BEFORE THE
DEPARTMENT OF NATURAL RESOURCES

DECISION/DETERMINATION ON
WISCONSIN ENVIRONMENTAL POLICY ACT COMPLIANCE

For

Richfield Dairy Confined Animal Feeding Operation (RDCAFO)

INTRODUCTION

The Wisconsin Environmental Policy Act (WEPA), s. 1.11, Stats., requires state agencies to fully consider and disclose the environmental impacts of agency actions. Chapter NR 150, Wis. Adm. Code, outlines policy and procedures for implementing WEPA for the Department of Natural Resources (DNR). Section NR 150.24, Wis. Adm. Code (2013), and s. NR 150.35, Wis. Adm. Code (2014), require a final written decision regarding WEPA compliance.

The Wisconsin Department of Natural Resources has prepared an environmental impact statement for the RDCAFO in order to satisfy WEPA as outlined above.

FINDINGS OF FACT

The Department of Natural Resources finds that:

1. This project was initiated under a previous version of ch. NR 150, Wis. Adm. Code – referred to here as the 2013 version. This decision/determination is made under the current version of ch. NR 150, Wis. Adm. Code, which is an emergency rule revision to the rule promulgated on April 1, 2014. This is referred to here as the 2014 version.

2. Under the 2013 version, s. NR 150.03, Wis. Adm. Code, established a "Type List" for all DNR actions, setting minimum procedural requirements for WEPA compliance. Pursuant to s. NR 150.03 (8)(i)2.a, Wis. Adm. Code (2013), issuance of a Wisconsin Pollutant Discharge Elimination System (WPDES) permit for this RDCAFO project was a Type 2 action, requiring that an Environmental Assessment (EA) be completed. An EA was prepared, received public review from June 8, 2011 to July 25, 2011, and was finalized on November 1, 2011. A Supplemental EA (SEA) was also prepared, received public review from November 26, 2012 to January 7, 2013, and was finalized on March 12, 2013. The Department followed the process as outlined under s. NR 150.20 (1) (c), Wis. Adm. Code (2013).

3. Interested parties sought judicial review of the adequacy of the EA. As a general matter, the Dane County Circuit Court found the original EA to be adequate. However, the Court remanded the EA to DNR on July 20, 2012, finding that the EA did not evaluate the effects of the high capacity wells at their approved pumping rate. In response to the Court's order, DNR prepared

the SEA. The SEA included additional factual investigation to allow a reasonably informed preliminary judgment about the environmental effects of the high capacity wells operating at 72.5 million gallons per year (MGY), which is the rate requested by the Richfield Dairy in a revised high capacity well approval application. During the public review period on the SEA, the DNR received 183 comments. The DNR carefully reviewed all comments and provided detailed responses to those comments as part of its March 12, 2013, WEPA compliance decision.

4. The Circuit Court had concluded that DNR's original EA and SEA evinced "sufficient consideration of the cumulative effects of the high capacity wells." The parties that sought judicial review of the EA appealed that portion of the court's ruling. The Court of Appeals, District IV, issued its decision on December 19, 2013 (2012AP1882). The Court of Appeals reversed the part of the Circuit Court's decision that concluded that DNR properly considered cumulative impacts and remanded the case, directing DNR to consider the cumulative effects of the two high capacity wells in conjunction with other high capacity wells.

5. On March 26, 2014, pursuant to the Court of Appeals decision, the Dane County Circuit Court issued a Supplemental Remand Order (case # 11CV3375), directing DNR to consider the cumulative effects of the two high capacity wells, consistent with the Court of Appeals decision.

6. The same parties that petitioned for judicial review of the EA also requested a contested case hearing regarding the permit and approvals for the proposed Richfield Dairy, including the high capacity well approval. During the time when the original EA was being challenged at the Court of Appeals, the contested case hearing proceeded, on June 24-28, August 19-22 and December 16-20, 2013. Because the Supplemental Remand Order was received by DNR following the close of the contested case hearing, this WEPA analysis includes some relevant information that became available at the hearing.

7. Since the Court's remand, Chapter NR 150 has been revised, and the new rule went into effect on April 1, 2014.[1]

8. The department has decided, pursuant to s. NR 150.20(4)(b), Wis. Adm. Code (2014), and s. NR 150.22(1)(f), Wis. Adm. Code (2013), to follow the Environmental Impact Statement (EIS) procedures as the best approach to achieve WEPA compliance for this action and to satisfy the Circuit Court's Supplemental Remand Order. In addition, an EIS was determined to be the best way to capture the previous EA, Supplemental EA and the associated response to comments for both documents.

9. DNR received the decision in the contested case hearing, dated September 3, 2014. The Administrative Law Judge (ALJ) limited the approved maximum groundwater withdrawal amount for the property to 52.5 million gallons in any 365-day period. Since the draft environmental impact statement (EIS) was largely prepared before the decision in the contested

[1] In addition, ch. NR 150 was amended by an emergency rule, ER1417, which became effective on August 31, 2014, and continues in effect until May 27, 2015. The emergency rule provisions do not have an effect on this EIS.

case hearing was received, it primarily considered the potential environmental impacts of the high capacity wells operating at 72.5 MGY, such that the impacts from the Dairy's wells were overstated in the draft EIS. The final EIS has been amended to primarily consider the potential environmental impacts of the high capacity wells operating at 52.5 MGY, which is the pumping rate approved by the ALJ.

10. Much of the EIS includes materials prepared for public review in the previous environmental analysis documents, as described above. In specific response to the Court's remand order, the area impacts and cumulative impacts sections of the analyses have been revised and may be found in Section IV.A.4 and Chapter V of the EIS.

11. The process for public comment was conducted in a manner that complied with both the 2014 and 2013 versions of ch. NR 150. As such, the public review followed the current procedures, as outlined in ss. NR 150.20 and 150.30, Wis. Adm. Code (2014), and the prior procedures, as outlined in ss. NR 150.20to 150.23, Wis. Adm. Code (2013), with a 45 day comment period for the Draft EIS, as provided in s. NR 150.22(3)(d), Wis. Adm. Code (2013).

12. The Department web-site has most of the current and previous documentation for this proposal at:

    http://dnr.wi.gov/topic/agbusiness/cafo/richfielddairy.html

13. In addition to the documentation on the Department's web-site, there are three (3) DVDs that contain the following documentation from the contested case hearing for this proposal: pre-filed testimony from all witnesses, all hearing exhibits and the hearing transcript. The DVDs can be made available by contacting Russ Anderson, Fitchburg Service Center, 3911 Fish Hatchery Road, Fitchburg, WI 53711 at 608-275-3467

14. This Decision/Determination on Wisconsin Environmental Policy Act compliance supersedes a version that was signed on April 13, 2015, and posted on the Department web-site.

CONCLUSIONS OF LAW

The Department concludes that:

1. The Department of Natural Resources, under s. 1.11, Stats., and Ch. NR 150, Wis. Adm. Code (2013 and 2014), has the responsibility to comply with WEPA, and the authority to determine its compliance with that Act.

2. The procedure and analysis identified in the Findings of Fact complies with the requirements of s. 1.11, Stats., and ch. NR 150, Wis. Adm. Code (2013 and 2014).

DECISION/DETERMINATION

The DNR has complied with the requirements of WEPA, s. 1.11, Stats. and Ch. NR 150, Wis. Adm. Code (2013 and 2014), for the RDCAFO project. Documents for this project can be found on the Department website listed under Paragraph 12 above, and by contacting Russ Anderson under paragraph 13 above. This Decision/Determination applies to all DNR actions on the project, the impacts of which are considered in the EIS and are already completed.

Dated at Madison, Wisconsin, this 23rd day of April, 2015

STATE OF WISCONSIN
Department of Natural Resources
For the Secretary

By: _____ for RA
Russ Anderson, Supervisor of the Environmental Analysis and Review program, South Central Region

NOTICE OF APPEAL RIGHTS

If you believe you have a right to challenge this decision made by the Department, you should know that Wisconsin statutes, administrative codes, and case law establish time periods and requirements for reviewing Department decisions.

To seek judicial review of the Department's decision, ss. 227.52 and 227.53, Stats., establish criteria for filing a petition for judicial review. Such a petition shall be filed with the appropriate circuit court and shall be served on the Department. The petition shall name the Department of Natural Resources as the respondent.

April 23, 2015
WISCONSIN DEPARTMENT OF NATURAL RESOURCES

RICHFIELD DAIRY PROJECT

ENVIRONMENTAL IMPACT STATEMENT

Permit/Approval	File Number	Date of Issuance
WI Pollutant Discharge Elimination System (WPDES) Permit	WI-0064815-01-0	November 3, 2011
Plans and Specifications Approval-Production Area Structure/System Design	R-2011-0029	June 24, 2011 - Statutory approval November 3, 2011 Conditional approval modifying statutory approval
Plans and Specifications Approval-Groundwater Monitoring Plan	R-2012-0057	July 27, 2012-Conditional approval
Plans and Specifications Approval-Production Area Structure/System Design	R-2013-0180	October 7, 2013-Conditional approval of resubmitted plans (R-2011-0029) October 25, 2013-Revised Conditional approval October 28, 2013-2nd Revised Conditional approval
Conditional High Capacity Well Approval	01-3-0009	November 3, 2011 (modified on March 13, 2013)
WPDES Nutrient Management Plan	WI-00648	June 2, 2011
WPDES Construction Site Storm Water Runoff	WI-S067831-04	February 22, 2011 (extension granted January 27, 2014)

Environmental Impact Statement for Richfield Dairy

Introduction

In November 2011, the Wisconsin Department of Natural Resources (DNR) prepared an Environmental Assessment (EA) for the proposed Richfield Dairy facility pursuant to the Wisconsin Environmental Policy Act (WEPA), s. 1.11 Stats., and ch. NR 150, Wis. Adm. Code.

Interested parties sought judicial review of the adequacy of the EA. As a general matter, the Dane County Circuit Court found the EA to be adequate. However, the Court remanded the original EA to DNR on July 20, 2012, finding that the EA did not evaluate the effects of the high capacity wells at their approved pumping rate. In response to the Court's order, DNR prepared a Supplemental Environmental Assessment (SEA). The SEA included additional factual investigation to allow a reasonably informed preliminary judgment about the environmental effects of the high capacity wells operating at 72.5 million gallons per year (MGY), which is the rate requested by the Richfield Dairy in a revised high capacity well approval application. During a public review period on the SEA, the DNR received 183 comments concerning the Richfield Dairy SEA. The DNR carefully reviewed all comments and provided detailed responses to those comments as part of its March 12, 2013, WEPA compliance decision.

The Circuit Court had concluded that DNR's original EA and addendum evinced "sufficient consideration of the cumulative effects of the high capacity wells." The parties that sought judicial review of the EA appealed that portion of the court's ruling. The Court of Appeals, District IV, issued its decision on December 19, 2013 (2012AP1882). The Court of Appeals reversed the part of the Circuit Court's decision that concluded that DNR properly considered cumulative impacts and remanded the case, directing DNR to consider the cumulative effects of the two high capacity wells in conjunction with other high capacity wells.

On March 26, 2014, pursuant to the Court of Appeals decision, the Dane County Circuit Court issued a Supplemental Remand Order, directing DNR to consider the cumulative effects of the two high capacity wells, consistent with the Court of Appeals decision (case # 11CV3375).

The same parties that petitioned for judicial review of the EA also requested a contested case hearing regarding the permit and approvals for the proposed Richfield Dairy, including the high capacity well approval. During the time when the original EA was being challenged at the Court of Appeals, the contested case hearing proceeded, on June 24-28, August 19-23 and December 16-20, 2013. Because the Supplemental Remand Order was received by DNR following the close of the contested case hearing, this WEPA analysis includes some relevant information that became available at the hearing.

Since the Court's remand, Chapter NR 150 has been revised, and the new rule went into effect on April 1, 2014.[1]

The department has decided, pursuant to s. NR 150.20(4)(b), Wis. Adm. Code, and s. NR 150.22(1)(f), Wis. Adm. Code (2013), to follow the Environmental Impact Statement (EIS) procedures as the best approach to achieve WEPA compliance for this action and to satisfy the Circuit Court's Supplemental Remand Order.

DNR received the decision in the contested case hearing, dated September 3, 2014. The Administrative Law Judge (ALJ) limited the approved maximum groundwater withdrawal amount for the property to 52.5 million gallons in any 365-day period. Since the draft environmental analysis was largely prepared before the decision in the contested case hearing was received, it primarily considered the potential environmental impacts of the high capacity wells operating at 72.5 MGY, such that the impacts from the Dairy's wells were overstated in the draft EIS. The final EIS has been amended to primarily consider the potential environmental impacts of the high capacity wells operating at 52.5 MGY, which is the pumping rate approved by the ALJ.

Much of this document includes materials prepared for public review in the previous environmental analysis documents, as described above. In specific response to the Court's remand order, the area impacts and cumulative impacts sections of the analyses have been revised and may be found in Section IV.A.4 and Chapter V of this document.

Public Review of the EIS

The process for public comment was conducted in a manner that complied with both the current and 2013 versions of ch. NR 150. As such, the public review followed the current procedures, as outlined in s. NR 150.30, Wis. Adm. Code, and the prior procedures, as outlined in ss. NR 150.22 and 150.23, Wis. Adm. Code (2013), with a 45 day comment period for the Draft EIS, as provided in s. NR 150.22(3)(d), Wis. Adm. Code (2013).

The Department web-site has all the current and previous documentation for this proposal at:

http://dnr.wi.gov/topic/agbusiness/cafo/richfielddairy.html

[1] In addition, ch. NR 150 was amended by an emergency rule, ER1417, which became effective on August 31, 2014, and continues in effect until May 27, 2015. The emergency rule provisions do not have an effect on this EIS.

This information is a compilation of the environmental documents already produced by the Wisconsin Department of Natural Resources, the applicant, and materials received from other sources. Please see the references at the end of this document for a complete list.

List of Contributors

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Gretchen Wheat, Water Resources Engineer—Madison	WPDES Permit—Facilities Design
Jeff Kreider, Water Resources Engineer—Madison	Facilities Plan Review
Jeff Johnson, Air Engineer—Eau Claire Dave Panofsky, Air Engineer—Madison	Air Management
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II Project Description

II.A Purpose, need & cost

The primary purpose of the Richfield Dairy project is to produce milk.

Milk Source Holdings, Inc. is proposing construction and operation of the Richfield Dairy, a large Concentrated Animal Feeding Operation (CAFO) in Adams County. The applicant currently owns four other permitted CAFO's – Tidy View Dairy (Outagamie County) with 7180 dairy and 700 beef cattle (10,634 animal units, or AU[2],) Omro Dairy (Winnebago County) with 2597 dairy cattle (3590 AU), New Chester Dairy (Adams County) with 9250dairy and 235 beef cattle (13,080 AU) and Rosendale Dairy (Fond du Lac County) with 9150 dairy and 450 beef cattle (13,155 AU). Milk Source Holdings, Inc. received permits and approvals to operate this fifth CAFO dairy, Richfield Dairy.

Richfield Dairy's facility was proposed to house 4300 milking/dry cows and 250 steers for a total of 6270 AU (under the combined AU calculation used to determine operation size, one milking/dry cow equals 1.4 AU, 1 beef steer equals 1 AU). The Administrative Law Judge (ALJ) ordered that the WPDES be modified to establish a cap on the number of animal units. The Department will issue a modified WPDES Permit with an AU cap.

The project cost is estimated at $35 million. The facility expects to employ ~ 40 staff with an estimated annual payroll of $1.5 million.

II.B Project sites

II.B.1 Facility Location

The proposed Richfield Dairy facility would be located is the southeast corner of the intersection of 1st Drive and Cypress Avenue. Primary access to the facility would be from 1st Drive. Total site disturbance entails the conversion of 115 acres of existing cropland to farm buildings, production area and ancillary area.

[2] As defined in s. NR 243.03(5), 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 manure produced and the code defines the units by animal type. For this proposal, a cow is generally equivalent to 1.4 AU and a beef steer is 1.0 AU.

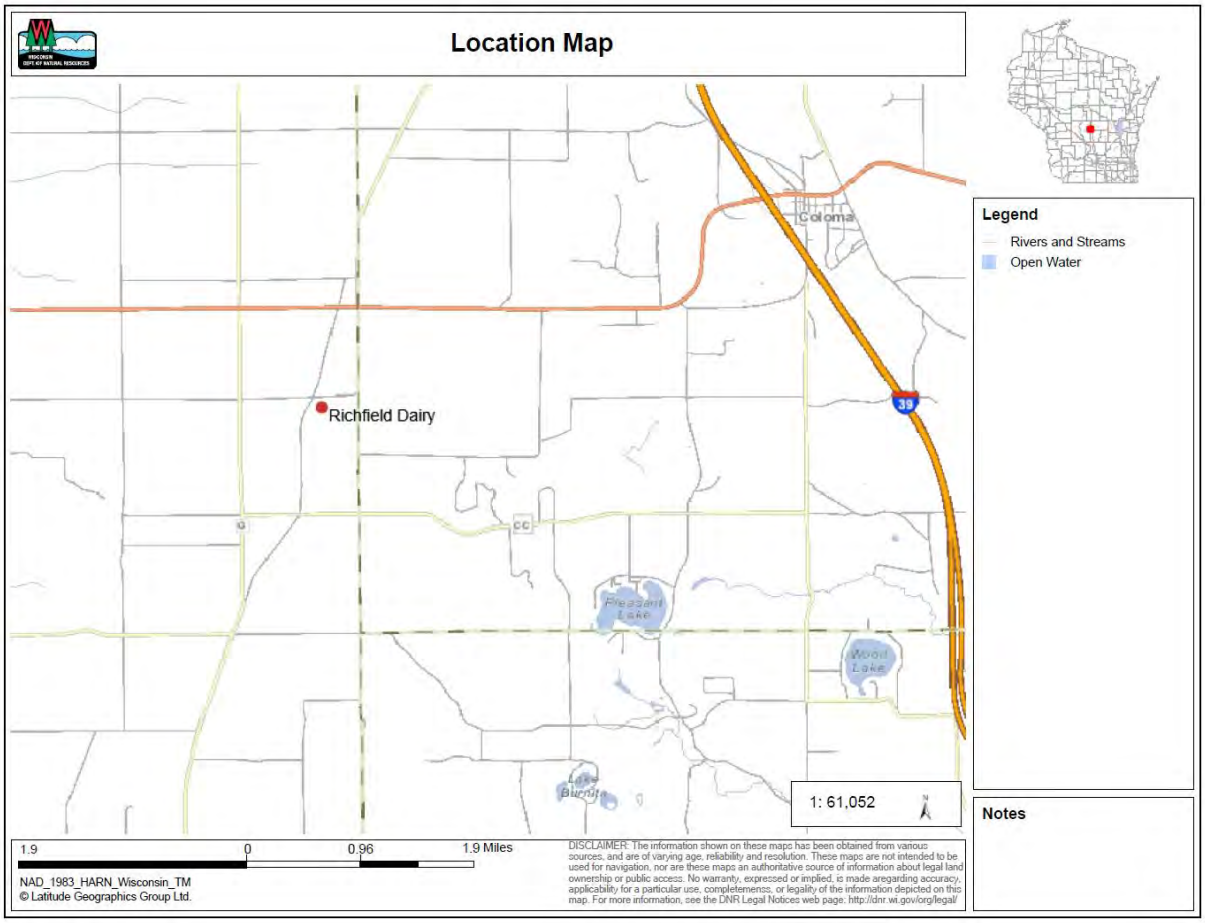


Figure 1 Richfield Dairy and Surrounding Local Roads

II.B.2 Land Spreading Locations

Richfield Dairy owns a total of 1,044.8 spreadable acres and has Nutrient Management Plan (NMP) subscription agreements for an additional 15,245.5 spreadable acres (see summary table below from 2014 NMP) available for landspreading after various restricted areas have been accounted for. Thus, the farm has a total of approximately 16,290.3 acres of available spreading area.

