids Storage: A manure processing building will house mechanical sand separators, manure solids separators, a six-chambered concrete liquid-tight tank to facilitate manure solids separation, and five concrete liquid-tight tanks for storage of partially separated manure solids. The five manure solids storage tanks (combined capacity 506,700 gal) will be maintained at their maximum operating level (MOL), so their capacity is not included in storage calculations. Each of the five tanks will have a ramp to the bottom. A sand and solids stacking bunker, also constructed as a liquid-tight concrete storage facility, will be used for final sand dewatering, and storage of separated sand and manure solids. The sand separators are expected to capture 90% of the sand. The manure solids separation equipment (not yet selected) will be installed in Phase 1 and is expected to produce liquid manure with less than 2% solids. With manure solids separation equipment installed, the waste storage facilities will provide somewhat greater storage time. (Submittal 9.a., pp. 2-4.)

Sweet Corn Silage Feed Bunkers with Leachate and Runoff Collection: The sweet corn silage feed bunkers (two) will be constructed with a liquid-tight concrete surface (2% slope) over an HDPE lined leachate collection system. The leachate collection system will gravity drain to a sump. Sweet corn silage will be placed in the bunkers during harvest (Aug.-Oct.), and packed and covered with plastic. When sweet corn silage feed is being used, the area will be scraped clean daily. (Submittal 9.c., pp. 1-3 & 5-7.)

The long term and short term system design and operation are described as follows (Submittal 9.c., pp. 1-2 & 6-7):

- Long Term: Sweet corn silage leachate and runoff collected in the sump will be pumped to WSF 3. Leachate and runoff in excess of the sump and pump capacity will gravity flow via concrete channel to the "equalization basin". After the rain ends, contents of the equalization basin will gravity flow back to the sump (through a level control structure) and be pumped to WSF 3. The equalization basin will be normally dry, because for most rainfall events all runoff will be collected in the sump. The sweet corn silage leachate will not exceed 10% by volume of the manure and leachate mixture.
- Short Term: During the first year of operation, before animals are present and generating manure to dilute the sweet corn silage leachate in WSF 3, all leachate and runoff will flow via the concrete channel into the equalization basin. A pump stand will be set-up at the equalization basin so that tanker trucks can remove the sweet corn silage leachate and runoff for transport to land application sites.

Approximately 52,000 tons of sweet corn silage is expected to be stored at one time. Prior to shipping to Rosendale Dairy, silage will be pressed to remove liquids, so liquid content is estimated at 15-20% by weight (vs. 30% prior to pressing). This corresponds to 1.9-2.5 million gal. of liquid for collection as leachate annually (Submittal 9.c., p. 3). The design provides for collection of 2.4 million gal. of leachate and 1.8 million gal. of runoff (20 inches of rainfall), for a total of 4.3 million gal. of leachate and runoff collection annually (Submittal 9.a, p. 1 & Exhibit 16).

- The sweet corn silage bunker base elevation will range from 100.5-108 ft (Submittal 9.c., p. 11). The concrete surface will be inspected annually, joints will be resealed as needed, and any cracks that may develop will be sealed (Submittal 9.c., p. 7).
- The sweet corn silage leachate collection system (below grade) will be constructed with a compacted clay liner that exceeds requirements in s. NR 213.10 and 213.11 (Submittal 9.c., p. 6 & Exhibit 4). The compacted clay liner will be 12 inches (Submittal 9.c., p. 6) or 1.5 ft (Submittal 7.f., Drawing Cross Section CC & DD).
- The sump will be 48 inch diameter by 8½ ft deep, with a floor elevation at 92 ft (Submittal 7.f., Drawing Sheet 5, Detail P) or 93 ft (Submittal 9.c., p. 11).
- The equalization basin will be lined with 60 mil HDPE. Under the HDPE liner will be a gas vent system that will have a gravity line to provide leak detection (Submittal 9.c., pp. 6-7). The equalization basin floor will be at elevation 94 ft or 90 ft (Submittal 9.c., p. 11 vs. Exhibit 19, respectively). The equalization basin capacity is based on runoff from a 25 yr-24 hr rainfall plus an additional 150,000 gal., and is sufficient to provide storage for all leachate and runoff from the sweet corn bunker area (Submittal 9.c., p. 6).