The table below summarizes this information. Please refer to Section 3.0 of plan for more information related to landbase documentation. The farm has a total of approximately 16,290.3 acres of available land after various restricted areas have been accounted for.

Total land application acres available – 16,290.3 Spreadable

Acres owned – 1,044.8 ; Acres Rented – 0; Acres in agreements – 15,245.5

Grower Name	Grower Number	Spreadable Acres	Type	Length	Shared Land* Y/N	Additional Field Info
Richfield Dairy	500	1044.8	Owned		N	
Bula-Gieringer Farms	503	1678.5	Agreement	Ongoing	N	
Diversified Seed Producers	506	1193.3	Agreement	Ongoing	N	
Coloma Farms	507	2660.1	Agreement	Ongoing	N	
Kevin Sigourney	508	1590.8	Agreement	Ongoing	N	
Triple C Acres	509	896.2	Agreement	Ongoing	N	
Bartsch Farms	510	1059.3	Agreement	Ongoing	N	
Marv Grefe Farms	511	1431.4	Agreement	Ongoing	N	
Tom Machan	512	221	Agreement	Ongoing	Y	
Kendall Nichols	513	601.2	Agreement	Ongoing	N	
Heartland Farms Inc.	515	3913.7	Agreement	Ongoing	N	

* Shared land means fields that receive nutrients from more than one farm or nutrient source (e.g., manure, industrial wastewater, commercial fertilizer, septage, etc). These fields must be carefully tracked within the NMP.

II.B.3 High Capacity Well Locations

Two high capacity wells have been approved for the Richfield Dairy Operation. High Capacity Well Number 71786 is proposed to be constructed at Latitude 44 Degrees 0.308 Minutes and Longitude -89 Degrees 36.475 Minutes (SW ¼, NE ¼, S25, T18N, R7E). High Capacity Well Number 71787 is proposed to be constructed at Latitude 44 Degrees and 0.39 Minutes and Longitude -89 Degrees 36.466 Minutes (SW ¼, NE ¼, S25, T18N, R7E). If the locations of these wells are moved more than 660 feet from the proposed locations, Department approval is necessary prior to construction. The elevation of the proposed wells is 1080 feet above mean sea level (ft. msl). The wells will be constructed to a depth of about 350 feet.

II.C Constructed facilities

Proposed facility structures include a sand-bedded cross-ventilated freestall barn (416'x1232'), 80 stall milking parlor (106'x164'), livestock holding area (74'x194'), concrete feed storage pad (680'x765'), vegetated treatment area for precipitation runoff after collection of first flush (932'x348'), sweet corn silage bunker (658'x221'x12'height), High Density Polyethylene (HDPE) lined sweet corn silage attenuation basin (23,500 sq. ft.), manure processing building (92'x210'), concrete lined manure solids storage area (202'x384'x12'height), animal mortality storage facility (14'x24'), concrete lined waste storage pond (WSP) with cover (480'x400'x28'deep), uncovered concrete lined waste storage pond (480'x250'x15'deep), commodity shed (120'x300'), shop (60'x120'), two high capacity water wells, four storm water management ponds, five infiltration basins, Fuel Depot (24'x70'), weigh scale (12'x75'), potable water supply system, a domestic waste sewerage system and other lesser facilities. Total site disturbance entails the conversion of 115 acres of existing cropland to farm buildings, production area and ancillary area. See Figure 3 below.

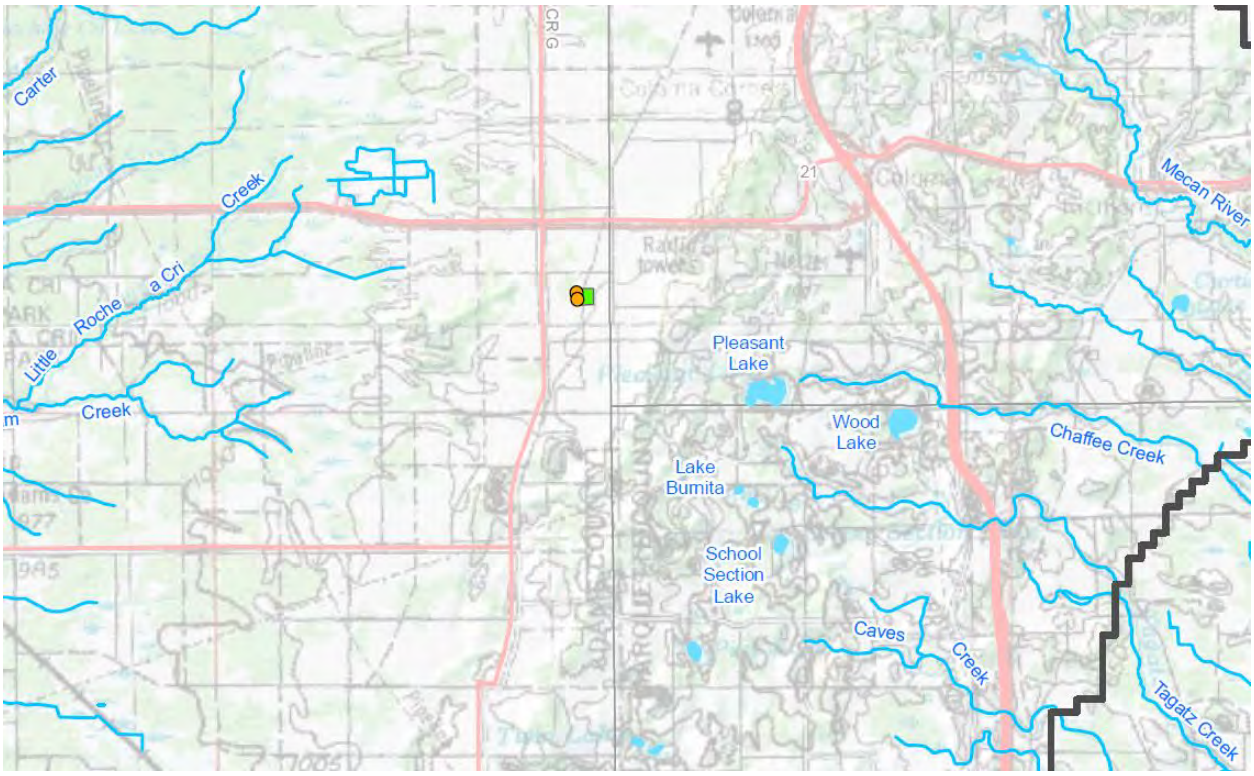


Figure 2 Richfield Dairy High Cap Well Locations & Surrounding Area

- Proposed High Capacity Well
- Proposed Dairy
- Model Domain

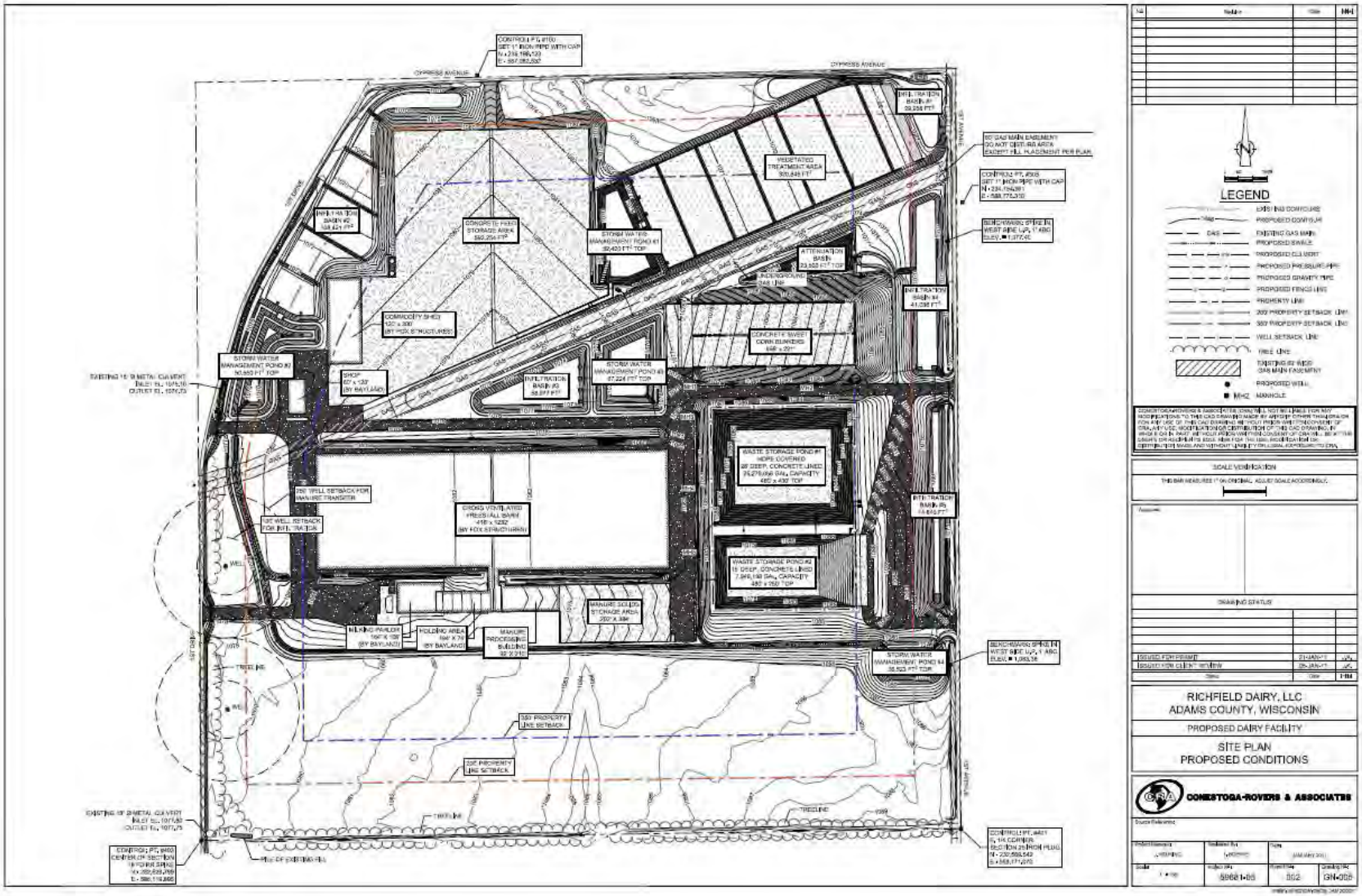


Figure 3 Production Site Layout

II.C.1 Buildings

Proposed facility structures, things constructed above ground, include a sand-bedded cross-ventilated freestall barn (416'x1232'), 80 stall milking parlor (106'x164'), livestock holding area (74'x194'), concrete feed storage pad (680'x765'), sweet corn silage bunker (658'x221'x12'height), animal mortality storage facility (14'x24'), commodity shed (120'x300'), shop (60'x120'), Fuel Depot (24'x70'), weigh scale (12'x75').

II.C.2 Manure management structures

Proposed manure management structures include a manure processing building (92'x210'), concrete lined manure solids storage area (202'x384'x12'height), concrete lined waste storage pond (WSP) with cover (480'x400'x28'deep), and an uncovered concrete lined waste storage pond (480'x250'x15'deep). Waste storage ponds (WSP #1 & #2), will have a combined design capacity of 33.2 million gallons (excluding freeboard), which represents approximately 205 days of storage for the proposed wastewater stream. WSP #1 will have a 6" thick concrete base with underlying 8" compacted clay liner which provides a secondary liner in the event of a concrete failure. An 8" clay liner will also be placed under the feed storage pad and manure solids storage area. WSP #2 includes a loading station for containment of any liquid spills while wastewater is being pumped to tanker trucks.

The proposed feed storage pad and manure solids storage area each have a surface to be constructed of concrete with water-stop installed at all joints, in addition to a soil liner component to be located immediately below (and in contact with) the concrete. This soil liner is classified as a "composite liner" as two or more liner components in direct contact with each other.

Approximately 8,552 tons and 59,266,555 gallons of manure and process wastewater will be generated annually on Site including liquid manure, normal precipitation on the sweet corn silage bunkers, sand and manure solids stacking surfaces and the surface of WSP #2, silage leachate and precipitation runoff from the feed pad surface. The waste storage system has a total useable capacity of 33,228,195 gallons. The Farm will have approximately 205 days of usable capacity for storage of liquid waste.

II.C.3 Other production operation structures

Other proposed structures include vegetated treatment area for precipitation runoff after collection of first flush (932'x348'), High Density Polyethylene (HDPE) lined sweet corn silage attenuation basin (23,500 sq. ft.), high capacity water wells, four storm water management ponds, five infiltration basins, potable water supply system, a domestic waste sewerage system and other lesser facilities.

Storm water runoff from the production area of the proposed Richfield Dairy facility will be handled by a series of culverts, swales and diversions directing flow to the storm water detention ponds (the largest of which is sized to retain runoff from a 100-year storm event).

II.C.4 Roads

Two access driveways will be established off 1st Drive and will serve as the main access to the Site. Two additional driveways will be established off 1st Avenue and one off Cypress Avenue that will be used for seasonal activities including crop harvest and manure application. Internal driveways will be established on the Site to access the proposed facilities.

II.C.5 Wells

Milk Source Holdings, LLC/Richfield Dairy, submitted a high capacity well application to the Department of Natural Resources (DNR) on May 4, 2011 for the construction of two 500 gallon per minute (gpm) potable high capacity wells to be constructed to a depth of ~350 feet and cased into sandstone bedrock. A location map is found below; Well #1 refers to the South Well and Well #2 refers to the North Well.

One well would serve as the primary water supply well for dairy operations, while the other would function as a back-up well. The maximum total water use approved for the two wells is 52.5 million gallons per year. Water would be used year-round for animal watering and cleaning (about 84% of annual water use), and in summer for evaporative cooling of the barn (about 16% of annual water use). An existing irrigation well on the property would be abandoned prior to construction of the dairy's wells.

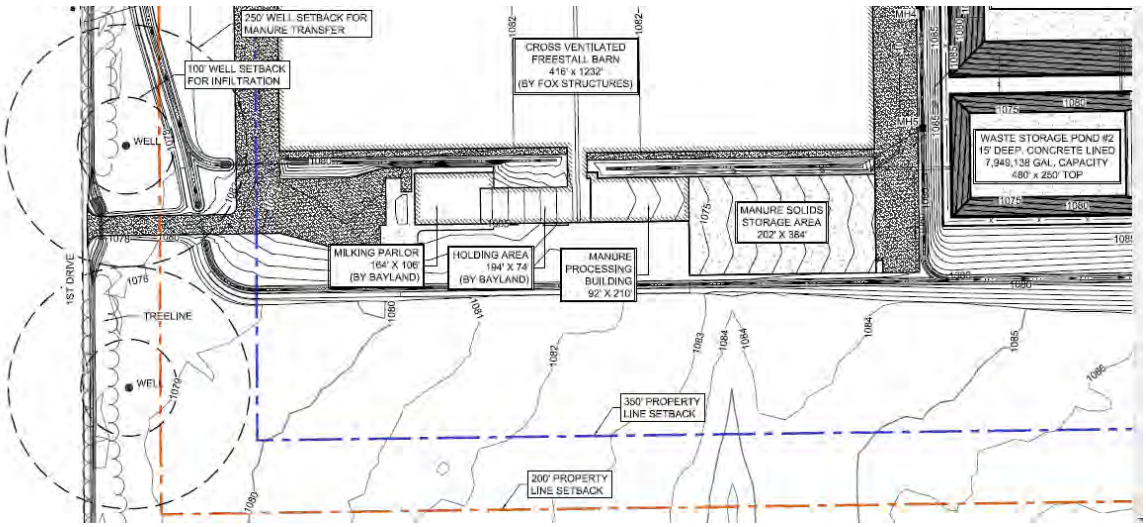


Figure 4 High Cap Well Locations Within Production Site

II.C.6 Storm water structures

The Richfield Dairy (Site) is approximately 152 acres in size while the disturbance area is approximately 117 total acres in size. See Figure 5 below. Construction activities will occur in four phases. All soil and erosion and sediment control measures, or Best Management Practices (BMP's), will be in place prior to major soil disturbances for each phase. All BMP's will be installed in accordance with the WDNR and USDA-Natural Resource Conservation Service (NRCS) Conservation Practice Standards (CPSs). It is anticipated that equipment fueling and on-Site storage will be conducted at the north side of the Site. Examples of BMP's proposed to be utilized are silt fence, tracking pads, temporary and permanent seeding, temporary sediment basins and ditches, ditch checks, and mulching. Permanent storm water management features will also be constructed; examples include; ponds, infiltration basins, vegetated treatment areas (VTA), and grassed swales.

Storm water BMPs were designed to control runoff quantity and quality. The plan meets or exceeds the requirements under s. NR 151.12, Wis. Adm. Code, for Peak Discharge Rate Control, Water Quality Treatment, Infiltration, Protective Areas, Fueling and Vehicle Maintenance Areas. Additionally, the Site provides runoff volume control measures such that runoff volumes from the 2-year, 25-year, and 100-year/24-hour rainfall events leaving the post-developed site at no greater than pre-development volumes. Further, conveyance facilities internal to the Site have been designed to provide both 25-year and 100 –year capacities ensure that runoff is collected and routed to the various storm water management features so that the desired performance standards can be met.

The facility referred to in the plans as "storm water management pond #1" will receive low concentration contaminated runoff from the feed pad (after leachate and a significant amount of first flush runoff is collected). The pond will have a concrete liner that meets the minimum design criteria for a manure storage facility, although the runoff is expected to have much lower concentration of nutrients than does manure.

Storm water management ponds #2, #3 and #4 will receive only storm water, such as runoff from building roofs, not in contact with feed materials or manure. These ponds will have earthen bottom, designed in accordance with Wisconsin Construction Standard 1001 Wet Detention Basins, intended to substantially prevent infiltration.

A VTA is required to be designed to maintain overland flow, so infiltration is not a primary means of treatment. For this reason a VTA must have a minimum 2.5 ft thickness of soil that is 20% fines (above groundwater and bedrock). However, the DNR acknowledges a VTA does still have potential for infiltration, but because there is significant first flush capture (0.15 inches of precipitation) the runoff is expected to contain relatively low concentration of nutrients. UW Madison field research is underway to help determine the effectiveness of VTAs in Wisconsin. If infiltration is intended as a primary means of treatment, the system is regulated under ch. NR 214, Wis. Adm.

Code. All feed leachate and the 0.15 inches of first flush runoff will be collected and transferred to storage. Only the less contaminated remaining runoff (in excess of 0.15 inches of precipitation) will flow to the storm water management pond #1 and then to the VTA. A VTA is intended to consume nutrients from the leachate runoff.

II.C.7 Domestic wastewater system structures

A private sewerage system is proposed at the facility for collection of all human waste pursuant to Adams County Private Onsite Wastewater Treatment System Ordinance. Prior to installation, Richfield Dairy will obtain the necessary permits from the Adams County Planning and Zoning Department.

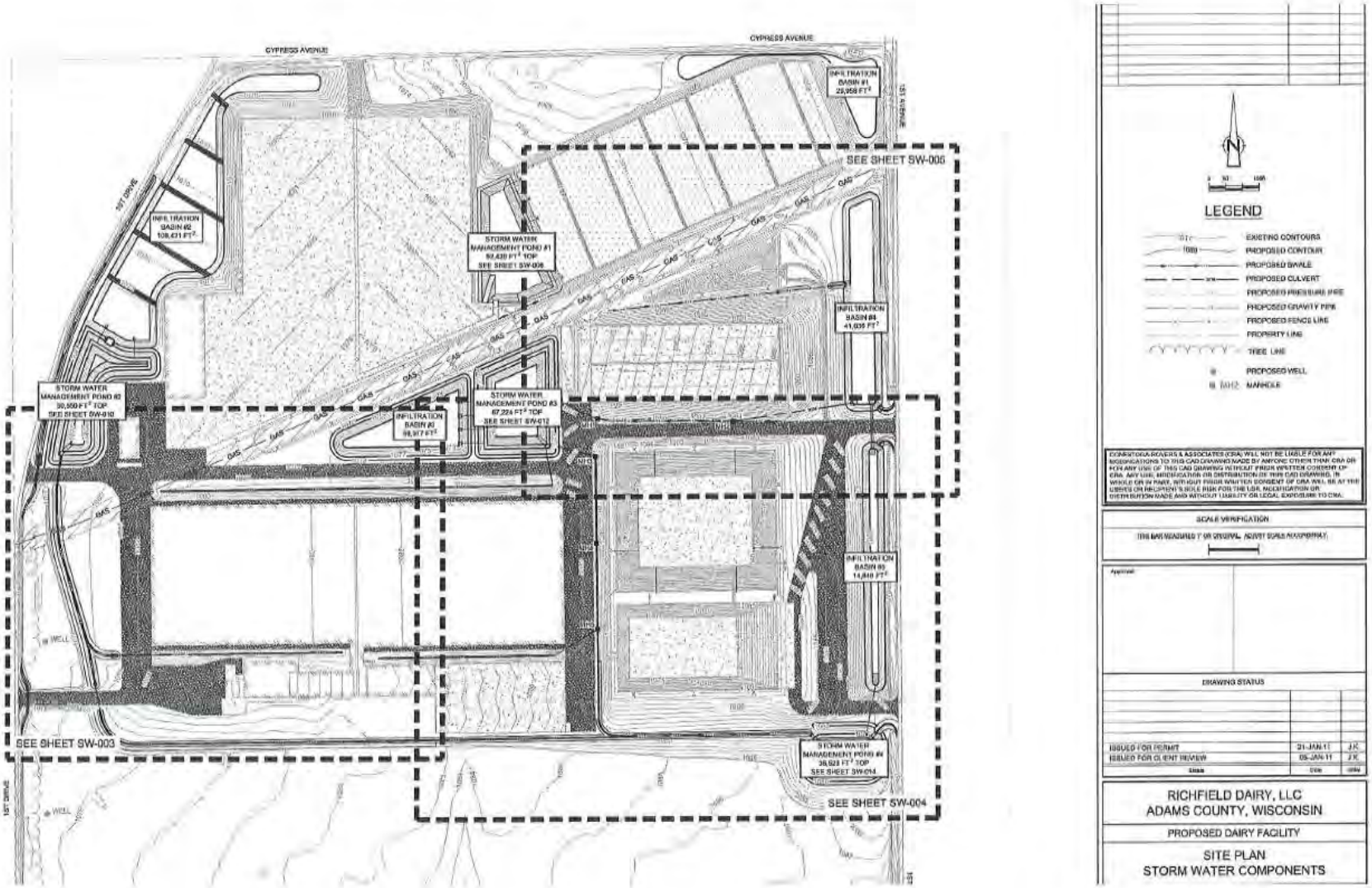


Figure 5 Storm Water Structures

II.D Environmental control & monitoring structures & equipment

II.D.1 Groundwater monitoring structures & equipment

Due to the porous nature of the sandy soils at the Richfield Dairy site and the potential for groundwater impacts associated with potential leakage from manure and process wastewater handling structures/systems at the site, the Department believes groundwater monitoring is warranted at the Richfield Dairy production area. Therefore, as part of its WPDES permit, the applicant is required to install water table monitoring wells in the production area. Richfield Dairy's monitoring plan calls for eight monitoring wells approximately evenly spaced around the perimeter of the facility.

Additionally, as part of the high capacity well approval, the applicant must install a minimum of one additional piezometer nested with a monitoring well downgradient of the high capacity wells. The applicant is required to collect monthly water level information from the monitoring wells and piezometer and submit collected information to the Department's Water Use Section on an annual basis.

Numeric groundwater modeling is the best tool available to predict water table drawdown and surface water impacts from groundwater withdrawals. However, impacts to surface water and groundwater cannot be fully understood until years of groundwater withdrawals have occurred. DNR made a preliminary judgment that the wells are not anticipated to cause significant adverse environmental effects based on the modeling submitted. However, given that the environmental effects are not completely certain, DNR included conditions in the approval to avoid significant adverse environmental impacts. The Wisconsin Supreme Court has held this to be an acceptable method to "control potential adverse environmental consequences through conditions that must be complied with to obtain approval." *State ex rel. Boehm v. DNR,* 174 Wis. 2d at 676.

The purpose of the water level monitoring is to identify any major discrepancy between the groundwater drawdowns modeled by SSPA and groundwater drawdowns related to actual pumping. In the case such a discrepancy was noted, the accuracy of the model predictions would need to be re-examined to determine if additional pumping restrictions would be appropriate to protect waters of the state. In the case of a decrease in water supply in nearby wells, water level monitoring could also help to demonstrate whether or not pumping from the Dairy was linked to adverse impacts.

II.E Operation

II.E.1 Production management

II.E.1.a Animals

The dairy facility was proposed to house 4,300 milking / dry cows and 250 steers for a total of 6,270 AU (under the combined AU calculation used to determine operation size, one milking/dry cow equals 1.4 AU, 1 beef steer equals 1 AU). The Administrative Law Judge (ALJ) ordered that the WPDES permit be modified to establish a cap on the number of animal units. The Department will issue a modified WPDES Permit with an AU cap. References in this section are to the dairy's proposed number of AUs. This section also discusses the amount of manure and process wastewater that will be generated, based on the dairy's proposed number of 6,270 AU.

II.E.1.b Animal housing & bedding

As proposed, a sand-bedded cross ventilated freestall barn (416' x 1232') would house 4,300 milking cows and dry cows and 250 steers.

II.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 300,000 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.

II.E.1.d Products

Richfield Dairy estimates that 4,300 milking cows will produce six semi-tanker loads of milk to market each day, for an annual total of 2,190 loads of milk. It is expected that most of this milk will be sold and used for fluid milk. There will be a continuous cycling of 250 beef steers at the site as the operation raises the animals from six months to approximately 16 months and then sells them for beef production.

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

II.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 buildup of manure. All manure and manure contaminated bedding from animal housing facilities will be transferred to the sand separation area. Wastes from the milking parlor will also be directed to the sand separation area. Manure is pumped through the indoor mini-sand settling lines to further remove fine sand and fine particles from the liquid waste stream. The liquid is pumped to rotary screens separators to separate the liquid effluent from the manure solids. The manure solids are dewatered and conveyed to an outdoor concrete stacking facility and re-used as a soil conditioner/fertilizer. The liquids are collected in the flush tank and re-circulated through the facility to flush flume lines. Overflow liquids are directed to WSPs. The sand separation system allows 90% of the sand to be reclaimed and reused as bedding within 60 days.

Richfield Dairy (at 6,270 AU) will produce approximately 59.3 million gallons of liquid manure and 8,552 tons of separated manure solids annually.

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

The combined annual estimated quantity of manure and process wastewater (including precipitation runoff and (at 6,270 AU) is 59.3 million gallons, plus an additional 8,552 tons of separated manure solids. Waste storage ponds (WSP #1 & #2), will have a combined design capacity of 33.2 million gallons (excluding freeboard), which represents approximately 205 days of storage for the proposed wastewater stream. WSP #1 will have a 6” thick concrete base with an underlying 8” compacted clay liner which provides a secondary liner in the event of a concrete failure. An 8” clay liner will also be placed under the manure solids storage area. WSP #2 includes a loading station for containment of any liquid spills while wastewater is being pumped to tanker trucks. After loaded, tanker trucks will then landspread manure and process wastewater on area farm fields in accordance with the DNR approved NMP.

WSP #1 receives wastewater from the overflow of WSP #2, wastewater from the attenuation basin, and wastewater directly from the manure processing building during removal of accumulated solids in WSP #2.

WSP #1 and WSP #2 have concrete bottoms designed to support a skid steer, payloader, or equivalent live load used for the removal for accumulated solid buildup.

WSP #1 and WSP #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 WSP #1 has been designed to facilitate heavy equipment. Equipment size into the bottom of WSP #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.

The application includes a General Operations plan and Maintenance plan for manure storage structures.

II.E.2.c Manure spreading & disposal

Manure spreading & disposal will be completed according to the Richfield Dairy NMP and WPDES permit. The applicant has developed a NMP for the project, and the NMP must be amended over time, on at least an annual basis. All NMP amendments must be reviewed and approved by the Department. The Department has reviewed the NMP and has 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 for Richfield Dairy reflects the following proposed herd size and acreage: 4,300 milking/dry cows, 250 steers (combined 6,270 AU) and approximately 16,290.3 spreadable acres. Richfield Dairy currently owns 1,044.8 spreadable acres with 15,245.5 spreadable acres under formal agreements with other landowners. The approved NMP includes detailed maps of all the land spreading locations

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 planned to be implemented in order to protect surface water and ground water resources while maintaining the physical, chemical and biological condition of the soil. The approved NMP shows irrigation equipment will not be used by Richfield Dairy to land apply manure and process wastewater to fields. If Richfield Dairy decides to use a manure irrigation application method, they must first revise their NMP to reflect the method and associated NR 243 and NR 214 requirements and may not use a manure irrigation application method before the revised NMP has been reviewed and approved in writing by the Department.

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 ch. 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 s. NR 243.14(4)].

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

- Method(s) of manure and process wastewater application.

- Nutrient Crediting [s. NR 243.14(3)].

- Phosphorus-based nutrient management and managing for nutrient impaired waters [s. 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 BMPs (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].

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.

Compliance with all regulatory criteria is expected to reduce or eliminate most of the water quality risk caused by the projects proposed manure spreading activity. The WPDES permit requires the NMP to be fully implemented at all times and for Richfield Dairy, Inc., to report periods of non-compliance with the permit. Should Richfield 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.

There are a number of ways the Department monitors a CAFO's compliance with its WPDES permit, including site visits/compliance inspections and review of submitted reports. The Department has committed to completing at least one full-operation inspection during each five-year permit term, typically during the last year of the permit term. Other inspections may occur on a more frequent basis due to specific issues at a

given operation or in response to citizen complaints. That said, it is an ongoing challenge to ensure there is adequate staff and time to conduct these activities. The Department is continually working to find ways to increase the amount of time staff can spend on compliance and enforcement activities. DNR staff also regularly visit CAFO facilities as a result of citizen complaints, compliance issues or random site visits.

II.E.2.d Animal disposal & rendering

A 14 foot by 24 foot three-sided concrete and roofed mortality storage facility will store mortalities that will be disposed of through a mortality disposal company within 24 hours of a death event.

II.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 storage pad. Leachate is collected in the leachate collection system and pumped into a 7,000 gallon precast septic tank, or approved equal. 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. 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 2-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 an attenuation basin for storage.

II.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:

II.E.3.a Manure hauling

Nutrients (manure) – estimated 7,000 truckloads of manure leaving the facility yearly (based on 6270 AUs). Truck traffic will be the heaviest during the spring as the operation will apply most of its manure prior to spring planting.

II.E.3.b Feed hauling

Corn Silage and Haylage - approximately 3,500 truckloads annually.

Sweet Corn Silage – approximately 2,200 truckloads annually.

Protein and Feed Supplements – approximately 1,500 truckloads annually.

The number of truckloads is based on 6270 AUs. Also, 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.

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

Milk will be removed from the production area to a local dairy milk processor in semi-trailers (six (6) loads per day for an annual total of 2,190 loads; based on 6270 AUs).

II.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 following construction.

II.E.4 Environmental control & monitoring

II.E.4.a Storm water control & monitoring

Conformance with the approved site-specific erosion control plan and storm water management plan is required. Erosion and sediment control BMPs and treatment devices must be installed and operated as indicated by the erosion control plan, storm water management plan and plan sheets.

The construction site storm water runoff permit requires that 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.

Storm water runoff from the production area will be handled by a series of culverts, swales, and diversions directing flow to the four storm water detention ponds (the largest of which is sized to retain runoff from a 100-year storm event).

Additional information regarding storm water basins and the VTA is located in section IV.A.1.d.02.

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

The proposed facility may affect air quality and that odors will be generated. This is true for any size of animal livestock operation, even with successful air quality BMPs in place or with production methods which minimize air quality impacts. Similar to federal air emission reporting requirements, state air emission reporting requirements include the reporting requirements in ch. NR 445 and the annual air emission reporting requirements of ch. NR 438. Air emissions from animal feeding operations are not categorically exempt from these reporting requirements.

The proposed facility, as with any source of air pollution, is required to evaluate existing information and determine its air emissions, and comply with any air regulatory requirements that apply. The Department also believes it does not have the authority to require air quality monitoring.

Richfield Dairy plans to cover its main manure storage facility and exhaust emissions through a biofilter to minimize potential air emissions associated with manure storage. Covering manure storage is expected to reduce odors and air emissions associated with covered manure storages. It is uncertain how other uncovered manure storage, solids separation and storage, and subsequent land application will impact odor and air emissions overall. Land application BMPs identified by the Agricultural Waste Air Emissions Advisory Group in its December 13, 2010, report, include injection, followed by immediate and rapid incorporation (less than 12 hours), and band spreading.

Dust from gravel driveways may be generated during periods of high traffic during construction. The driveways will be maintained during the construction phase and watered as required to minimize dust. After construction, driveways will be paved with asphalt.

II.E.4.c Groundwater Monitoring Structures & Equipment

The proposed and finalized WPDES permit contains permit conditions that protect groundwater and surface water and are consistent with ch. NR 243, Wis. Adm. Code, the code that establishes permit requirements for CAFOs throughout the state. To address these unique site conditions for this operation, the Department also added the following site specific permit conditions within the permit.

For the production area:
The permittee has designed some production area structures above current design standards. However, given that the sandy soils present at the production area are porous in nature, there is an increased risk of groundwater impacts at the site. For this facility, additional monitoring requirements (groundwater monitoring wells, leak detection) are warranted to determine if manure and process wastewater structures/systems have been constructed and are operated properly. The following changes were made to the permit to reflect these concerns.

- Section 2, “Production Area Monitoring Requirements,” has been added to the permit requiring the installation and monitoring of groundwater monitoring wells for the production area. In addition, chemical monitoring of the leak detection systems installed underneath the Attenuation Basin and Sweet Corn Silage Bunkers is being required.

- A construction schedule (section 3.3 “Production Area Monitoring-Groundwater Monitoring Well Installation) has been added to the “Schedules” section of the permit outlining the timing of the required installation of groundwater monitoring wells at the production area.

- Section 4.2, “Groundwater Standard Requirements,” has been added to the Standard Requirements of the permit associated with the groundwater monitoring requirements.

As part of the high capacity well approval, the applicant must also install a piezometer (a deeper monitoring well with a short screened interval, completed in sandstone bedrock), nested with a monitoring well downgradient of the high capacity wells. This piezometer is in addition to the eight water table monitoring wells required in the WPDES permit. The applicant must collect monthly water level information from all of the monitoring wells and the piezometer and submit collected information to the Department’s Water Use Section on an annual basis.

Additional information can be found in Section I.D.1.

III Authorities & approvals

III.A Department of Natural Resources

The Department has the following authorities regarding this operation:

- WPDES Permits for large Concentrated Animal Feeding Operations (CAFO), i.e. those operations with 1,000 AU 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 storm water 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 Richfield 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 March 16, 2011 and renewed on January 27, 2014.

- 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 approvals are required for properties with the capacity to withdraw groundwater at a rate of 70 gallons/minute or more, s. 281.34, Wis. Stats. An approval for two high capacity wells was issued November 2011; a modified

approval was issued March 2013.

The Conditional High Capacity Well Approval, dated March 13, 2013, limited the total withdrawal of the two high capacity wells to 72.5 million gallons per year. The approval also limited withdrawal from the two wells to 21.6 million gallons in any 30-day period and required monthly water level monitoring from water table monitoring wells and one piezometer in the production area. The authorized withdrawal amount was limited to 52.5 MGY by the ALJ. A second modified High Capacity Well Approval reflecting this reduction in the annual pumping limit was issued March 12, 2015. Any increased withdrawal over the approved amount would require a new high capacity well application, subject to DNR approval.

The 2013 well approval is a modification of an earlier approval issued in 2011. Richfield Dairy's 2011 high capacity well application requested a combined total pumping capacity of 1000 gallons per minute (gpm) or 525.6 million gallons per year (MGY) from its two wells. The November 2011 high capacity well approval restricted the maximum total gallons pumped from the two wells in any 365-day period to 131.2 million gallons. In information submitted for the preparation of the 2011 Environmental Assessment, Richfield Dairy had estimated its annual water use amount to be 52.5 MGY. On July 27, 2012, after re-evaluating water needs, Richfield Dairy requested that the total annual pumping withdrawal for the high capacity wells be limited to 72.5 million gallons per year. This is the annual pumping amount for which the 2013 well approval was granted, and later limited by the 2015 well approval to 52.5 MGY.

- 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.

- Under ch. NR 856, the dairy must register its water withdrawal and annually report its monthly water withdrawals. This is a state-wide requirement for all water users with the capacity to withdraw more than 100,000 gallons per day. (Note: Because

the Great Lakes Compact defines that Great Lakes Basin based on the surface water divide and Richfield Dairy is west of that divide, within the Mississippi River Basin, the withdrawal is not considered a diversion under the Great Lakes Compact and does not require a water use permit.)

III.B Other Wisconsin agencies

The Department is not aware of any other state authorities.

III.C County & local

To the best of our knowledge Adams County requires:

- Construction Site Erosion Control and Storm water Management permit (ss. 17.09 and 17.10)—permit # SE-79 issued 9/8/08
- Conditional Use Permit for the operation with 500 or more AU
- Sanitary Permit

III.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).

IV Existing environment

IV.A Physical environment

IV.A.1 Area

IV.A.1.a Location & Size

The Richfield Dairy is located in Adams County in the Little Roche-A-Cri Creek watershed. The Little Roche-A-Cri Watershed has portions located in Adams, Waushara and Marquette Counties. The dairy is about 1.1 miles *west* of the subcontinental divide, in the Mississippi River basin. The dairy (and proposed wells) are about 0.4 miles *east* of the regional groundwater divide. Groundwater in the vicinity generally flows to the southeast.

Figure 6 Regional Watersheds

IV.A.1.b Topography

Richfield Dairy is located in Adams County. Adams County is in the Wisconsin Central Plain, which is characterized by flat or gently undulating topography. This region is often referred to as the Central Sands region and/or the Central Sand Plain of Wisconsin. Relief is generally low except for occasional pinnacles and hills of sandstone such as Friendship Mound and Roche-A-Cri Mound.

The eastern edge of the dairy is less than one mile west of the Johnstown moraine, a north-south trending glacial feature that forms a narrow ridge rising as much as 120 feet above the sand plains. West of the moraine, in the vicinity of the dairy, sediments were primarily deposited by Glacial Lake Wisconsin or glacial meltwater. Topography east of the ridge that forms the edge of the moraine is hummocky; this terrain formed as the result of the collapse of sediments deposited on glacial ice. There are a number of seepage lakes in the hummocky moraine. These lakes have no surface water outlet or inlet, and water levels are controlled to a large degree by the elevation of the water table.