Corn Silage and Haylage Feed Pad with Leachate Collection and Runoff Control: The corn silage and haylage pad (640 ft x 900 ft, or 576,000 ft^2) will be constructed with a liquid-tight concrete surface over a subsurface leachate collection system. The leachate and first flush runoff collection system is designed to collect up to 785,000 gal. of leachate and 217,000 gal. of runoff (based on 0.05 inch first flush collection, & 25 yr-24 hr rainfall), for a total of up to 1.0 million gal. leachate and runoff collection capacity per storm event. The leachate and first flush runoff will gravity drain to a sump (MH4, base elevation 91.11 ft) and be pumped to a waste storage facility (WSF2). The collection volume is limited by the sump volume and pump capacity. (Submittal 9.a., pp. 5-7.)

- Runoff not collected in the sump will flow to a concrete-soil composite lined detention basin (North Stormwater Basin, base elevation 83 ft) for solids settling, and then flow to a VTA. Discharge from the VTA is to cropland (Submittal 9.c., pp. 3, 5 & 20; & Submittal 9.d., Drawings 13 & 16, Detail M).
- The VTA slope is 0.67% - 4%, and the surface elevation is 82 ft – 86 ft. A 1.6 acre VTA is required based on the surface flow distance (600 ft) to the nearest surface water (a wetland) and NRCS 629, Figure 1, but a larger VTA of 3.2 acres is provided, not including the cropland the VTA will discharge to (Submittal 9.a., p. 7).

Soil borings for the components of the corn silage and haylage feed facilities are summarized as follows:

- Among the test pits in the area of the corn haylage feed pad, bedrock (elevation 91 ft) was found in certain areas, but the proposed elevation of the top of the concrete storage pad (93-99 ft) exceeds the minimum separation distance of 3 ft (Submittal 9.a., p. 14 & Exhibit 3).
- Test pits in the area of MH4 (base elevation 91.11 ft) indicate bedrock is high to the west of MH4 (TPO found bedrock at elevation 92.35 ft), but bedrock falls as the location of MH4 is approached (TP226 & TP237 found no bedrock within 3 ft below the MH4 base elevation).
- Test pits in the area of the North Stormwater Basin found bedrock (elevation 80.2 ft), but the basin exceeds the minimum separation distance of 3 ft (Submittal 9.a., Drawing 20, Section Q-Q).
- Test pits in the VTA are not discussed in the proposal, but boring logs were provided for two test pits and the test pit locations are shown on drawings.

WDNR Comments and Information Required: Each comment is followed by an explanation of the required information, and labeled to indicate whether it is required for completeness or approvability.

General

1. It is unclear whether the on-site groundwater supply wells comply with s. NR 243.15(1)(a)2., Wis. Adm. Code.

   Required – Approvability: Submit the following information:
   - A drawing that identifies the location of all private groundwater supply wells (existing & planned) in relation to all of the proposed facilities (manure storage facilities, feed storage areas, manure and wastewater transfer systems, and feed leachate collection and runoff control systems).
   - Clarification that all private groundwater supply wells are (or will be) located in compliance with s. NR 243.15(1)(a)2., Wis. Adm. Code (at least 250 ft from barnyards, feedlots and facilities or systems reviewable under ch. NR 243, Wis. Adm. Code); or submit justification that a closer distance is appropriate based on soil types and other site specific conditions.

2. The nearest wetland is shown on the wetland map (Submittal 9.c., Exhibit 5) which indicates the west edge of the wetland is approximately 2,000-2,300 ft east of Highway M. However, that map (and other submitted maps and drawings) do not show the wetland location in relation to the proposed reviewable facilities and systems. The WDNR found the following additional information about the wetland location:
   - Text description indicates the wetland is 600 ft from the draining end of the VTA (Submittal 7.a., p. 7).
   - Comparison of the wetland map and plat map (Submittal 9.c., Exhibit 4 and Exhibit 1) indicates the wetland is in the northeast corner of the property that is highlighted on the plat map.

   Required – Completeness: Submit information identifying locations of surface water features (including, but not limited to, channelized flow and wetlands) and subsurface features (such as drain tile) in relation to the proposed reviewable facilities and systems. Surface water and drain tile may not be located in the following areas:
   - VTA for runoff control (from the corn silage and haylage feed storage pad); and
   - Area identified for the VTA to discharge to (for the distance selected for use of NRCS 629, Figure 1).

3. The proposal (Submittal 9.c., p. 11) lists soil types and references the soil map (Exhibit 2). Comparison of the soil map and plat map (Submittal 9.c., Exhibit 2 & Exhibit 1) indicates discrepancy from the soil types list provided:
   - BsA soils are in the soil types list, but this soil type is indicated only north of the property parcel highlighted on the plat map (not located on the property).
   - LrC2 soils are not in the soil types list, but this soil type is indicated as being located within the property parcel highlighted on the plat map.

   Required – Completeness: Clarify whether the WDNR's understanding is accurate, and if so, consider whether this impacts any design assumptions.

Sweet Corn Silage Feed Storage Bunker, and Leachate Collection and Containment System

4. Only one sample analysis was provided to document the quality of onsite clay for use in the liner for the subsurface leachate collection system under the sweet corn silage feed bunkers, but the sample location is not specified and permeability test results have not yet been submitted (Submittal 9.c., p. 6 & Exhibit 4).

   Required – Completeness: Identify where the one soil sample was taken from and submit results of permeability tests. Also, describe the borrow characterization, and identify the location and in-place thickness of the soil materials intended to be used for liner of the subsurface leachate collection system.

5. The sweet corn silage leachate collection system (below grade) compacted clay liner thickness is described as both 12 inches (Submittal 9.c., p. 6) and 1.5 ft (Submittal 7.f., Drawing Cross Section CC & DD).

   Required – Completeness: Submit clarification of the clay liner thickness, and any needed drawing revisions.

6. It is unclear whether the concrete diversion channel complies with applicable design and construction requirements.

   Required – Completeness: The sweet corn silage leachate collection system components are subject to design and construction requirements in s. NR 213.14(7)(a), Wis. Adm. Code, which requires compliance with either ch. NR 213 subch. II (Lining of Industrial Lagoons), or s. NR 213.15, Wis. Adm. Code (Storage Tanks).

7. The submittal presents conflicting information on the sump floor elevation (92 ft is shown in Submittal 7.f., Drawing Sheet 5, Detail P, vs. 93 ft per Submittal 9.c., p. 11).

   The proposal (Submittal 9.c., p. 11) states the sweet corn silage facilities will occupy a total area of 3.04 acres and indicates it was used to determine the minimum number of test pits. The WDNR understands the 3.04 acres includes the sweet corn silage storage bunker and related facilities (diversion channel, sump, equalization basin).

   The proposal (Submittal 9.c., p. 12) states, "The site investigations show that the sweet corn waste silage facilities meet the separation distances in Wisconsin Administrative Code 213…" However, the WDNR does not find that

the minimum separation distance of 5 ft from bedrock has been met for the leachate collection sump and the equalization basin (required by s. NR 213.08(2)(a), Wis. Adm. Code), because only one test pit (TPEE) is properly located (within 100 ft of the equalization basin and sump). Two other test pits (TPS, TP40) are within approximately 150 ft. The WDNR has used these three (closest) test pits for preliminary assessment of compliance with separation from groundwater and bedrock for the equalization basin and sump, as summarized in the table below. The following information applies to the summary table:

- Locations of these test pits are shown in Submittal 7.f., Drawing 2.
- Logs of test pits marked "*" are found in Submittal 9.c., Exhibit 3.
- Logs of test pits marked "**" are found in Submittal 9.a, Exhibit 3.
- RWT or bedrock elevations are based the letter from per Ryan Rice, Fond du Lac County, dated 6/5/08, found in Submittal 9.a., Exhibit 3.