IV.A.1.c Soils

The predominant soil types within the area of the Richfield Dairy facility consists of Billett Sandy Loam and Coloma Sand. The Billett series consists of deep, well drained soils on outwash plains. The soils formed in loamy and sandy outwash deposits. The Coloma series consist of deep, somewhat excessively drained, rapidly permeable soils on outwash plains and moraines. The soils formed in sandy glacial till or outwash plains and moraines. There are no documented karst areas in Adams County.

Recharge rates in the vicinity of the property are relatively high because of the coarse-grained surficial sediments. Average annual precipitation based on the last 30-years of record at the Hancock Agricultural Research Station, located about 9 miles north-northeast of the dairy, is about 31 inches per year and about one-quarter to one-third of precipitation is estimated to infiltrate into the subsurface and recharge the groundwater aquifers (Mechenich and others, 2009; Bradbury and others,1992).

IV.A.1.d Geology

Bedrock geology in the Central Sands near Richfield Dairy consists of Cambrian sandstone of the Mount Simon formation overlying an impermeable basement of Precambrian igneous and metamorphic rock. The Mount Simon Formation is generally a well-rounded, medium-grained sandstone. The sandstone bedrock surface is very irregular with a number of sandstone mounds extending to the surface in the area. In the vicinity of the Richfield Dairy its thickness is estimated to be about three hundred feet. A variety of generally sandy Pleistocene materials overlie bedrock. Unconsolidated deposits are estimated to be 170 feet thick in the vicinity of the dairy.

The Richfield Dairy facility would be located in a broad, flat outwash plain bordered on the west by the Wisconsin River and on the east by the Johnstown Moraine, a north-south-trending ridge about 1 mile to the east of the facility. The outwash deposits are sand and gravel overlying silty and clayey lacustrine deposits laid down in old glacial Lake Wisconsin. East of the terminal moraine, topography is hummocky and surficial geology is generally more variable than within the sand plain. Glacial deposition was the source of the unconsolidated materials, which generally consist of sandy tills interbedded with finer-grained materials.

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

Wetlands

Mapped wetlands in the vicinity of Richfield Dairy are shown in Figure 11. The mapped wetland nearest to the dairy is approximately 1.5 miles northwest of the proposed wells. This wetland is categorized as a grazed emergent/wet meadow and is part of the eastern edge of a large wetland complex adjacent to the unnamed headwater streams of Little Roche a Cri Creek. The wetland complex is a mix of forested, scrub/shrub, and emergent/wet meadow wetlands. The Little Roche a Cri wetlands are located in an area of concentrated irrigation (6 irrigation wells within 1 mile of the wetland area nearest to the dairy), and there is likely to be existing wetland drawdown from current groundwater withdrawals in the area (discussed in Section V.A.3).

Several wetlands near Pleasant Lake, about 2.8 miles east of the dairy site, were considered during the course of the environmental review for this project. The largest and most diverse of the Pleasant Lake wetlands is adjacent to Turtle Bay, in the southwest corner of the lake. The Turtle Bay wetland has an area of 0.75-1 acre. The wetland has been present since before the 1930s and was possibly dredged at some point in the past (spoil piles are present adjacent to the wetland). The wetland is connected to the main body of the lake by a shallow, linear channel, which also may have been dredged in the past. The Turtle Bay wetland is fed by groundwater, as is all of Pleasant Lake. The wetland supports a diverse community of wetland flora (tussock sedges, bullrushes, blue-flag iris, chara, etc.) and fauna (insects, frogs, turtles, waterfowl). Fish, including Banded Killifish, a state Special Concern species, are found in the Turtle Bay wetland, as well as in other parts of the lake. Eurasian Water Milfoil, an invasive species, is found in the open-water section of the wetland.

Two other small wetlands near Pleasant Lake were also evaluated, one at Camp Fairwood on the south side of the lake, and one on the north side of the lake ("Duck Box"). The Camp Fairwood wetland is a naturally formed, ephemeral pond, approximately 65 feet wide. Based on ordinary high water mark, the pond's maximum annual water depth is approximately 30 inches in spring and declines throughout the remainder of the year. The main plant species is reed canary grass (an invasive), although native plant species are also present. Wildlife (ducks, frogs, turtles) makes use of the wetland habitat. The Duck Box wetland is a small dredged pond on the north side of the lake, dominated by reed canary grass. Waterfowl and frogs make use of the wetland. Both wetlands appear to receive groundwater inputs but naturally dry down during the course of the year.

The other wetland area that was evaluated in connection with the Richfield Dairy review is adjacent to the Chaffee Creek spring pond. Groundwater discharge in the vicinity of the spring pond is described in the Springs section, below. The wetland area adjacent to the spring pond includes areas of mapped scrub/shrub and emergent/wet meadow wetland types, and a high quality, intact calcareous fen. Calcareous fens are a rare, groundwater-dependent wetland type with highly alkaline soil conditions. The main fen is located on the north side of the spring pond, and there is also a small area of fen on the south side of the pond. Several fen indicator species are present, including tufted

hair grass, a state Special Concern species. Under the Wisconsin Rapid Assessment Methodology, the current condition of the Chaffee Creek spring pond wetland is exceptional. Expert testimony at the contested case hearing indicated that wetland plants in some upslope areas of the Chaffee Creek spring pond wetland area were observed to be experiencing stress, possibly due to existing water table drawdown.

Springs

A large spring is located 3.5 miles east of the proposed well site, at the headwaters of Chaffee Creek. The Chaffee Creek spring is the only large spring (>1 cfs) mapped within 5 miles of the proposed Richfield Dairy. The spring pond is located within a steep-sided glacial valley, with numerous seeps along the northern and southern hillslopes. Groundwater seeps from the hillslope one to two feet above the elevation of the pond and also discharges as boils within the 2.5-acre spring pond. Fish species found in the spring pond include Brook Stickleback, Least Darter (a Special Concern species), Northern Redbelly Dace, and Mud Minnow.

The Wisconsin Springs Inventory estimated the spring's flow to be approximately 2 cubic feet per second (cfs), in August, 1963. In July of 2003, flow at a monitoring station roughly 3,800 feet downstream of the headwater spring was 1.2 cfs. Springs in general naturally experience a wide range of flow, so it is not possible to estimate changes in the typical flow over time based on only two measurements.

The Chaffee Creek spring pond is the only large spring mapped in the area and the only spring specifically reviewed. However, DNR's analysis of impacts to surface waters also assumed that the streams and seepage lakes in the area are groundwater-fed (small springs and seepages), even if no concentrated springs are mapped. The Department is aware that the fisheries and water quality of nearby streams depend on groundwater flow to maintain habitat for thermally sensitive fish species and macro-invertebrates, and that lake chemistry is dependent on groundwater inputs. These factors were considered during the review of potential impacts.

Streams

The following streams are located within five miles of the proposed wells:
Unnamed headwaters of Little Roche-A-Cri Creek (~2.5-2.9 miles northwest and west), Little Roche-A-Cri Creek (4.6 miles west-northwest), Fordham Creek (4.5 miles west-southwest), Chaffee Creek (3.5 miles east), and Tagatz Creek (3.5 miles southeast). All of the named streams are Class I or II trout streams; Little Roche-A-Cri and Fordham Creeks are Exceptional Resource Waters, and Chaffee and Tagatz Creeks are Outstanding Resource Waters. The streams are categorized as either cool-cold or cold, and water levels fluctuate seasonally.

Little Roche a Cri Creek is a clear, hard water stream that has a predominantly sand bottom. Flow is generally in a westerly direction toward Castle Rock Lake. The portion of the stream above Friendship Lake and below State Highway 21 is classified trout water. Historical records from 1979 and 1963 show that navigable water was found within about a mile up or downstream of Highway 21 (4.8-5.5 miles from the dairy). Healthy populations of brook trout were found at Cypress Avenue (sec.25, T18N R6E)

in 2010, and trout migration further upstream is likely. The dominant species is brook trout, although brown and rainbow trout are also present. Fish surveys conducted at Highway 21 in 2003 and 2012 classified the stream's coldwater Index of Biotic Integrity (IBI) as fair and very poor, respectively. (Note that 2012 was a hot, dry summer.) Little Roche a Cri Creek's principal water sources are groundwater seepage and springs and marsh drainage. The stream has over 2,400 acres of adjoining wetland, mostly at the upper end of the stream. Beaver and muskrat are present. Mallard and wood ducks nest along the stream. DNR habitat improvement efforts have included over 350 acres of land purchases, overhead cover installation, and brushing of stream banks.

Fordham Creek is one of the finest Class I trout stream in Adams County, and is unique in that it supports naturally-reproducing populations of brook, brown, and rainbow trout. The stream is a small, westerly-flowing tributary to Little Roche a Cri Creek fed by groundwater seeps and springs and wetland drainage. Siltation and sedimentation are existing problems throughout the stream, resulting in the loss of spawning substrate for fish as well as the loss of valuable pool cover. Several DNR habitat improvement efforts have been completed on Fordham Creek; these have included land purchases of about 50 acres, installation of overhead cover, and brushing the streambank to narrow the channel.

Chaffee Creek is a long, low-gradient cold stream which originates in a large spring pond near Pleasant Lake and flows generally easterly to join the Mecan River. The stream has very good water quality and generally flows over sand. Chaffee Creek is a Class I trout stream over most of its length, including the headwater area. Trout were observed just downstream of the spring pond during an August 2013 site visit.

Tagatz Creek is a long stream with moderate gradient which originates from spring ponds in the terminal moraine south of Pleasant Lake and drains southeasterly to the Montello River. Tagatz Creek is a Class I trout stream.

Lakes

Pleasant Lake is a seepage lake with no surface water inlet or outlet. The lake is located at the border of Waushara and Marquette Counties, about 2.5 miles southeast of the proposed dairy site and 2.8 miles southeast of the dairy's proposed high capacity wells. It is located in an elevated moraine area, higher in elevation than the proposed dairy site, and has a relatively small surface watershed drainage area. Groundwater enters the lake from the west and north and exits to the east and south, feeding the headwaters of Chaffee and Tagatz Creeks.

Pleasant Lake has historically-reported maximum depths of 23.4 feet (June 2012 bathymetry survey), 24 feet (July 1964 bathymetry survey, level recorded during a period of drought), and 30 feet (1996 Lake Management Plan, level recorded during a period of unusually high water). Pleasant Lake has an average depth of 15 feet.

Because Pleasant Lake's water budget is dominated by groundwater, it is relatively well-buffered (pH > 8, alkalinity >100 mg/L) and experiences good water clarity for the most part (average summer water clarity between 8-13 feet from 2009-13; Figure 6,

https://dnrx.wisconsin.gov/swims/public/reporting.do?type=11&action=post&format=html&stationNo=703057. The lake typically stratifies during the open water season, though occasionally experiences overturn in late summer, leading to minor algae blooms. Aquatic vegetation is most abundant in the 3 - 5 foot depth zone, and consists primarily of submerged species, dominated by muskgrass (*Chara sp.*) (data provided by UW Stevens Point). Emergent vegetation and submerged species in the nearshore zone (less than 3 feet) are likely limited due to historical water level fluctuations and shoreland development and associated human activities.

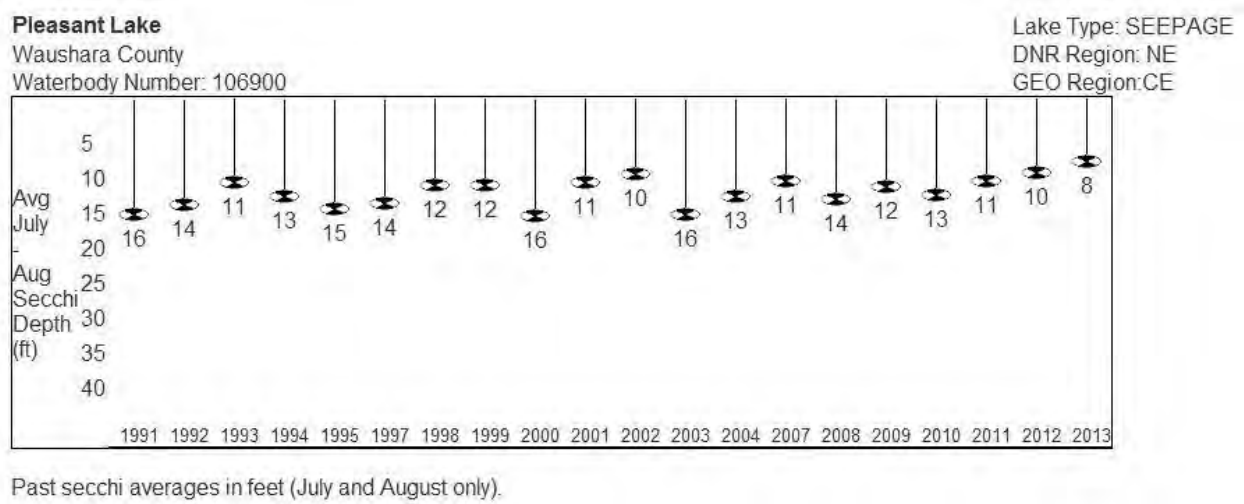


Figure 7 Pleasant Lake Water Clarity Readings 1991-2013

A 1996 Pleasant Lake Management Plan identified several parts of the Pleasant Lake shoreline as "Sensitive Areas". These areas include Turtle Bay (southwest bay), the south shoreline, and the sand and gravel bar extending from the north shore, which provide important spawning and feeding grounds for the lake's fishery. A seining survey was conducted on Pleasant Lake in August of 2013. The most common fish species present (more than 100 individuals caught) were bluntnose minnow, largemouth bass, bluegill, and banded killifish. The banded killifish is a state Special Concern species and is described in Section III.A.1.h. In all, 129 individuals of the killifish were caught during the 2013 seining survey, including 112 adults and 17 young of year. The species was found throughout the lake; the highest concentration of adults and young was found at the sandy point on the north side of the lake.

Based on analysis of air photos from 1992, 2005, 2010, and 2011, Pleasant Lake has a surface area of 130.4-136.7 acres. A 1964 lake survey estimated a lake surface area of 126.5 acres (representing the lake area during drought conditions prior to large-scale irrigation pumping in the area). Evaluation of the bathymetry of Pleasant Lake and historical air photos indicates that for historically-observed lake levels, a one-foot change in lake elevation results in a change of 2 to 5.3 acres in the surface area of the lake.

Water levels in Pleasant Lake are generally an expression of the elevation of the water table. Historic recorded lake levels are shown in Figure 7. For the period of 1964-2012, measured lake levels have varied by 5.5 feet. The oldest recorded lake level was

relatively low (979.61 in 1964). The recorded maximum lake level was 983.75 feet MSL on 7/18/1994; the minimum recorded level was 978.27 feet MSL on 8/3/2007. For 1964-1994, a period during which irrigation pumping was less prevalent than at present, recorded lake levels varied by 4.1 feet. This amount of variation over a period of several decades is typical of a groundwater seepage lake in Wisconsin. On a seasonal basis, water level fluctuations in Wisconsin seepage lakes typically vary by an average of 1.4 feet (Novitski & Devaul; House). The lake level record for Pleasant Lake includes four years with multiple water level measurements, including several measurements for 2012 submitted by the Dairy. These show annual variability ranging from 0.49 to 0.86 feet (5.9 to 10.3 inches). The measurements were not collected to represent maximum and minimum lake levels, but suggest that the seasonal water level fluctuation in Pleasant Lake could be between 6 inches and 1 foot.

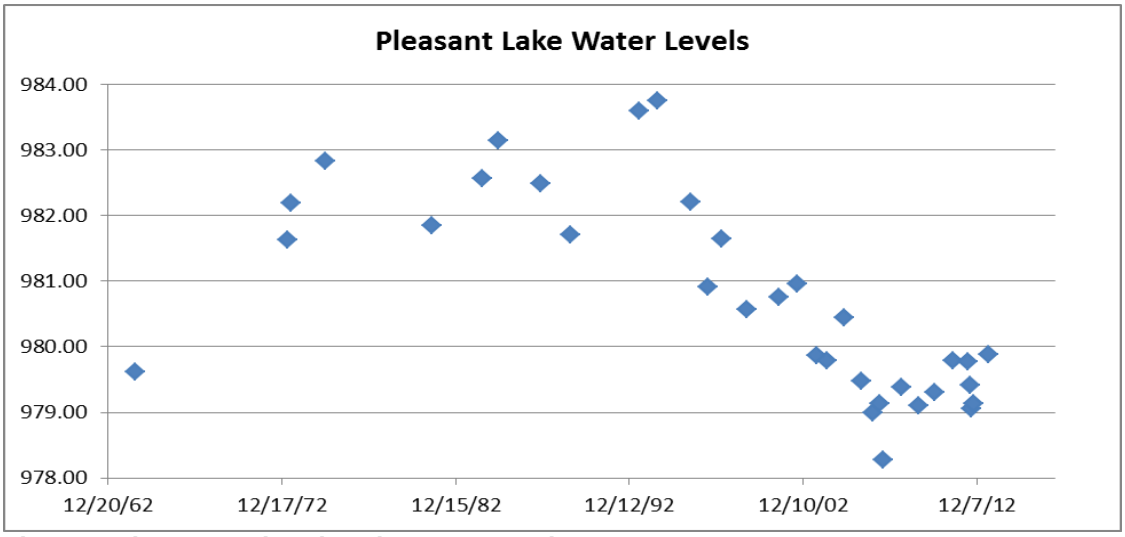


Figure 8 Pleasant Lake Historic Water Levels 1962-2012

Lake Burnita is a 10.5-13.5-acre seepage lake 3.7 miles southeast of the proposed dairy. The maximum depth of Lake Burnita is reported to be 8 feet, and a 1963 water body description reports that the lake experiences winterkill and fluctuating water levels. There is no historical water level record available for Lake Burnita. A reasonable estimate of mean lake depth is between four and five feet, based on regression analysis of depth data from other lakes in Wisconsin.

IV.A.1.f Groundwater quantity & quality

Regional Groundwater Flow and Quantity

The proposed dairy is located on the eastern edge of a relatively flat plain with coarse-grained surface sediments deposited by glacial meltwater streams. The plain is bounded to the east by the Johnstown Moraine, a ridge that represents the westernmost extent of glaciation during the last phase of Wisconsin-age glaciation (Mickelson and others, 2011) and forms the surface water divide between the Mississippi River and Lake Michigan basins. Richfield Dairy is roughly 0.4 miles east of the Mississippi River/Lake Michigan *groundwater* divide, and groundwater at the site generally flows in a southeasterly direction (Figure 9). The aquifer is highly productive and consists of

150-200 feet of sand and gravel overlying about 300 feet of sandstone bedrock of the Cambrian Mount Simon Formation.

Based upon soil borings taken in March, April and November 2010, unsaturated conditions exist to approximately 36 feet below the ground surface (1036.19 MSL) where the extent of high saturation is identified. Construction information from nearby wells indicates that the depth to water at Richfield Dairy is 35-40 feet below ground surface.