Test Pit #	Bottom Elev. (ft)	Test Pit Depth Below Equal. Bas. Flr. @ 94 ft (ft)	Test Pit Depth Below Sump Flr. @ 92 ft (ft)	Saturation or Bedrock Reached	RWT or Bedrock Elev. (ft)	Separation Distance to Equaliz. Basin Flr., & Sump Flr. (ft, based on sump bottom elevation @ 92 ft)
TPEE*	82.7	11.3	9.3	Not indicated by log	RWT 87	RWT to Equal. Bas. Flr. 7 RWT to Sump Flr. 5
TPS**	86.63	7.37 (mottling at 7.53 ft above floor)	5.37 (mottling @ 9.53 ft above flr.)	Mottling @ 101.53 elev.	Bedrock 92.5	Bedrock to Equal. Bas. Flr. 1.5 Bedrock to Sump Flr. -0.5
TP40*	80.3	13.7	11.7	Not indicated by log	Not verified	Not verified

Required – Completeness: Submit clarification of the sump floor elevation and make any necessary drawing corrections, or submit a revised design. Provide additional subsurface investigation to demonstrate compliance with the minimum separation distance of 5 ft from bedrock for the leachate collection sump and the equalization basin, as required by s. NR 213.08(2)(a), Wis. Adm. Code. The test pits presented above indicate the minimum separation distance to bedrock will not be achieved, and the subsurface investigation did not comply with s. NR 213.09(2), Wis. Adm. Code. A minimum of three borings is needed for the first acre, plus one boring for each additional acre (see s. NR 213.09(2)(b), Wis. Adm. Code).

8. At certain places in the proposal (Submittal 9.c., p. 11, and elsewhere) the term "runoff detention basin" is used, when the pertinent collection facility would be the "equalization basin". For example, in the proposal, under "Sweet Corn Silage Facilities", the following statement is made:

   "Six test pits (TP39, 40, T, U, V & EE) were excavated within the footprint of the sweet corn silage facilities… Five of the test pits were within the footprint of the pad and one test pit (TPEE) was within the footprint of the runoff detention basin. See Test Pit and Soil Profile drawings for detail."

   Required – Completeness: At each place in Submittal 9c where the runoff detention basin is referred to, clarify whether the equalization basin should instead be referred to.

9. Information is unclear related to the soil test pits for the sweet corn silage area (Submittal 9.c., Drawing 2):
   - TPEE is between the bunker and equalization basin, but not in the equalization basin footprint.
   - TPV is not in the area of the sweet corn silage facilities, but TPL is. However, the TPL soil log isn't in the sweet corn silage plans (Submittal 9.c., Exhibit 3), but is in other plans (Submittal 9.a., Exhibit 3).

   Required – Completeness: Submit information to identify the location of TPV and TPL.

10. For the HDPE equalization basin, the storage capacity is required to be sufficient for all leachate along with the runoff from a 25 yr-24 hr rainfall. The proposal states the capacity is based on the runoff from a 25 yr-24 hr rainfall plus an additional 150,000 gal. (Submittal 9.c., p. 6). Elsewhere, the proposal states the design provides

for annual collection of 2.5 million gal. of leachate and 1.8 million gal. of runoff (20 inches of rainfall), for a total of 4.3 million gal. of leachate and runoff to be collected (Submittal 9.a., p. 1).

Because the weekly leachate production estimates are based on a daily average (times seven), it appears that peak leachate generation is not accounted for, and it is unclear whether the equalization basin is sufficiently sized. The proposal calculates 1 week's leachate volume for collection based on 7 days of average daily leachate generation, and the average daily generation was based on an average over an entire year. The WDNR believes leachate generation will be much greater in the first few months, such that a daily average over a year will significantly underestimate the leachate collection capacity needed.

In addition, certain necessary information seems to be missing and other information may be conflicting. For example, the calculations (Submittal, Exhibit 19) did not determine runoff on a rainfall of 4.5 inches, leachate does not appear to be accounted for, and the elevations (facility bottom & maximum operating level) appear to conflict with information provided elsewhere in the submittal.

Required – Completeness: Submit information that clearly identifies all of the following:

- Volume (ft^3) of leachate anticipated over a 7 day period during peak leachate generation.
- Volume (ft^3) of runoff that must be stored, from the 25-yr 24-hr rainfall on the sweet corn feed storage area.
- Volume (ft^3) of precipitation that must be stored, from rainfall on the equalization basin (from average precipitation, minus evaporation, plus the 25-yr 24-hr rainfall).
- Area (ft^2) of the sweet corn feed storage area over which the 25-yr 24-hr rainfall event is being calculated.
- Depth (inches) of the 25-yr 24-hr rainfall.
- Operating capacity (ft^3) of the equalization basin.
- Bottom (ft elevation) and maximum operating level (ft elevation) of the equalization basin.

11. The sweet corn bunker subbase soils are required to have additional testing.

    Required – Completeness: If on site soils will be used for the subbase, provide results of testing in accordance with s. NR 213.09(2)(e), Wis. Adm. Code (including soil penetration resistance, and soil samples taken each 5 ft depth and at all significant changes in soil type or lithology). If off site sand or gravel will be used for the subbase, the additional site soil testing isn't necessary, but instead specify the soil material that will be used.

Corn Silage & Haylage Feed Pad, & Leachate Collection & Runoff Control

12. Information about test pits performed in the corn haylage feed pad area are presented in a summary table (Submittal 9.c., Exhibit 3), but the soil logs aren't provided. Also, separation from the top of the pad to bedrock appears to be overstated (by approximately 0.6 ft).

    Required – Completeness: Submit soil logs for test pits TPF1-TPF40, and verify the separation distances from the top of the corn haylage feed pad to bedrock.

13. Based on a permanent feed storage pad area (576,000 ft^2) and surface flow distance (600 ft) to channelized flow, NRCS 629, Figure 1, specifies a VTA of 115,200 ft^2, or 2.6 acres (with no VTA size reduction due to collection of 0.05 inch first flush runoff). Although the submitted VTA sizing information is unclear, the WDNR believe the proposed VTA size of 3.2 acres is sufficient. However, it is not clear whether the VTA meets certain portions of the siting criteria in NRCS 629. The VTA exact boundary wasn't delineated, but three test pits (TPB, TBC and TP103) appear to be located within the VTA footprint. At the lower end of the VTA, TPB and TPC found water (elevations 81.1 & 81.4 ft, respectively) indicating the VTA surface (82-86 ft) is within 2 ft of saturation. At the upper end of the VTA is where TP103 is shown, but the WDNR could not find a boring log or any other information for TP103. The VTA sizing is also described with an incomplete sentence (Submittal 9.a., p. 27).

    Required – Completeness: Submit a scaled drawing that delineates the VTA and shows any channelized flow that may exist beyond the VTA (to as far as the wetland). Identify the distance from the end of the VTA to any channelized flow, surface water or wetland. Also, submit information to demonstrate the VTA meets NRCS 629, V.C.1.d.1) (regarding saturation) and V.C.2.c. (Siting Parameters), including all of the following:

- Tile drains do not exist in the VTA.
- The VTA is situated or constructed over a 2 ft minimum depth of soil with at least 20% P200.
- Minimum 2 ft separation exists from the VTA surface to saturation and bedrock.
- The VTA slope will range from 0.5% - 8%.
- Indicate the expected infiltration rate in the VTA and state that overland flow will be maintained.
- If necessary, submit a revised VTA design.

Rules for the Feed Storage Systems: The feed storage systems were reviewed with respect to the following rules.