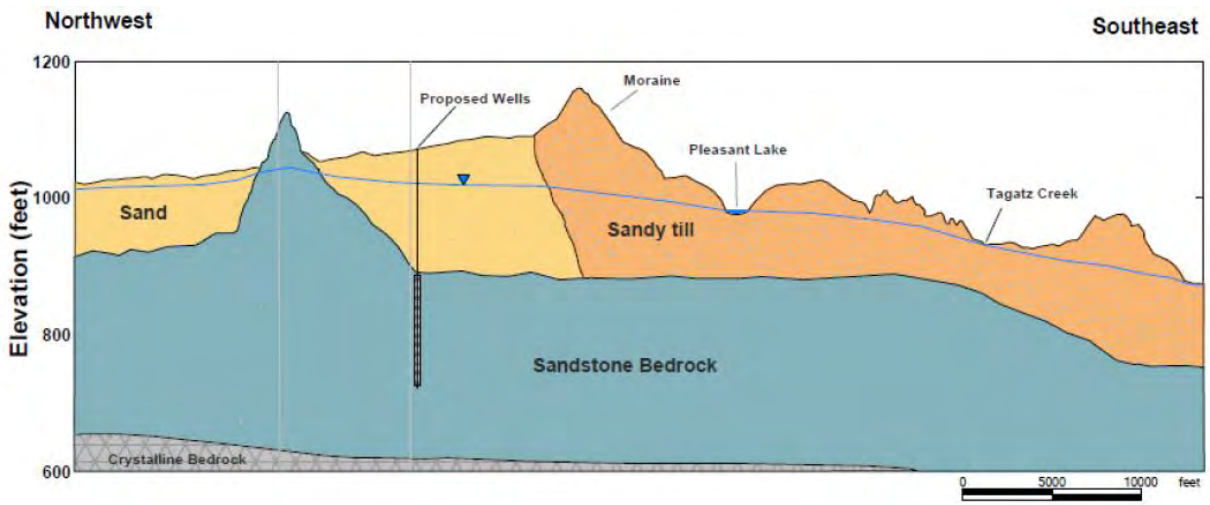


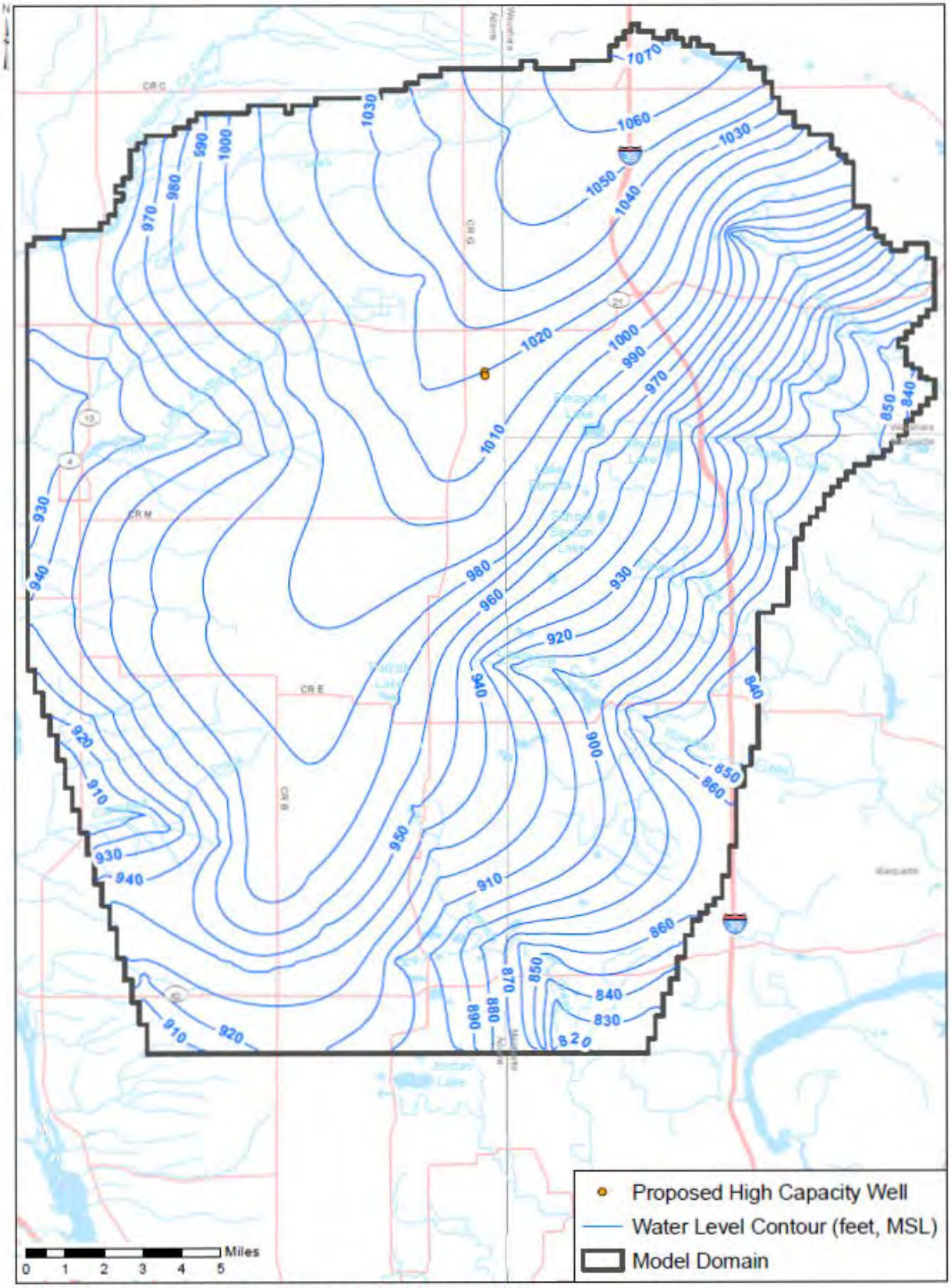
Figure 9 Regional Geology

Groundwater is extensively used in the Central Sands region for irrigated agriculture, and this use has expanded significantly within the last twenty years. Within five miles of the Richfield Dairy property, there are 128 wells with a pumping capacity over 70 gpm, most of which are irrigation wells with capacities of 900-1200 gpm. The majority of the high capacity wells are located in a narrow band on the relatively flat plain just west of the terminal moraine. The amount of water applied to irrigated lands varies based on soil type, crop, and climate conditions, but it is estimated to be as much as fourteen inches per year. Some of the applied irrigation water infiltrates back to the water table as a result of the coarse-grained soils, while the remainder either evaporates or is transpired by crops. On-going research at the University of Wisconsin suggests that irrigation results in an average of 2 inches in recharge reduction compared with perennially vegetated lands (Kraft and others, 2012).

In Adams County, total groundwater pumping for irrigation in 1979 was estimated to be 1.5 billion gallons per year. By 2005, groundwater pumping for irrigation had increased more than tenfold to 17 billion gallons per year. Total groundwater recharge in Adams County is estimated to be about 100 billion gallons per year; therefore, at 2005 pumping rates, about 17 percent of total recharge is being captured by the irrigation pumping.

Recent studies by researchers at the University of Wisconsin-Stevens Point (Kraft and others 2011; and Kraft and Mechenich 2010) have suggested that groundwater use for irrigated agriculture in the Central Sands region has resulted in observable declines in

groundwater levels and lake levels and declines in base flow of headwater streams in the region. In the vicinity of the proposed dairy, the effect of irrigated agriculture on groundwater levels has been estimated to be about a two foot decline in groundwater levels relative to those that existed prior to 1980 (Kraft, 2010). These existing reductions are supported by groundwater modeling from SSPA, which predicts irrigation-related baseflow reductions of between 1% and 30% on various stream reaches in the region (Table 2), an average 0.7 feet of water level drawdown at Pleasant Lake, and 2.8 feet of existing water table drawdown in the vicinity of the dairy facility.



Note: Water levels calculated with groundwter model described in section 5.

Figure 10 Groundwater Contours near Richfield Dairy

Regional Groundwater Quality

The 2011 Little Roche-a-Cri Watershed Plan, which includes the Town of Richfield, assesses regional groundwater quality as follows: The Little Roche-a-Cri Creek Watershed contains the City of Adams and the Village of Friendship. These two municipalities share the same water source. The City of Adams owns three wells, two that withdraw water from the sandstone aquifer and one that draws from the shallower sand and gravel aquifer. Adams, in turn, sells water to the Village of Friendship. The sandstone aquifer, which is protected by a clay overburden, was the traditional aquifer for these communities. The water is of very good quality with the exception of slightly elevated iron and manganese concentrations. Iron and manganese are naturally occurring elements that can cause aesthetic problems such as red, brown or black water, staining of fixtures and clothing, as well as imparting taste and odor to the water.

The City elected to tap the shallower sand and gravel aquifer in the area with their newer Well 4 to avoid problems from iron and manganese. Iron and manganese were successfully avoided, but the shallower sand and gravel aquifer is more susceptible to contamination from the surface. Even though a wellhead protection program was adopted for this well, volatile organic compounds, related to gasoline discharges, have been detected in this well. Concentrations of these compounds remain lower than the Safe Drinking Water Act Standards; therefore, the well remains in use and is monitored on an annual basis.

All three wells are very low in nitrates (less than 1.0 ppm), and fluoride is the only chemical added to the water to optimize the prevention of dental cavities. Chlorination facilities are available if the need for emergency disinfecting was to occur.

The University of Wisconsin Stevens Point Groundwater Task Force conducted well samples in every watershed in the Central Wisconsin Basin for nitrates and triazine. In the Little Roche-a-Cri Watershed, 277 wells were tested for traces of nitrates. Of the 277 wells tested, 13.7 percent of them were over the allowable 10 parts per million for safe drinking water. Of the wells that are over 10 parts per million, 5.7 percent of those wells contained concentration greater than 20 parts per million. This exceeds the basin average by 3.2 percent and is the second highest percentage for concentrations greater than 20 parts per million or greater throughout the entire Central Wisconsin Basin.

Of the 29 wells tested for triazine in the Little Roche-a-Cri Watershed, 3.4 percent of those tested had concentrations over 1.1 parts per billion. None of the samples taken were over 3.0 parts per billion. Since triazine cannot be used to set standards for drinking water limitations it is strongly recommended that if a test result comes back above 1 part per billion of triazine the well should be tested further for total concentrations of atrazine.

In addition, three tables below summarize groundwater sample analyses for nitrate and pesticides in public and private wells located near the production site and land application sites (data from WDNR Groundwater Retrieval Network, WDNR Drinking Water System and UW Stevens Point Center for Watershed Science and Education).

Analysis of samples collected from wells near the production area and land application sites show that about 16% of the private well samples exceeded the Enforcement Standard of 10 ppm. Of those analyses, about 7% were greater than 20 ppm. Sample analytical results from transient community well samples, serving restaurants and churches for example, showed that almost 6% exceeded the Maximum Contaminant Level for nitrate of 10 ppm. It is unknown how many of these transient community wells have been required to treat for nitrate so results may be skewed in that nitrate concentration in groundwater may be higher than sample analytical data collected from faucets where treatment has been installed to meet Safe Drinking Water Act requirements.

Private Wells (DNR)						
Township	Range	No. of well samples	No. <PAL (2 ppm)	No. >=PAL, <ES	No. >=ES (10 ppm)	No.>=20 ppm
20	8	13	5	5	3	2
19	8	28	5	14	9	6
18	8	33	8	19	6	5
14	8	47	24	21	2	0
20	7	9	6	2	1	0
19	7	19	8	7	4	2
18	7	9	2	4	3	1
17	7	15	5	4	6	3
15	7	65	33	29	3	1
14	7	38	15	19	4	2
13	7	23	7	16	0	0
18	6	55	36	17	2	0
15	6	61	35	19	7	1
14	6	77	37	35	5	2
18	5	40	9	25	6	3
15	5	40	22	14	4	0
Total		572	257	250	65	28

Transient Non-community wells (DNR)						
Township	Range	No. of well samples	No. <PAL (2ppm)	No. >=PAL, <ES	No. >=ES (10ppm)	No.>=20 ppm
20	8	7	3	4	0	0
19	8	4	0	2	2	1
18	8	3	2	1	0	0
14	8	11	4	7	0	0
20	7	5	2	0	3	2
19	7	0	0	0	0	0
18	7	0	0	0	0	0
17	7	0	0	0	0	0
15	7	14	12	1	0	0
14	7	8	4	3	1	0
13	7	30	10	20	0	0
18	6	13	13	0	0	0
15	6	5	4	1	0	0
14	6	34	13	19	2	0
18	5	9	3	5	1	0
15	5	18	13	5	0	0
Total		161	83	68	9	3

Private wells (Center for Watershed Science and Education)						
Township	Range	No. of well samples	No. <PAL	No. >=PAL, <ES	No. >=ES	No.>=20 ppm
20	8	13	5	3	5	4
19	8	38	8	15	15	8
18	8	25	8	11	6	3
14	8	11	6	4	1	0
20	7	25	10	3	12	4
19	7	14	6	3	5	3
18	7	22	8	8	6	2
17	7	23	3	8	12	3
15	7	98	66	18	14	5
14	7	16	6	6	4	2
13	7	9	5	3	1	0
18	6	69	47	17	5	1
15	6	18	10	5	3	1
14	6	49	29	19	1	0
18	5	61	28	20	13	9
15	5	2	1	0	1	0
Total		493	246	143	104	45

IV.A.1.g Air quality

Animal agricultural operations generate odors and air pollutants. When localized and insignificant, these odors and air pollutants pose few problems. If enough animals are concentrated together in a small area, air emissions may cause human health and environmental concerns.

Airborne contaminant emissions emitted from CAFO's or other types of animal agricultural operations, include gases and particles. Air quality concerns have focused primarily on ammonia (NH_3), hydrogen sulfide (H_2S), two toxic air pollutants, as well as odors, particulate matter (PM), volatile organic compounds (VOC), and greenhouse gases (GHG). Diesel exhaust PM emissions from semi-trucks, manure spreading, and other miscellaneous farm operations could also be associated with animal agricultural operations.

Emergency generators, other stationary diesel or biogas engines and other combustion sources, such as dryers, will emit pollutants, too. Criteria pollutants (oxides of nitrogen (NOx); carbon monoxide (CO); and sulfur dioxide (SO2)) and incomplete products of combustion are also emitted and formed from the combustion of diesel, biogas or other fuels.

In addition to primary emissions, certain air pollutants are formed through chemical processes in the atmosphere known as secondary formation processes. The secondary pollutants have significant effects. Ammonia reacts with SO2 and nitrogen oxides (NOx) to form PM2.5. VOC and NOx react to form ozone. Nitrogen containing compounds such as ammonia and NOx result in increased nutrient loading and acidification of soils and waters.

Both quantity and the types of air contaminant emissions from animal agricultural operations are challenging to estimate, making off-site air quality impacts difficult to predict. This is due to diurnal and seasonal temperature variation, varying number and type of animal species present (which may change over time), type of housing and manure handling system, feed type, and chosen management practices.

Large amounts of nitrogen are excreted in the production of all animal feces, including dairy, and most excess nitrogen is in a form that is easily transformed into ammonia. Most ammonia is produced when the urea contained in urine comes in contact with the urease enzyme contained in feces (also on barn floors and in soil). Much smaller amounts of ammonia are produced during the decomposition of feces. Nitrogen occurs as both unabsorbed nutrients in animal feces and as either urea (mammals) or uric acid (poultry) in urine.

After contaminants are generated, they can be emitted through animal housing ventilation systems (if used) or emitted from any number of sources including

animal housing and production areas, feed preparation and storage, manure management/storage facilities, mortality composting, land application sites and dispersed by atmospheric processes. Air contaminant travel distance varies due to size of particles, weather conditions and surrounding topography and vegetation. These variations make it challenging to form a clear picture of the expected emissions and emission-related effects from animal agricultural operations.

Regulatory dispersion modeling is predicated on the steady-state nature of the release. Gaussian plume models have been developed to replicate monitored concentrations attributed to industrial or commercial operations, for example a large industrial boiler for generating steam and/or electricity. The release of farm emissions comes from locations (i.e. barns, lagoons) that are unlike a smoke stack. These “fugitive” emissions are able to be modeled, but there is more uncertainty associated with establishing release parameters. The time-varying nature of farm emissions is even more difficult to model. Regulatory models generally assume steady-state emission generation. This implies that over the course of one hour, the emission rate will not significantly change, and that any changes from hour-to-hour are under the control of the operator. Farm emissions vary between hours, within a given hour, and more importantly this variation is chaotic and unpredictable.

Despite the variability of emissions from animal agricultural operations, the nitrogen balance (and ammonia as a part of the balance) has been studied extensively in dairy operations which have integrated cropping systems. Nitrogen excretion from animals varies based on nitrogen feed rates, the nutritional needs of the dry or lactating cows, and how much nitrogen ends up in milk. In Wisconsin and elsewhere, research points to an average annualized total nitrogen loss of 15 percent from freestall housing and losses of incoming nitrogen into uncovered manure storage from 10 to 30 percent loss of nitrogen as ammonia. Estimates based on farm component ammonia losses are presented in the table below. Wisconsin DNR is currently working with an agricultural waste advisory group to examine and recommend beneficial practices that reduce ammonia and hydrogen sulfide air emissions and will work for Wisconsin farms.

The facility is proposing practices which are expected to mitigate air emissions. This includes a floating geomembrane waste facility storage cover combined with a biofilter treating exhaust air from under the cover. Covering the waste facility storage with a properly designed geomembrane cover may reduce air emissions and odors by 90% from the waste storage facility. Appropriate land application techniques should be combined with waste facility storage covers to ensure that air contaminants (and beneficial nutrients) which are prevented from volatizing with waste facility covers are not lost during the land application process.

IV.A.1.h Flora/Fauna/Rare Species

See Central Sand Plains Ecological Landscape:
http://dnr.wi.gov/topic/landscapes/index.asp?mode=detail&Landscape=7

Although there are no rare or endangered species near the Richfield Dairy, some Special Concern species are found in water bodies evaluated as part of the Richfield Dairy EIS. Special Concern species are those species about which some problem of abundance or distribution is suspected but not yet proved. The main purpose of this category is to focus attention on certain species before they become threatened or endangered. There are no laws regulating use, possession or harvesting of Special Concern species.

Banded killifish is a state Special Concern species present in Pleasant Lake (See also section III.A.1.e). Banded killifish are not actively tracked in the Natural Heritage Inventory, the database DNR uses to identify sensitive species during environmental reviews. However, according to DNR records, banded killifish were identified in Pleasant Lake in 1999. Twenty-five individuals were identified in the lake in November, 2012, and 129 individuals were caught during a 2013 seining survey. During the seining survey, killifish were found at almost all stations around Pleasant Lake. The banded killifish generally prefers clear water of bays and quiet backwaters of large lakes and medium to large streams with sparse to no vegetation over gravel, sand, silt marl, clay detritus, or cobble. Spawning occurs from June through mid-August. Threats to the species include artificial water level stabilization, invasive species (such as Eurasian Water Milfoil and Curly-leaf Pondweed), non-point source pollution, habitat destruction due to boating (wave energy), aquatic plant control, and shoreline clearing. Many of these are existing concerns at Pleasant Lake.

Two Special Concern species were observed in the headwater area of Chaffee Creek, 3.5 miles east-southeast of the Richfield Dairy. Tufted Hairgrass was observed in the calcareous fen adjacent to the spring pond. This species grows in wet, sandy, or calcareous soils. In addition, Least Darter was observed in the Chaffee Creek spring pond. Least Darter is a fish species that generally prefers clear, warm, quiet waters of overflow ponds, pools, lakes and streams over substrates of gravel, silt, sand, boulders, mud or clay with dense vegetation or filamentous algal beds. Spawning occurs from late April into July.

IV.A.2 Production site & immediate vicinity

IV.A.2.a Location & Size

The Richfield Dairy (Site) is approximately 152 acres in size while the disturbance area is approximately 117 total acres in size. The land was used for agricultural crops. The proposed Richfield Dairy facility would be located is the southeast corner of the intersection of 1st Drive and Cypress Avenue. The dairy

facility was proposed to house 4300 milking/dry cows and 250 steers for a total of 6270 AU. One milking/dry cow is equivalent to 1.4 AU or a 1,400 pound animal.