- The sweet corn silage bunker and its subgrade leachate collection system are subject to ss. NR 213.08 and 213.14, and s. NR 243.15, Wis. Adm. Code. The sweet corn silage leachate collection and containment system is subject to ss. NR 213.08 to 213.12, and s. NR 243.15, Wis. Adm. Code. The entire production area is subject to s. NR 243.13, Wis. Adm. Code, which requires containment structures to be designed based on the 25 yr-24 hr rainfall event, and this also applies to the sweet corn silage bunker, subgrade leachate collection system, and leachate collection and containment system.
- The synthetic liner for the equalization basin is part of the sweet corn leachate containment system, and is therefore subject to specifications, and quality assurance and testing, in ss. NR 213.11(3), and 213.12(1) and (3), Wis. Adm. Code.
- The corn silage and haylage feed pad, and the leachate collection and runoff control system, are subject to s. NR 243.15, Wis. Adm. Code. In conjunction with s. NR 243.15, Wis. Adm. Code, the WDNR will accept designs that also comply with NRCS 629 Waste Treatment.

WDNR Review Process and Timeline: The plans and specifications were reviewed in accordance with s. 281.41, Stats., chs. NR 243 and 213, Wis. Adm. Code, and applicable NRCS Standards:

- The WDNR conducted substantial review of the plans and specifications received on August 19, 2008. Subsequently, Rosendale Dairy and its consultant told the WDNR that revised plans and specifications would be prepared.
- On August 27, 2008, the WDNR issued a letter to Rosendale Dairy providing notice that the plans and specifications received on August 19, 2008, were incomplete.
- Revised replacement plans and specifications (not accompanied by a revision summary) were received by WDNR on September 3 and 10, 2008, and the WDNR conducted full second and third reviews. The WDNR understands the revisions were prepared, at least in part, in response to comments from Fond du Lac County, and review of the Fond du Lac County comments indicate there were a significant number of revisions, with varying consequence in terms of approvability by the WDNR.

Sincerely,

Gordon R. Stevenson, P.E.
Chief
Runoff Management Section
Bureau of Watershed Management

Attachment

cc:

John Roach – Roach and Associates
Ryan Rice – Fond du Lac County
David Crass – Michael Best and Friedrich, LLC
Laurie Fischer – Dairy Business Association
Randy Romanski – DATCP
Permit File
Dave Jelinski – DATCP
Pat Henderson – AD/8
Todd Ambs – AD/8
Russ Rasmussen – WT/3
Gretchen Wheat – WT/3
Charlie Verhoeven – DNR/NER Green Bay
Dan Helf – DNR/NER Green Bay

ATTACHMENT: Plans & Specifications Information

Plans & Specifications Submittals Received: Plans and specifications were submitted on behalf of Rosendale Dairy, by Richard Seas, P.E., Roach & Associates, LLC, and received by the WDNR as listed below. Document dates are the P.E. signature date, except as otherwise noted (where no P.E. signature was provided). The most current design submittals are shown in bold.

1. **On June 3, 2008, the following documents, dated June 3, 2008, except as noted:**
   a. "Sweet Corn Silage Bunker with Leachate Collection and Containment System".
   b. Drawing set (#1-5), "Waste Storage Facility" (later noted as incorrectly titled).
   c. NR 243 Plan and Specification Checklist (WDNR's August 14, 2007, version).
   d. "Amended WPDES Permit Application & Environmental Analysis Questionnaire Original Application Received by the WDNR 3-13-08", dated June 2, 2008.

2. On June 13, 2008, the following documents, dated June 13, 2008 except as noted:
   a. "Stormwater Management Plan, Amendment to: Fond du Lac County Stormwater Ordinance and WDNR Environmental and Stormwater Management Permit No. WI-S067831-3.
   b. "Waste Storage Facilities and Manure Transfer Systems".
   c. "Construction Plan Waste Storage Facility and Manure Transfer Systems".
   d. Drawings set (#1-22), "Waste Storage Facilities and Manure Transfer Systems".
   e. Drawing #1, "Sweet Corn Waste Silage Bunker and Leachate Collection" (replacement to correct the title on the cover sheet for drawing set listed in 1.b.), dated June 3, 2008.
   f. NR 243 Plan and Specification Checklist (WDNR's August 14, 2007, version), dated June 3, 2008.