IV.A.2.b Topography

Prior to construction, the site was used for agricultural fields. The topography of the project site is a relatively flat plain.

Elevations at the site range from about 1,090 feet above mean sea level (MSL) in the southeast portion of the property to about 1,070 feet above MSL along the northern boundary of the property. The eastern edge of the dairy is less than one mile west of the Johnstown moraine, a north-south trending glacial feature that forms a narrow ridge rising as much as 120 feet above the plain. This ridge represents the westernmost extent of glaciation during the last phase of Wisconsin-age glaciation (Mickelson and others, 2011). The proposed dairy is located on the eastern edge of a relatively flat plain with coarse grained surface sediments deposited by glacial meltwater streams.

IV.A.2.c Soils

Soils are consistent with surrounding landscape. See III.A.1.c. Soils

More soil information can be found at: http://websoilsurvey.nrcs.usda.gov/

IV.A.2.d Geology

Geology is consistent with surrounding landscape. See section III.A.1.d. Geology

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

IV.A.2.e.01 Wetlands

The aerial photo layer of the spreading restriction map shows no evidence of a wetland (Wisconsin state waters) located within the property boundary. Instead, the map shows evidence of a cropped field.

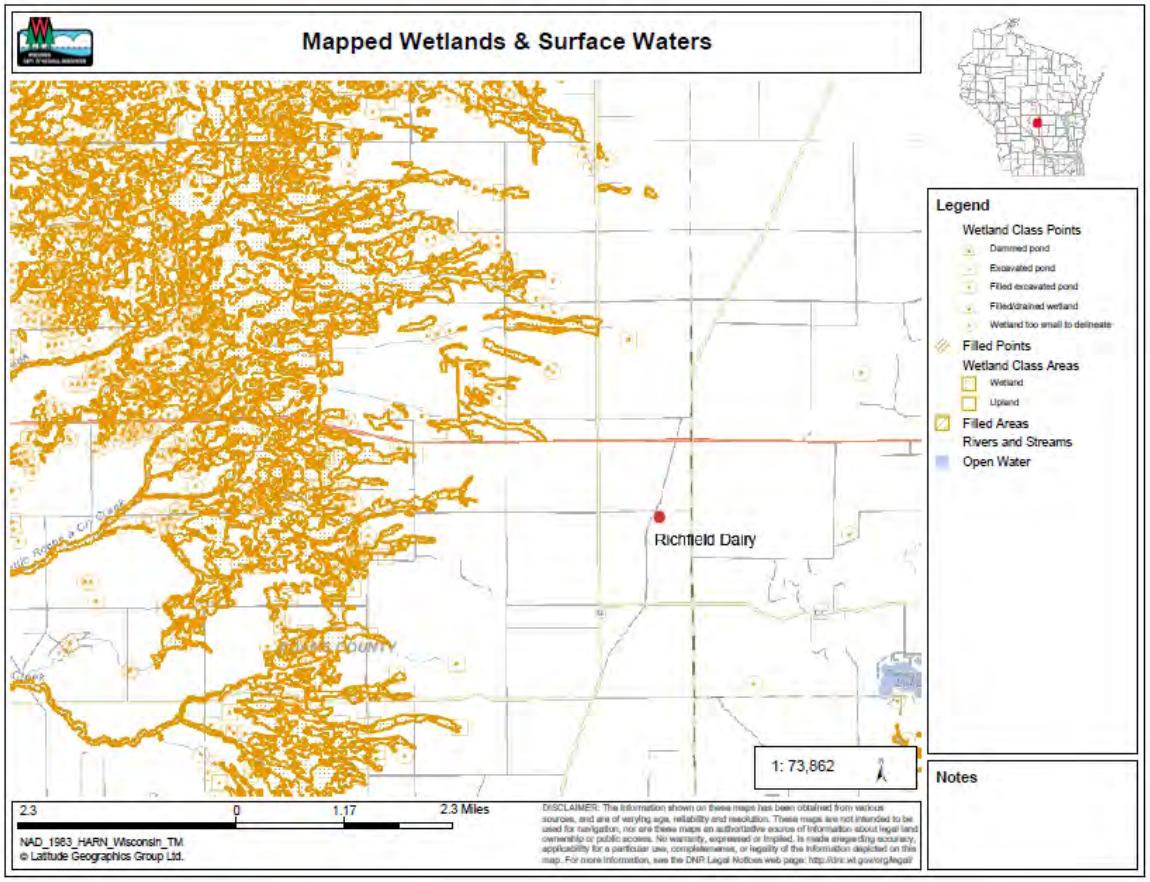


Figure 11 Wetlands & Surface Waters near Richfield Dairy

IV.A.2.e.02 Surface water

The farm site is located in the Little Roche a Cri watershed. No waterways are present at the immediate farm site. Therefore, no Outstanding Resource Waters (ORW) or Exceptional Resource Water (ERW) resource waters will be directly affected. See Figure 11 above.

Livestock at the proposed Richfield Dairy facility will be confined within roofed buildings. Manure generated within these buildings will be transferred to a storage facility, long-term nutrient impacts on wetlands and surface waters from the cattle housing area are not expected.

Proposed manure storage and runoff control facilities at the proposed operation must be built in accordance with currently accepted engineering standards to minimize the risks of ground and surface water contamination. Plans and specifications for proposed facilities must be reviewed and approved by Department staff prior to construction.

Current regulations require that there be no discharge of pollutants from any manure storage facilities, outdoor animal lots, composting and leachate

containment systems, milking center wastewater treatment/containment systems, raw material storage areas, or other area of the operation to navigable waters, except in the event of a 25-year, 24-hour rainfall event. In addition, current regulations prohibit (1) overflow of manure storage facilities, (2) direct runoff from a feedlot or stored manure to waters of the state, (3) unconfined manure piles/stacks in water quality management areas, and (4) unlimited access by livestock to waters of the state in locations where high concentrations of animals prevent maintenance of adequate sod cover.

WPDES permitted CAFO facilities are required to adhere to very stringent requirements. The Department believes the permit as issued complies with ch. NR 243 and provides an adequate level of water quality protection. The Richfield Dairy facilities have been designed in a manner that exceeds NRCS Technical Standards to further reduce the potential of leaching. The manure storage facilities were also designed to exceed the 180-day storage capacity requirement, which also includes additional freeboard capacity to capture a twenty-five year rain event and prevent an overflow. It is important to note that an allowed overflow discharge to surface waters from the production area is very unlikely given the conditions contained within the WPDES permit. In addition, the only allowable land application discharges of manure, process wastewater or associated pollutants (e.g. nitrogen, phosphorus) from Richfield Dairy to surface waters are discharges of agricultural storm water (those discharges that occur after compliance with ch. NR 243, the WPDES permit and an approved nutrient management plan) which are not subject to WPDES regulation.

For WQBELs for the production area, for any authorized discharge, the permit requires compliance with state water quality standards and ground water standards. This satisfies the requirements in s. 283.13(5), Stats. Also, the Department has added language that prohibits any discharges from the production area to a 303(d) listed water (Reference Section 1.1 below). As for the land application areas, the Department cannot apply WQBELs to agricultural storm water runoff.

IV.A.2.f Groundwater quality & quantity

Two high capacity wells have been approved for the Richfield Operation. Both high capacity wells will be constructed to a depth of ~350 feet. Based on well construction reports in the area, the static groundwater level at the site is 35-40 feet below ground surface. Both the surficial sand and gravel aquifer and the sandstone aquifer, where the dairy wells will be completed, are highly productive.

The two planned manure storage facilities will be designed to meet appropriate USDA- NRCS design standards to ensure that groundwater impacts do not occur, and the proposed facility will have to meet these guidelines as well.

Quantity

One high capacity irrigation well exists on the proposed Richfield Dairy facility property. As a condition of the Dairy's high capacity well approval, the existing well would be abandoned prior to facility construction. Based on reported pumping for 1978-1980, 1982-1989 and 2007-2014, the historical average pumpage of the existing irrigation well is 40.6 million gallons per year (MGY). The lack of pumping data for 1981 and 1990-2006 reflects the fact that owners of high capacity wells were not required to report pumping data during that period. Pumping for the most recent period of record-keeping (2007-2013) averaged 57.3 MGY.

On an *annual* basis, the dairy's maximum approved groundwater withdrawal of 52.5 MGY constitutes an 8% decrease over past pumping for the 2007-2013 period, or a 29% increase over the average for all years on record.

Under Ch. NR 142, Wis. Adm. Code, water losses from dairy farming are assumed to be 90%, while water losses from irrigation are assumed to be 70%. Past annual water loss from the irrigation well (for years with records) has averaged 28.4 MGY. Water loss for the proposed wells could be up to 47.3 MGY at the maximum approved annual pumping rate.

Quality

The two planned manure storage facilities will be designed to meet appropriate USDA-NRCS design standards to ensure that groundwater impacts do not occur, and the proposed facility will have to meet these guidelines as well.

WPDES permitted CAFO facilities are required to adhere to very stringent requirements. The Department believes the permit as issued complies with ch. NR 243 and provides an adequate level of water quality protection. The Richfield Dairy facilities have been designed in a manner that exceeds NRCS Technical Standards to further reduce the potential of leaching. The manure storage facilities were also designed to exceed the 180-day storage capacity requirement, which also includes additional freeboard capacity to capture a 25-year, 24-hour rain event and prevent an overflow. It is important to note that an allowed overflow discharge to surface waters from the production area is very unlikely given the conditions contained within the WPDES permit. In addition, the only allowable land application discharges of manure, process wastewater or associated pollutants (e.g. nitrogen, phosphorus) from Richfield Dairy to surface waters are discharges of agricultural storm water (those discharges that occur after compliance with ch. NR 243, the WPDES permit and an approved nutrient management plan) which are not subject to WPDES regulation.

As previously noted, the two proposed Waste Storage Ponds, feed storage pad and separated manure solids stacking area, will have an 8" compacted clay liner in addition to a concrete base. The sweet corn feed pad consists of a 24" compacted clay liner under an 8" drainage layer which is under 8-inches of

concrete. The applicant has not yet determined where the estimated ~32,000 cubic yards of clay needed for these structures will be acquired. Richfield Dairy will follow any natural resource laws that may pertain to how and where the clay is obtained.

For WQBELs for the production area, for any authorized discharge, the permit requires compliance with state water quality standards and ground water standards. This satisfies the requirements in s. 283.13(5), Stats. Also, the Department has added language that prohibits any discharges from the production area to a 303(d) listed water (Reference Section 1.1 below). As for the land application areas, the Department cannot apply WQBELs to agricultural storm water runoff.

1.1 Production Area Discharge Limitations

The permit for the project requires that the permittee comply with the livestock performance standards and prohibitions in ch. NR 151. In accordance with s. NR 243.13, the permittee may not discharge manure or process wastewater pollutants to navigable waters from the production area, including approved manure stacking sites, unless all of the following apply:

- Precipitation causes an overflow of manure or process wastewater from a containment or storage structure.
- The containment or storage structure is properly designed, constructed and maintained to contain all manure and process wastewater from the operation, including the runoff and the direct precipitation from a 25-year, 24-hour rainfall event for this location (**Adams County – 4.7 inches**).
- The production area is operated in accordance with the inspection, maintenance and record keeping requirements in s. NR 243.19.
- The discharge complies with surface water quality standards. For all new or increased discharges to an ORW or ERW, any pollutant discharged shall not exceed existing levels of the pollutant immediately upstream of the discharge site. For any new or increased discharge to other fish and aquatic life waters, the discharge shall not cause a significant lowering of water quality under chapter NR 207, Wis. Adm. Code.

A permittee may not discharge any pollutants from the production area to a 303(d) listed surface water if the pollutants discharged are related to the cause of the impairment, unless the discharge is allowed under a EPA approved TMDL.

All structures shall be designed and operated in accordance with ss. NR 243.15 and NR 243.17 to control manure and process wastewater for the purpose of complying with discharge limitations established above and groundwater standards.

The permittee may not discharge pollutants to navigable waters under any circumstance or storm event from areas of the production area, including manure

stacks on cropland, where manure or process wastewater is not properly stored or contained by a structure.

Production area discharges to waters of the state authorized under this permit shall comply with water quality standards, groundwater standards and may not impair wetland functional values.

NOTE: Wastewater treatment strips, grassed waterways or buffers are examples of facilities or systems that by themselves do not constitute a structure.

IV.A.2.g Air quality

Production site air quality similar to Area air quality information can be located in Section III.A.1.g.

IV.A.2.h Flora & Fauna

The immediate project area and proposed land spreading sites are existing cropland and would be expected to provide habitat primarily for common vegetative species acclimated to farm operations.

IV.A.2.i Rare Species

The Department conducted an on-site review within the project area where the facility is to be constructed as well as at all road access locations. No lupine was found at these locations. The site review focused on the specific area where construction activities would occur. Land spreading sites were not reviewed for Lupine, as the proposed land use for these fields will remain for agricultural crop production.

IV.A.3 Manure spreading/irrigation sites

IV.A.3.a Location & Size

Richfield Dairy owns a total of 1,044.8 spreadable acres and has NMP subscription agreements for an additional 15,245.5 spreadable acres (see summary table, Section I.B.). . Detailed maps and other documents that describe manure spreading locations (fields) and sizes (acreage) are in the Richfield Dairy Nutrient Management Plan (NMP).

No applications are planned during frozen or snow covered ground conditions. The 2011 NMP approved by the Department identifies eleven fields, totaling 831 spreadable acres, for emergency winter spreading of liquid or solid manure.

These fields were evaluated and found to be in compliance with NR 243.14 (6-8) winter spreading requirements. Subsequent NMP versions (2013 and 2014) received and approved by the Department did not identify these same eleven fields for emergency winter spreading.

The nutrients from Richfield Dairy's manure and process wastewater are meant to replace, not add, to the nutrients that are placed on area crop fields. Fields previously not covered under an NMP that receive Richfield Dairy manure will be covered under an NMP. The associated nutrient budgeting that goes along with an NMP, particularly under NR 243 and a WPDES permit, may result in decreased nutrient loading to area surface waters and groundwater. The Department is obligated by law to review a given proposal to determine if the proposal can meet the standards and any prescribed conditions of a permit or approval. If a proposal can meet permit requirements, we are obligated by law to issue the permits and approvals.

The 2014 Richfield Dairy NMP, reviewed and approved by the Department, describes 4% of the16,290.3 spreadable acres are planned with a alfalfa/perennial forage crop. The remaining 96% is planned with annual crops such as corn grain, corn silage, potato, winter wheat, snap beans and sweet corn. With respect to fields, not acreage, 15% of the fields are planned for alfalfa/perennial forage and 65% of the fields with annual crops are planned to have cover crops. If annual crop fields (with or without cover crops) receive liquid or solid manure, the manure will be applied prior to planting and immediately incorporated or injected. If alfalfa/perennial forage crop fields receive liquid or solid manure, the manure will either be surface applied on the established forage crop or will be applied prior to planting and will be immediately incorporated or injected.

Monitoring under 283.55(1) applies to end-of-pipe discharges. Because of the unpredictable nature of field runoff and the difficulty in obtaining representative samples, the CAFO WPDES permit program relies on implementation of BMPs in lieu of discharge monitoring.

IV.A.3.b Topography

Topography is consistent with surrounding landscape. See III.A.1.b. Topography

IV.A.3.c Soils

Soil wind erosion within the Central Sands area is a concern. The Department does not have regulatory authority to address wind erosion. However, the introduction of alfalfa crops and cover crops into the cropping rotation will result in a reduction of wind erosion within those specific fields.

Nitrogen containing compounds are generated during the manure application process and will result in an increased nutrient loading to soils, acidification of soils and groundwater above current conditions. However, the Richfield Dairy NMP contains several required nutrient / manure management practices that, taken together, help reduce the risk for nutrient loading above crop fertility needs and further reduces the rate, scope and/or frequency of soils and water acidification. These practices include requirements to regularly test all crop fields for soil P, K, and pH levels and plan appropriate management practices to prevent over application of nutrients. Practices include lime applications to reduce soil acidification, immediate incorporation or injection of liquid manure, regular calibration of spreading equipment to ensure that application rates reflect the UW recommendations for crops selected and the planned application of manure in the spring, prior to crop establishment. Spring application prior to crop establishment on highly permeable soils reduces the risk for N mineralization and leaching from applied manure as opposed to fall manure applications. The NMP also includes detailed manure spreading and soil restriction maps of all fields covering more than 16,000 spreadable acres, including field and map verification procedures to ensure that all manure spreading setbacks are properly followed and s. 243.14 prohibited areas (shallow groundwater, conduits to groundwater) are followed or avoided when fields are utilized for manure application.

IV.A.3.d Geology

See section III.A.1.d.

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

Waterways and wetlands are present within the vicinity of the 16,290.3 acres of available spreading area. Streams within 0.5 miles of spreading sites include Big Roche a Cri Creek, Carter Creek, Little Roche a Cri Creek, Fordham Creek. Mason Lake, an impoundment of the South Branch of Neenah Creek, is also within 0.5 miles of spreading sites.

The land application of manure on area cropland poses the greatest risk of environmental impact if it is not done properly. Impacts from nutrient loadings, biochemical oxygen demand and ammonia are water quality concerns with surface waters. Since this operation will require coverage under a WPDES permit due to its size, landspreading of its manure is regulated in accordance with a Department approved NMP. The NMP can be an effective tool to proactively address possible problems that would otherwise be associated with poor manure landspreading activities. Following conditions in the NMP for setback distances, appropriate application rates, timing and record keeping should result in direct benefits to the environment.

It is not clear if wetlands shown adjacent to field boundary are conduits to surface waters and require 300 ft SWQMA boundary spacing because it is not clear the wetland on the map discharges *via channelized flow* to navigable waters. NR 243.03(14) defines conduits to navigable water to mean a natural and man-made area or structure that discharges to a navigable water *via channelized flow* (italics added by DNR).

For the land application areas, the WPDES permit establishes application restrictions and BMPs designed to keep pollutants on the land. Through permit coverage, all land application activities must be done in conformance with a nutrient management plan. In most cases, once a parcel of cropland comes under a chapter NR 243 based nutrient management plan, there will likely be a reduction of pollutant runoff from that parcel of land. This is due to the fact that cropland not previously covered under a nutrient management plan will, through permit coverage, become subject to more (water quality) protective management practices required by the WPDES permit program. Manure applications cannot exceed crop need and must be made in a responsible manner. Facilities must observe manure application set back requirements from private wells, conduits to groundwater and within defined surface water quality management areas (SWQMA). Manure applications are restricted during snow covered and frozen ground conditions. In addition to these stringent requirements, the proposed operation will be applying nitrogen contained in manure (where the nitrogen is less mobile than is true for liquid commercial fertilizer).

IV.A.3.f Groundwater quantity & quality

Quantity

The majority of the land spreading area is on irrigated agricultural land. There are approximately 150 existing or approved irrigation wells on land proposed for manure spreading. No change in groundwater use for irrigation is anticipated due to the Richfield Dairy project.

Quality

According to driller construction reports, groundwater depth near the production area and land application sites varies between 1 and 192 feet below the ground surface with 89% of the wells showing static water level in wells at 10 feet or greater below the ground surface. It indicates that there may be shallow groundwater in areas near land application sites. Under NR 243, there must be a two foot separation between the ground surface where manure is applied and groundwater as measured in a hole dug just prior to manure application. There is debate over whether this separation is adequate to protect groundwater in all circumstances. Research on this topic is ongoing.