3. **On June 26, 2008, the following documents, dated June 25, 2008 except as noted:**
   a. "Addendum No. 1, Waste Storage Facilities and Manure Transfer Systems".
   b. Drawing set (indexed as #1-22, only sheets numbered 1-11 in the set), "Waste Storage and Transfer Facilities, and Feed Storage System and Storm Water System".
   c. Drawing set (not indexed, sheets numbered 12-22 in the set), not titled (appears to be intended as part of the drawing set listed in 3.b.), with sheets dated either June 20 or 25, 2008 (no P.E. signature & date).
   d. NR 243 Plan and Specification Checklist (WDNR's August 14, 2007, version), page 2 only with titled added, "Amended Checklist No. 1", not dated.

4. On July 7, 2008, the following documents, dated as noted:
   a. Cover letter "RE: Rosendale Dairy", dated July 3, 2008. The letter describes the revisions as showing construction joint spacing for WSF 1 and 2.
   b. Drawing #4, 5 and 7, "Waste Facility", dated June 25, 2008.

5. On July 24, 2008, Drawings #8 and 16, "Waste Facility", dated July 16, 2008.

6. On August 19, 2008, the following documents, dated August 18, 2008:
   a. Cover memo "RE: Response to Fond du Lac County LCD Comment Letter", dated August 19, 2008. The memo expresses an understanding that revisions would be accepted without altering the review time (based on the original submittal date of June 13, 2008), because the WDNR had not yet reviewed the plans.
   b. "Addendum No. 2, Waste Storage Facilities and Manure Transfer Systems".
   c. "Addendum No. 2, Construction Plan Waste Storage Facility and Manure Transfer".
   d. "Addendum No. 2, Sweet Corn Silage Bunker with Leachate Collection and Containment System".
   e. Drawing set (indexed as #1-27, with sheets #26 & 27 numbered A3.5 and un-numbered, respectively), "Waste Storage and Transfer Facilities, and Feed Storage System and Storm Water System".

7. **On September 3, 2008, the following documents, dated September 3, 2008:**
   a. **"Stormwater Management Plan, Amendment to: Fond du Lac County Stormwater Ordinance and WDNR Environmental and Stormwater Management Permit No. WI-S067831-3.**
   b. "Addendum No. 3, Waste Storage Facilities and Manure Transfer Systems".
   c. "Addendum No. 3, Construction Plan Waste Storage Facility and Manure Transfer".
   d. "Addendum No. 3, Sweet Corn Silage Bunker with Leachate Collection and Containment System".
   e. Drawing set (indexed as #1-27, with sheets #26 & 27 numbered A3.5 and un-numbered, respectively), "Waste Storage and Transfer Facilities, and Feed Storage System and Storm Water System".
   f. **Drawing set (#1-5), "Sweet Corn Waste Silage Bunker and Leachate Collection".**

8. On September 4, 2008, letter "RE: Rosendale Dairy, Waste Storage and Transfer Facilities and Feed Storage System and Storm Water System, Corrections and Errata", dated September 4, 2008.

9. **On September 10, 2008, the following documents, dated September 9, 2008:**
   a. **"Addendum No. 4, Waste Storage Facilities and Manure Transfer Systems";**
   b. **"Addendum No. 4, Construction Plan Waste Storage Facility and Manure Transfer", dated August 18, 2008;**
   c. **"Addendum No. 4, Sweet Corn Silage Bunker with Leachate Collection and Containment System";**
   d. **Drawing set (#1-28), "Waste Storage and Transfer Facilities, and Feed Storage System and Storm Water System".**

10. **On September 11, 2008, letter "RE: Rosendale Dairy, Waste Storage and Transfer Facilities and Feed Storage System and Storm Water System, Corrections and Errata, No. 3", dated September 11, 2008.**

Fond du Lac County Comments & Rosendale Responses Received: The WDNR received the following documents from Fond du Lac County, and to Fond du Lac County from John Roach on behalf of Rosendale Dairy, regarding the plans and specifications, and the status of construction activities at the Rosendale site.

- On August 12, 2008, email from Ryan Rice, "Subject: Rosendale Dairy, Inc. – Update". The email documents that as of August 7, 2008, excavation had commenced for the three proposed waste storage facilities.