The Department agrees that the Richfield Dairy NMP depicts planned manure spreading on many fields that contain sandy, highly permeable soils. These soils, in general, have a higher risk for leaching of nitrates and other pollutants to groundwater.

With respect to groundwater contamination, in general, commercial N has a higher risk for leaching nitrate nitrogen into groundwater than manure. Currently, commercial N is used to meet all crop nutrient needs for all acres within the Richfield Dairy NMP and it cannot be confirmed if this commercial N is being applied consistent with an NRCS 590 standard NMP and UW crop recommendations.

IV.A.3.g Air quality

Air qualities for manure spreading/irrigation locations are similar to Section III.A.1.g.

IV.A.3.h Flora

Provided manure land-spreading is limited to existing croplands and application practices avoid increased nutrient loading to surface waters (see *III.A.3.e.—Hydrography & surface water quality & quantity)*, no serious threat to sensitive resources in the vicinity would be expected. Therefore, long-term significant impacts on terrestrial animals and vegetation are not expected.

IV.A.3.i Fauna

Provided manure land-spreading is limited to existing croplands and application practices avoid increased nutrient loading to surface waters (see *III.A.3.e.—Hydrography & surface water quality & quantity)*, no serious threat to sensitive resources in the vicinity would be expected. Therefore, long-term significant impacts on terrestrial animals and vegetation are not expected.

Further, the immediate project area and proposed land spreading sites are existing cropland and would be expected to provide habitat primarily for common animal species acclimated to farm operations. Since the farm and land spreading sites are currently used for agriculture, the proposed land use will not change significantly as a result of the issuance of the WPDES permit.

IV.A.3.j Rare species

Provided manure land-spreading is limited to existing croplands and application practices avoid increased nutrient loading to surface waters, no serious threat to sensitive resources in the vicinity would be expected. Therefore, long-term significant impacts on terrestrial animals and vegetation are not expected.

The immediate project area and proposed land spreading sites are existing cropland and would be expected to provide habitat primarily for common animal species acclimated to farm operations. Occasional visits/use by mobile rare species such as Kirkland's warbler, whooping crane, or bald eagle may occur but will not be negatively impacted by such use.

The Department conducted an on-site review within the project area where the facility is to be constructed as well as at all road access locations. No lupine, habitat for the federally listed Karner Blue Butterfly, was found at these locations. The site review focused on the specific area where construction activities would occur. Land spreading sites were not reviewed for Lupine, as the proposed land use for these fields will remain for agricultural crop production.

IV.B Socioeconomic environment

IV.B.1 Area

IV.B.1.a Land use

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

IV.B.1.b Transportation

The physical appearance of the site will change and activity level, noise, traffic, etc. at the farm and surroundings (roads, etc.) will be greater.

IV.B.1.c Zoning

Many parcels near and around the proposed Richfield Dairy are zoned agricultural.

IV.B.1.d Economy

The area's economy will change through an estimated 40 jobs created (projected $1.5M annual payroll) and an increase in the area's tax base from farm improvements. It is also estimated that $16M will annually enter the local economy as a result of added business such as the purchase of services, equipment and feed.

IV.B.1.e Property values & taxes

Real estate values, particularly for those residential properties near the operation, may decrease. Impacts to tourism are difficult to predict and will depend on which, if any, impacts (odors, noise, traffic) occur in areas where people recreate. The statewide EA for a general WPDES permit for dairy CAFOs did not find adverse impacts of CAFOs on tourism. Reference**: Large Dairy Concentrated Animal Feeding Operation WPDES General Permit Large Dairy Concentrated Animal Feeding Operation WPDES General Permit:** http://dnr.wi.gov/topic/EIA/ArchiveTitle.html

The value of housing is based on both the value of the land and the value of the buildings and other improvements to the land. Between 1940 and 2000, median home values in Wisconsin increased from $33,600 to $112,000. Generally, Wisconsin housing values have been consistent with national trends. Land values have gone up primarily due to general demand, but also due to the demand for vacation property. Residential improvements have also increased in value because of increasing house sizes and building quality, both for new houses and for renovations. (Housing Megatrends, UW Extension)

IV.B.1.f Visual

The existing viewshed in the area is flat vast open farmland with the moraine ridge visible to the east.

IV.B.2 Production site

IV.B.2.a Land use

The production site will change from cropland to a confined feeding operation; however, remaining agricultural.

IV.B.2.b Zoning

No zoning changes (currently A-1 agricultural) will be required for the new farm and operation.

IV.B.2.c Archaeological & Historical

No historical, archeological or other cultural resources are known to be present at the farm site or expected to be impacted.

IV.B.2.d Noise & Visual

The physical appearance of the site will change and the activity level, noise and traffic at the farm and surrounding roads will be greater. While the use of the site will remain agricultural, the construction phase of the project will be most noticeable to neighbors located within a one-mile radius of the facility site. At the time Richfield Dairy becomes operational, odors from the facility will also be more noticeable to neighbors. Residents not located within the immediate vicinity of the facility may notice odors on a less frequent basis, particularly during the spring or fall period when the manure storage facility is agitated and the manure is land applied to area fields.

IV.B.3 Manure spreading sites

IV.B.3.a Land use

Since the farm and landspreading sites are currently used for agriculture, the proposed land use will not change significantly as a result of the issuance of the WPDES permit.

V Environmental Effects

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.

V.A Physical environment

V.A.1 Production site

V.A.1.a Production site Topography

Changes to topography for construction activities involved moving existing material around on the site to provide a level surface for construction.

V.A.1.b Production site Soils

For 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.

V.A.1.c Production site Geology

The Geology of the site will not change.

V.A.1.c.01 Production site Hydrography & surface water quality & quantity

V.A.1.c.02 Production site Wetlands

No wetlands are present at the immediate farm site.

V.A.1.c.03 Production site Surface water

The Richfield Dairy (Site) is approximately 152 acres in size while the disturbance area is approximately 117 total acres in size. The land is currently used for irrigated agriculture. Irrigation would cease with facility construction. 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 storm water detention basins, where some of the water will infiltrate into the soil. The relative proportion compared to pre-development conditions has been calculated by the Dairy but is not precisely known.

It is the intent of the WPDES permit for Richfield Dairy to avoid impacts to human health and exceedences of groundwater and surface water quality standards. There are a number of standard WPDES permit conditions as well as additional restrictions specific to Richfield Dairy that provide additional levels of water quality protection beyond what is required of operations that do not require coverage under a WPDES permit. These restrictions have been adopted in part, in response to practices that have resulted in impacts in the past. While these restrictions and the WPDES permit do not completely eliminate the risk for impacts, they significantly reduce the potential for such impacts to occur.

In accordance with s. NR 243.13, Wis. Adm. Code, the permittee may not discharge manure or process wastewater pollutants to navigable waters from the production area, including approved manure stacking sites, unless all of the following apply:

- Precipitation causes an overflow of manure or process wastewater from a containment or storage structure.
- The containment or storage structure is properly designed, constructed and maintained to contain all manure and process wastewater from the operation, including the runoff and the direct precipitation from a 25-year, 24-hour rainfall event for this location (Adams County – 4.7”).
- The production area is operated in accordance with the inspection, maintenance and record keeping requirements in s. NR 243.19, Wis. Adm. Code.
- The discharge complies with groundwater and surface water quality standards.

The Department believes the permit as issued complies with ch. NR 243 and provides an adequate level of water quality protection. The Richfield Dairy facilities have been designed in a manner that exceeds NRCS Technical Standards to further reduce the potential of leaching. The manure storage facilities were also designed to exceed the 180-day storage capacity requirement, which also includes additional freeboard capacity to capture a twenty-five year rain event and prevent an overflow. It is important to note that an allowed overflow discharge to surface waters from the production area is very unlikely given the conditions contained within the WPDES permit. In addition, the only allowable land application discharges of manure, process wastewater or associated pollutants (e.g. nitrogen, phosphorus) from Richfield Dairy to surface waters are discharges of agricultural storm water (those discharges that occur after compliance with ch. NR 243, the WPDES permit and an approved nutrient management plan) which are not subject to WPDES regulation.

<u>Storm water basins</u>

The facility referred to in the plans as “storm water management pond #1” (see Section I.C.6) will receive low concentration contaminated runoff from the feed

pad (after leachate and a significant amount of first flush runoff is collected). The pond will have a concrete liner that meets the minimum design criteria for a manure storage facility, although the runoff is expected to have much lower concentration of nutrients than does manure.

Storm water management ponds #2, #3 and #4 will receive only storm water, such as runoff from building roofs, not in contact with feed materials or manure. These ponds will have earthen bottom, designed in accordance with Wisconsin Construction Standard 1001 Wet Detention Basins, intended to substantially prevent infiltration.

A VTA is required to be designed to maintain overland flow, so infiltration is not a primary means of treatment. As part of the DNR's review, Richfield Dairy's VTA was required to have a minimum 2 ft thickness of soil that is 20% fines (above groundwater and bedrock). However, the DNR acknowledges a VTA does still have potential for infiltration. Because there is significant first flush capture (0.15 inches of precipitation) the runoff is expected to contain relatively low concentration of nutrients. All feed leachate and the 0.15 inches of first flush runoff will be collected and transferred to storage. Only the less contaminated remaining runoff (in excess of 0.15 inches of precipitation) will flow to the storm water management pond #1 and then to the VTA.

<u>Leachate and manure collection and storage</u>
See Section I.E. – Operations for additional information

The Department does not claim that the requirements of a WPDES permit, including the requirement to develop and implement an NMP, will guarantee that water quality will not be impacted. The proposed designs of the facilities and systems exceed minimum design standards and are expected to protect groundwater and surface water to the extent required by law, meaning the production site is not expected to cause exceedance of groundwater or surface water standards. While it is still possible such an event could occur, the DNR acknowledges the need to balance the level of protection with what is deemed likely and reasonable, particularly in light of codified requirements in ch. NR 243. Only limited data exists on failure rates of manure storage impoundment liners, but the data indicates some level of protection above the minimum is appropriate for higher risk sites, such as this one. The DNR believes an appropriate level of additional protection is provided by the proposed designs. In addition, the Department has added a requirement for the permittee to conduct leak detection and groundwater monitoring as part of the WPDES permit.

Richfield 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 was 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.

V.A.1.d Production site Groundwater quality & quantity

Groundwater quality
The proposed Richfield Dairy is located in a region with very productive groundwater aquifers. The aquifers consist of glacial sands and gravels that are estimated to be up to 170 feet thick at the property and underlying Cambrian-age sandstones of the Mt. Simon Formation that are estimated to be about 300 feet thick at the property. This region is often referred to as the Central Sand region and/or the Central Sand Plain of Wisconsin.

Because of the porous nature of the sandy soils at the Richfield Dairy site and the potential for groundwater impacts associated with potential leakage from manure and process wastewater handling structures/systems at the site, groundwater monitoring is warranted at the Richfield Dairy production area. 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.

The permittee has designed some production area structures above current design standards. The proposed designs of the facilities and systems exceed minimum design standards and are expected to protect groundwater and surface water to the extent required by law, meaning the production site is not expected to cause exceedance of groundwater or surface water standards.
Richfield Dairy has designed the manure storage facilities to exceed the 180-day storage capacity requirement, which also includes additional freeboard capacity to capture a twenty-five year rain even and prevent an overflow. However, given that the sandy soils present at the production area are porous in nature, there is an increased risk of groundwater impacts at the site. The Department has added a requirement for the permittee to conduct leak detection and groundwater monitoring as part of the WPDES permit. The monitoring requirements are warranted to determine if manure and process wastewater structures/systems have been constructed and are operated properly.

Additional information can be found IV.A.4.b.

Groundwater quantity
Whenever a well is operated, an area of localized groundwater drawdown develops. This “cone of depression” is a radial zone around the well in which groundwater levels drop from pre-pumping level. The size of the zone of groundwater decline is related to the geologic conditions, the pumping rate of the well, and the duration of pumping. The Dairy wells will be approved to pump groundwater year-round, with pumping limited to an annual maximum of 52.5 MGY (annual average rate of 100 gpm), and limited to 21.6 million gallons in any

30-day period. Pumping rates are expected to be somewhat higher during the summer (up to 250 gpm) for cooling and slightly lower during the remainder of the year.

Modeling from SSPA (described in Section IV.A.4.b) predicts that the long-term water table drawdown at the production site will be 0.9 feet. Drawdown at the nearest existing private well, approximately 400 feet west of the dairy wells, is expected to be 1.0 feet. Both drawdown levels are for pumping at the maximum annual rate. For the immediate vicinity of the dairy, including the nearby private well, water table drawdown for the maximum approved *monthly* pumping rate was also assessed using the Theis analytical method. The Theis method is useful to analyze water table drawdown over relatively short distances and time periods in relatively homogeneous aquifer systems like the one near the dairy production area.[3] The Theis method indicates that for the maximum approved monthly pumping limit of 21.6 million gallons, drawdown at the production well is expected to be 31.3 feet, and drawdown at the private well is expected to be 4.8 feet. By comparison, for 30 days of pumping at the maximum approved *annual* pumping rate, drawdown at the production well is predicted to be 6.3 feet, and drawdown at the nearby private well is predicted to be 0.9 feet.

The other high capacity wells in the area also cause water table drawdown in the vicinity of the dairy productions area. SSPA modeling estimates that existing irrigation wells in the vicinity have cumulatively caused a steady state water table drawdown of 2.8 feet at the dairy site. Because irrigation pumping is seasonal, actual water table drawdowns in the vicinity would be greater than average during the summer months and lower during winter months.

V.A.1.e Production site Air quality

Animal agricultural operations generate odors and air pollutants. When localized and insignificant, these odors and air pollutants pose few problems. If enough animals are concentrated together in a small area, air emissions may cause human health and environmental concerns.

Airborne contaminant emissions emitted from CAFO's or other types of animal agricultural operations, include gases and particles. Air quality concerns have focused primarily on ammonia (NH_3), hydrogen sulfide (H_2S), two toxic air pollutants, as well as odors, particulate matter (PM), volatile organic compounds (VOC), and greenhouse gases (GHG). Diesel exhaust PM emissions from semi-

[3] Note: The Theis method utilizes several assumptions which make it an inappropriate tool for analyzing drawdown at distances more than several thousand feet or time periods greater than a couple months. For example, Theis assumes zero recharge to the aquifer and cannot account for aquifer heterogeneity or water received from or lost to surface water features. Errors due to these limitations increase with increased analysis time and with distance from the pumping well.

trucks, manure spreading, and other miscellaneous farm operations could also be associated with animal agricultural operations.

Emergency generators, other stationary diesel or biogas engines and other combustion sources, such as dryers, will emit pollutants, too. Criteria pollutants (oxides of nitrogen (NOx); carbon monoxide (CO); and sulfur dioxide (SO2)) and incomplete products of combustion are also emitted and formed from the combustion of diesel, biogas or other fuels.

In addition to primary emissions, certain air pollutants are formed through chemical processes in the atmosphere known as secondary formation processes. The secondary pollutants have significant effects. Ammonia reacts with SO2 and nitrogen oxides (NOx) to form PM2.5. VOC and NOx react to form ozone. Nitrogen containing compounds such as ammonia and NOx result in increased nutrient loading and acidification of soils and waters.

Both quantity and the types of air contaminant emissions from animal agricultural operations are challenging to estimate, making off-site air quality impacts difficult to predict. This is due to diurnal and seasonal temperature variation, varying number and type of animal species present (which may change over time), type of housing and manure handling system, feed type, and chosen management practices.

Regulatory dispersion modeling is predicated on the steady-state nature of the release. Gaussian plume models have been developed to replicate monitored concentrations attributed to industrial or commercial operations, for example a large industrial boiler for generating steam and/or electricity. The release of farm emissions comes from locations (i.e. barns, lagoons) that are unlike a smoke stack. These “fugitive” emissions are able to be modeled, but there is more uncertainty associated with establishing release parameters. The time-varying nature of farm emissions is even more difficult to model. Regulatory models generally assume steady-state emission generation. This implies that over the course of one hour, the emission rate will not significantly change, and that any changes from hour-to-hour are under the control of the operator. Farm emissions vary between hours, within a given hour, and more importantly this variation is chaotic and unpredictable.

Despite the variability of emissions from animal agricultural operations, the nitrogen balance (and ammonia as a part of the balance) has been studied extensively in dairy operations which have integrated cropping systems. Nitrogen excretion from animals varies based on nitrogen feed rates, the nutritional needs of the dry or lactating cows, and how much nitrogen ends up in milk. In Wisconsin and elsewhere, research points to an average annualized total nitrogen loss of 15 percent from freestall housing and losses of incoming nitrogen into uncovered manure storage from 10 to 30 percent loss of nitrogen as ammonia. Estimates based on farm component ammonia losses are presented in

the table below. Wisconsin DNR is currently working with an agricultural waste advisory group to examine and recommend beneficial practices that reduce ammonia and hydrogen sulfide air emissions and will work for Wisconsin farms.

The facility is proposing practices which are expected to mitigate air emissions. This includes a floating geomembrane waste facility storage cover combined with a biofilter treating exhaust air from under the cover. Covering the waste facility storage with a properly designed geomembrane cover may reduce air emissions and odors by 90% from the waste storage facility. Appropriate land application techniques should be combined with waste facility storage covers to ensure that air contaminants (and beneficial nutrients) which are prevented from volatizing with waste facility covers are not lost during the land application process.

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 Richfield Dairy include particulate from grain and feed handling and dust from truck traffic. Richfield Dairy will reduce the impact of roadway dust through their plan to apply water to unpaved roads during construction and then to pave roadways with asphalt.

The proposed facility, as with any source of air pollution, is required to evaluate existing information and determine its air emissions, and comply with any air regulatory requirements that apply. The Department also believes it does not have the authority to require air quality monitoring.

V.A.1.f Production site Flora

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.

V.A.1.g Production site Fauna

The presence of Richfield 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. Occasional visits/use by mobile rare species such as Kirkland's warbler, whooping crane or bald eagle may occur but will not be negatively impacted by such use.

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.

V.A.1.h Production site 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 radius.

V.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 will be 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 will be taken to ensure that any runoff from exposed and stockpiled materials do not result in this material leaving the construction site.

V.A.3 Manure spreading sites

V.A.3.a Manure spreading sites-Topography

Manure spreading sites (fields) listed in the Richfield Dairy NMP 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 BMPs (e.g., contour strips, filter strips, maintaining > 30% crop residue on soils after planting, and fall cover crops) [NRCS 590 V.C.1].

V.A.3.b Manure spreading sites- Soils

According to driller construction reports, groundwater depth near the production area and land application sites varies between 1 and 192 feet below the ground surface with 89% of the wells showing static water level in wells at 10 feet or greater below the ground surface. It indicates that there may be shallow groundwater in areas near land application sites. Under NR 243, there must be a two foot separation between the ground surface where manure is applied and groundwater as measured in a hole dug just prior to manure application. There is debate over whether this separation is adequate to protect groundwater in all circumstances. Research on this topic is ongoing.

The Department agrees that the Richfield Dairy NMP depicts planned manure spreading on many fields that contain sandy, highly permeable soils. These soils, in general, have a higher risk for leaching of nitrates and other pollutants to groundwater.

Manure spreading sites (fields) listed in the Richfield Dairy NMP 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 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 BMPs (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.

The NMP also describes liquid manure and process wastewater from the milking parlor will be pumped from storage lagoons into manure spreaders, and land applied. The NMP narrative 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. The NMP narrative was revised in 2014 to include specific practices for applications of manure in late summer and Fall to sandy soils. 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 approved NMP shows irrigation equipment will not be used by Richfield Dairy to land apply manure and process wastewater to fields. If Richfield Dairy decides to use a manure irrigation application method, they must first revise their NMP to reflect the method and associated NR 243 and NR 214 requirements and may not use a manure irrigation application method before the revised NMP has been reviewed and approved in writing by the Department.