- On August 19, 2008, letter from John Roach, "File #:00508052008", dated August 19, 2008, with attached item by item response to Fond du Lac County, including (but not limited to) the following revisions:

  soils investigation and site assessment; addition of perched water on geologic cross sections and need for perched water removal; changes in base elevations of certain facilities and systems; calculations for construction joint spacing and loads; locations where load bearing joints are needed; waterstop joint locations and lengths; core trench depth; use of calk type sealant for pipe penetrations; addition of transfer pipes and components to the plan view drawings (#23-25); and addition of reception tank detail drawings.

- On September 2, 2008, letter from Ryan Rice, "Subject: Rosendale Dairy, Inc. – 2nd Construction Plan Review", dated September 2, 2008. The letter requested revisions including (but not limited to) the following:

  additional soils investigation; addition of a waterstop joint detail plan; type of machinery to be used in the WSFs and calculations for concrete thickness based on anticipated loads; cross section drawing to show the location and bedding of the drain tile for perched water removal.

- On September 10, 2008, letter from Ryan Rice, "Subject: Rosendale Dairy, Inc. – 3rd Construction Plan Review", dated September 8, 2008.

- On October 1, 2008, email from Ryan Rice, "Subject Rosendale Reception Tank Revisions".

The WDNR is also aware, Fond du Lac County issued a comment letter dated August 7, 2008, on initial review of the Rosendale Dairy construction plans. However, the WDNR Bureau of Watershed Management does not have a copy.

VIII. Reference Materials

Batten, William. 2009. WGNHS, unpublished report on the geology of Fond du Lac County.
Newport, Thomas, G., 1962. Geology and Ground Water Resources of Fond du Lac County, Wisconsin, USGS Water-Supply Paper 1604.

Dunning, Charles and Douglas Yeskis, 2007. Lithostratigraphic and Hydrostratigraphic Characteristics of the Ordovician Sinnipee Group in the Vicinity of Waupun, Fond du Lac County, Wisconsin, 1995-96, USGS Scientific Investigations Report 2007-5114.

Kammerer, Phil A., L.C. Trotta, D.P. Krabbenhoft and R.A. Lidwin, 1998. Geology, Ground-water Flow, and Dissolved-Solids Concentrations in Ground Water along hydrogeological Sections Through Wisconsin Aquifers, USGS, Hydrologic Investigations Atlas HA 731.

Longcore, Travis and Catherine Rich, in their article "Ecological Light Pollution" (http://www.urbanwildlands.org/Resources/LongcoreRich2004.pdf) http://www.urbanwildlands.org/nightlightbiblio.html

Minnesota Dept of Administration Env.Quality Board, 1999, Generic Environmental Impact Statement for animal agriculture http://www.eqb.state.mn.us/project.html?Id=18252

Oregon DEQ Task force on Dairy and Air Quality http://www.deq.state.or.us/aq/dairy/report.htm

Protecting Wisconsin's Groundwater through Comprehensive Planning Website, USGS and UW-Extension Center for Land Use Education

Purdue Extension Guide AY-318-W http://www.ansc.purdue.edu/cafo/

Union of Concerned Scientists**,** April 2008, *CAFOs Uncovered-The Untold Costs of Confined Animal Feeding Operations*.
http://www.ucsusa.org/assets/documents/food_and_agriculture/cafos-uncovered.pdf

United Nations, Food and Agriculture Organization, 2006. *Livestock's Long Shadow – Environmental Issues and Options*". (Rome 2006).
ftp://ftp.fao.org/docrep/fao/010/A0701E/A0701E00.pdf.

USDA Census of Agriculture for Fond du Lac County http://www.ams.usda.gov/AMSv1.0/
USDA National Agricultural Statistics Service; http://www.nass.usda.gov

UW Extension Publication A280
UW Extension Discovery Farms – Tile Drainage in Wisconsin
UW Extension http://basineducation.uwex.edu/foxwolf/economics/angling.htm

Wisconsin CAFO Permitted Operations Summary Statistics Tables
http://dnr.wi.gov/runoff/agriculture/cafo/permits/cafo_stats.asp.