The Richfield Dairy NMP contains several required nutrient / manure management practices that, taken together, help reduce the risk for nutrient loading above crop fertility needs and further reduces the rate, scope and/or frequency of soils and water acidification. These practices include requirements to regularly test all crop fields for soil P, K, and pH levels and plan appropriate management practices to prevent over application of nutrients. Practices include lime applications to reduce soil acidification, immediate incorporation or injection of liquid manure, regular calibration of spreading equipment to ensure that application rates reflect the UW recommendations for crops selected and the planned application of manure in the spring, prior to crop establishment. Spring application prior to crop establishment on highly permeable soils reduces the risk for N mineralization and leaching from applied manure as opposed to fall manure applications. The NMP also includes detailed manure spreading and soil restriction maps of all fields covering more than 16,000 spreadable acres, including field and map verification procedures to ensure that all manure spreading setbacks are properly followed and s. 243.14 prohibited areas (shallow groundwater, conduits to groundwater) are followed or avoided when fields are utilized for manure application.

The NMP currently shows 98% of fields with planned manure applications have a calculated phosphorus index less than 1. Other planned fertilizer application rates and amounts, and applicable second year nutrient credits from manure and legume sources are currently included in the NMP on a field specific basis, to prevent over application of nutrients.

Approximately 95% of fields in NMP are comprised of sandy, highly permeable soils and fields. Sand soils, by definition, have a much lower soil erosion risk and corresponding P delivery risk to surface waters compared to silt loams or silt-clay loam or loess type soils found in other parts of the state because they infiltrate water rapidly. Given these facts, if cooperating growers follow different nutrient application rates or practices than shown in NMP, these changes may increase P Index calculation scores on some fields, but the department does not believe such changes will increase PI scores significantly to result in exceeding PI of 6 on any field in NMP.

Richfield Dairy is required to ensure the manure is applied at rates that do not exceed UW crop recommendations. Failure to revise plan with actual manure test concentration or achievable manure hauling rates may result in farm exceeding UW crop recommendations (for N or P).

Following UW nutrient application recommendations helps prevent over-application of nutrients and helps protect surface and ground waters of the state from environmental degradation. The underlying goal of the recommendations is to apply enough nutrients to the crop for optimum (not maximum) growth throughout the season. Because crop nutrient demands are not uniform throughout the growing season, an adequate supply must be available during the period of peak demand. The program defines the “critical” level as the cutoff between optimum and high soil test levels. The critical level determination within the UW recommendations is based upon the probability of yield increase to applied nutrients. If nutrient supply exceeds the critical soil test level, there is an increased risk of mobile nutrients moving into groundwater and surface water.

The UW crop recommendations were adopted by the department as regulatory/discharge limits via adoption of NR 151 and NR 243 performance standards. The standards are referenced within the proposed WPDES permit and all CAFO permitted farms must demonstrate compliance with these criteria. The UW recommendations are based upon years of peer reviewed agronomy/crop fertility, nutrient management and water quality research completed by UW faculty - http://www.soils.wisc.edu/extension/dir.php & http://www.soils.wisc.edu/soils/staff.php - at various UW Ag research stations - http://www.ars.wisc.edu/ - throughout the state, including the central sands region.

The UW Nitrogen (UW N) rate recommendations for corn are based upon soil organic matter, soil texture, growing degree days and yield potential of the soil. Please note corn for grain or corn for silage crops represent 30% of total acres within Richfield NM plan; all these acres have planned manure applications to meet corn crop needs using MRTN method. Recommendations for other crops are based upon soil organic matter and yield goal. The N recommendations are supported by field studies where crop responses to various rates of nitrogen

have been measured on soils typically used for production of various crops. N recommendations vary according to crop to be grown, soil characteristics and yield potential, and soil organic matter content. The UW N recommendations are not written to maximize crop production.

The UW N recommendations contain a specific section entitled: Managing nitrogen to avoid losses. This section explains nitrogen rate, nitrogen credits and soil test nitrate recommendations assume BMPs will be used to control nitrogen losses. The following BMPs are described in detail in this section to control nitrogen losses: (1) Nitrogen Rate, (2) Nitrogen Source, and (3) Nitrogen Timing. Many of these same BMPs will be used during manure applications planned by Richfield Dairy (e.g., following MRTN for all corn crop acres in plan; taking credit for manure and previous legume crops, applying manure in spring before crop establishment vs. fall application, regular testing of all manure sources applied to fields).

In addition, the NMP is required to include regular manure sampling (2x/month) and soil sampling (1x/4years) to determine appropriate application rates. It also contains requirement for revising the NM plan with this information on, at least, an annual basis. All NM plans and revisions must be developed and/or approved by a certified crop consultant.

The March 2014 Richfield Dairy NMP has been received and approved by the Department. The only changes in the 2014 NMP include the spreading of liquid manure by New Chester Dairy onto 16 fields within the Richfield Dairy NMP and specific practices for applications of liquid manure in late summer or fall on sandy soils, if such applications become necessary.

Reports within the Richfield Dairy NMP summarize the specific fields, amounts, application timing and method of the New Chester Dairy liquid manure applications (copies of reports available upon request).

V.A.3.c Manure spreading sites- Hydrography & surface water quality & quantity

<u>Quality</u>
WPDES permitted CAFO facilities are required to adhere to stringent requirements. The Department believes the permit as issued complies with ch. NR 243 and provides an adequate level of water quality protection.

While discharges are allowed under the WPDES permit, the restrictions in the WPDES permit and Richfield Dairy's NMP are designed to minimize potential impacts and ensure that groundwater and surface water quality standards are met.

The WPDES permit establishes application restrictions and BMPs designed to keep pollutants on the land. Through permit coverage, all land application activities must be done in conformance with a NMP. In most cases, once a parcel of cropland comes under a chapter NR 243 based NMP, there will likely be a reduction of pollutant runoff from that parcel of land. This is due to the fact that cropland not previously covered under a NMP will, through permit coverage, become subject to more (water quality) protective management practices required by the WPDES permit program. Manure applications cannot exceed crop need and must be made in a responsible manner (timing, rates, placement, method(s)). Facilities must observe manure application set back requirements from private wells, conduits to groundwater and within defined surface water quality management areas (SWQMS). Manure applications are restricted during snow covered and frozen ground conditions.

Richfield Dairy NMP (section 8.3) contains detailed field and map verification procedures that require the farm to check each field and map before planned manure spreading for any restricted or prohibited features, including conduits to navigable waters that may reside within or be adjacent to field boundaries. If found, spreading maps are required to be amended and such areas be avoided or have applicable setbacks followed during manure spreading (NOTE: if wetlands are found to be conduits to the stream via channelized flow, 25 foot setbacks – with injection or immediate incorporation - are required according to restriction map legend). Failure to complete these procedures may result in the department citing farm for WPDES permit violations related to NMP implementation and meeting NR 243 general and specific land spreading requirements.

Detailed information related to Richfield Dairy's NMP is located in section IV.A.3.b.

<u>Quantity</u>

The manure spreading/irrigation areas for the Richfield Dairy are located in existing agricultural fields, and most of these fields currently receive irrigation water from high capacity wells. No change in groundwater use on these fields is expected. As such, no surface water quantity changes are expected due to the manure spreading activities.

V.A.3.d Manure spreading- Groundwater quality & quantity

Groundwater quality

Central Sand Plains are vulnerable to groundwater contamination from agricultural chemicals. The threat to groundwater can be lessened if pest management and nutrient management strategies are used by all farmers. Managing manure according to a nutrient management plan as required under a CAFO permit will limit nitrate inputs to groundwater. It is assumed that lower application rates will result in less nitrate inputs to groundwater. Site specific groundwater monitoring of land application sites over a long period would be required to determine trends in nitrate concentration in response to nutrient management plans.

The DNR does not expect the proposed production site or land application sites to cause groundwater quality standards to be exceeded, or exacerbate (make worse) exceedences of groundwater quality standards that may already exist. The nitrate concentration in groundwater will reduce more slowly if nitrogen continues to be added to surface soils, by land application of either manure or liquid chemical fertilizer. However, nitrogen added via manure application is less leachable than nitrogen added via liquid chemical fertilizer.

According to driller construction reports, groundwater depth near the production area and land application sites varies between 1 and 192 feet below the ground surface with 89% of the wells showing static water level in wells at 10 feet or greater below the ground surface. It indicates that there may be shallow groundwater in areas near land application sites. Under NR 243, there must be a two foot separation between the ground surface where manure is applied and groundwater as measured in a hole dug just prior to manure application.

The Richfield Dairy NMP depicts planned manure spreading on many fields that contain sandy, highly permeable soils. These soils, in general, have a higher risk for leaching of nitrates and other pollutants to groundwater.

The permit as issued complies with Ch. NR 243 and provides an adequate level of water quality protection. Information on permit conditions that protect water quality can be found throughout this document. These permit conditions may actually reduce nutrient loading to groundwater and surface waters in the area. The risk for manure applications to cause contamination of groundwater or surface waters, via groundwater recharge, is effectively reduced by the following factors:

Manure vs. Commercial Fertilizer Properties

- In general, commercial N fertilizers have a higher risk for leaching nitrate nitrogen into groundwater than manure in sandy soils. Currently, commercial N is used to meet all crop nutrient needs for all acres within the Richfield Dairy NMP. Most of these N applications are currently not being applied consistent with the NRCS Standard and UW crop recommendations.
- Manure is primarily an organic source of N. Organic N is not immediately plant available (and leachable) and acts as a slow release fertilizer source for plants. Manure organic N must be converted by soil bacteria to a form that is immediately plant available (ammonium and nitrate). Ammonium-N does not bind tightly to soil particles, is highly soluble in water and leaches readily. Ammonium nitrogen can, under optimum conditions, quickly change to nitrate nitrogen (warm, moist, well aerated soils and with pH of 6.5 – 7.0).
- Conversion of manure organic N to plant available forms of N requires correct soil temperature (>50 degrees, ideal between 70-75 degrees) correct soil moisture and correct soil oxygen to occur. Conversion of organic N, however, is not an immediate or rapid process. It converts slowly over time during the crop growing season allowing for the applied N from manure to be utilized by established crops. This is key factor when considering risks for manure to cause N leaching into groundwater.

Timing and Method of Manure Application

- The Richfield dairy NMP shows that the timing of all planned manure applications occur in the spring or early summer months. All spring manure applications are planned within a short period (approximately 2 weeks) prior to crop establishment. All spring applied manure will be incorporated immediately. Although the NMP contains no planned manure applications in the late summer or fall months, the revised 2014 NMP contains specific practices for applications of liquid manure in late summer or fall on sandy soils if such applications become necessary. Applying manure N just before crop establishment in the spring, lowers the risk for N conversion and nitrate N leaching into groundwater, as manure, by definition, is a slow release N source compared to commercial fertilizer N (immediately plan available) sources. Incorporating manure immediately after application will help to further retain applied nutrients within the root zone of target crops. Established alfalfa crops are planned to receive surface manure applications in summer months without incorporation.

Irrigation

- The need for irrigation of water on sandy soils (and corresponding higher risk for leaching of applied nutrients) during spring months is less likely, or will not occur altogether, for the following reasons: in general, moisture levels found within sandy soils is adequate for crop establishment during spring months from snow/ice melt off, typical rainfall during spring months

and lower soil and air temperatures versus summer months when higher soil and air temperatures and less rainfall can dry out sand soils at faster rates/frequency and, thus, require irrigation for crop growth/development.

Sand Soil properties and Organic Matter

- Because sandy soils have less organic matter they retain less water compared to medium and fine textured soils. Without adequate moisture in sandy soil, conversion of manure organic N to inorganic plant available N is less likely or rapid compared to commercial N fertilizers.
- Manure applications to sandy soils will, over time, help improve sandy soil structure with more organic matter. More organic matter helps a soil, particularly sands, retain more water and this ability helps reduce the risk for leaching nutrients into groundwater. In addition, the Richfield Dairy NMP also has planned crop rotations that will help create more organic matter than current crops grown in the area, such as potato, sweet corn and snap beans. These crops include corn silage, corn grain, winter wheat and alfalfa. These crops all have large root systems that help increase organic matter in sandy soils, over time.

More Stringent and Enforceable Nutrient Management Regulations / Practices

- Some groundwater resources in proximity to Richfield Dairy fields are currently impaired for nitrates and a majority source for such impairment are current agricultural land use/activities. Richfield Dairy will be required, via WPDES permit and NR 243, to meet more stringent nutrient management requirements than current agricultural activities on the 16,290.3 spreadable acres within their NMP. Current agricultural activities in the area either do not have a NMP or do not follow the requirements of a NRCS 590 NMP. Nor are growers in the area required, by state regulations, to have a WPDES permit that regulates how, where and when they apply nutrients (commercial fertilizer) to their fields and discharge to waters of the state. Richfield Dairy proposed WPDES requires this farm to not only develop and implement the NMP, but also meet strict recordkeeping and reporting requirements. The land spreading and nutrient management practices and procedures as well as recordkeeping and reporting requirements within the NMP are all enforceable conditions via the proposed WPDES permit. Because Richfield Dairy is required to meet higher regulatory and recordkeeping standards for nutrient management than current growers in the area, the department believes fewer nutrients will enter groundwater than under current agricultural land use conditions.

Current Groundwater Conditions and Agricultural Land Use

- The department evaluated existing groundwater well sampling data for 2000-2011 years within each township and range that contained fields listed within Richfield Dairy NM plan. We found 16% (N= 169/1065) of all

private well samples showed nitrate contamination above the enforcement standard of 10mg/L and 6% (N= 73/1065) exceeded 20mg/L. This amount of contamination reflects current land use in the area (which is dominated by row crop agriculture). These operations either do not have NM plans or do not follow NRCS 590 NM plan requirements. No growers in the area use manure - a slow release organic based source of N to meet crop fertility. Bacterial sampling of private wells was also evaluated, but not considered relevant because sampling was completed only at time of well drilling and not after that time; the department does not consider these results representative of current levels of bacteria in these wells.

Compliance Record of Three Existing CAFO Farms that Applied Manure to Sands

- The department evaluated the compliance record of three existing CAFO permitted farms (Central Sands, Gordondale Farms and Ostrowski Farms) who have repeatedly applied liquid manure, over multiple years, to fields with sandy, highly permeable soils. We found no direct or circumstantial evidence that these three farms have caused any nitrate and bacterial contamination of drinking water wells, groundwater or lakes or streams from repeatedly applying manure to fields with sand soils over the multiple years they have applied manure to sand soils.

Pathogen Movement Risk associated with Sands

- The Department evaluated the risk for movement of pathogens (defined as bacteria, viruses and parasites that cause disease) within sand soils to groundwater associated with manure applications planned by Richfield Dairy. Land application of manure can contaminate groundwater with pathogens where *groundwater is vulnerable to contamination* and *where conditions allow pathogens to survive and sometimes thrive*. The unsaturated zone (the upper soil and sediment layers that have some water in pore spaces) can play an important role in slowing down pathogen transport and survival. This factor must be considered when determining the vulnerability of the aquifer to contamination, particularly with sands. Sand soils do not support ideal conditions for pathogen survival because they, by definition, have low organic matter and low moisture levels. Pathogens move easily in groundwater when pores and fractures in soil are full of water (referred to as saturated flow). Sands, compared to other soils, do not have fractures and do not support conditions for saturated flow, due to physical and permeability properties.
- In general, sand soils provide some filtering/attenuation of pathogens due to their physical and high oxygen content properties; aerobic decomposition of pathogens is more possible with sands vs. other soil types, provided conditions for pathogen movement is reduced or minimized. The department has experience with using sands in storm water and wastewater treatment systems for pollutant removal, including some pathogens. Sands have been used as part of on-site septic systems

design to reduce risk for pathogen movement and to increase pathogen attenuation.

- Shallow depth to groundwater represents a higher risk to groundwater contamination from pathogens. Accordingly, the department evaluated static water levels for private groundwater well sampling data (2000-2011 years) for all wells located within each township and range that contained fields listed within Richfield Dairy NMP. For all private wells, the static water level, at time of construction, was found to be greater than 10 feet in depth. This measured distance to groundwater demonstrates there is an unsaturated zone between the field surface and groundwater. This zone helps reduce the risk for pathogen delivery to groundwater, especially when compared other soil types in the state that currently receive manure from CAFO farms and have known corresponding static water levels that are close to or at the surface (0-5 feet) or soils with shallow bedrock properties (karst). Last, the department recognizes that many factors, environmental and those specific to each species, control the survival and movement of pathogens once they reach groundwater and the interaction of pathogens with groundwater and aquifer materials is complex and not well understood.

Richfield Dairy NMP Requirements and Procedures

- The department approved NMP for Richfield Dairy has several items that help reduce risks for groundwater contamination, including:
  1. Procedures for evaluating fields before, during and after applications for restricted or prohibited features, to follow correct setbacks from restricted areas (i.e., wells, wetlands, streams or lakes) and to determine if any manure runoff occurs and for taking immediate corrective action if manure or process wastewater runoff, ponding is identified.
  2. Planned manure applications are set to not exceed crop nutrient budgets determined in accordance with NRCS 590 standard, UW crop recommendations, the WPDES permit and s. NR 243.14. All manure applications are required to be based upon current manure and process wastewater analyses, soil tests, and other sources of nutrients applied to a field.
  3. All spring manure applications are planned within approximately 2-weeks prior to crop establishment and followed by incorporation of applied manure. No manure applications are planned for fall or winter months. Applying manure just before crop establishment in the spring, lowers the risks for N conversion and then N leaching into groundwater, as manure, by definition, is a slow release N source compared to commercial fertilizer N (immediately plant available) sources.
  4. Second year credits are calculated for manure, legumes and other planned nutrient sources applied to fields.

5. Daily recordkeeping of all manure and process wastewater applications to fields to track what was actually applied vs. planned.
6. Regular collection and analysis of representative samples of land applied manure and process wastewater.
7. Reviewing and amending the NMP on, at a minimum, annual basis to reflect any changes in operations over the previous year (including incorporation of previous years amendments to actual crops grown, nutrients applied, nutrient concentrations, etc.) and include projected changes for upcoming year.
8. Cover crops are planned on 145 out of 224 (65%) of fields; primarily following early harvest potato or sweet corn crops. Cover crops not only help control soil erosion, but also help scavenge residual nitrogen and prevent nutrient pollution of both surface and groundwater and help build soil organic matter, over time.

Procedures for manure applications to fields with high potential for N leaching to groundwater, soil temperature, application rate and timing restrictions. Such procedures require Richfield Dairy to either apply manure in the spring, or measure soil temperatures on fields and delay fall applications of manure until soil temperatures fall below 50 degrees F. All manure applications in NMP are planned for spring and early summer. The NMP was revised in 2014 and approved by the Department with specific practices for applications of liquid manure in late summer or fall on sandy soils, if such applications become necessary.

Other Conditions within the WPDES Permit

- The WPDES permit contains several restrictions that require Richfield Dairy to manage manure and also apply manure and process wastewater to fields in a manner that reduces risks for groundwater contamination. The restrictions include, but are not limited to:
  1. Manure and process wastewater applications may not cause fecal contamination of a well.
  2. Manure and process wastewater may not be applied within 100 ft of direct conduits to groundwater and within 100 ft of private wells.
  3. Land application practices shall maximize use of available nutrients for crop production, prevent delivery of manure or process wastewater to waters of the state, and minimize loss of nutrients and other contaminants to waters of the state to prevent exceedences of groundwater and surface water quality standards. Practices shall retain land applied manure and process wastewater on the soil they are applied with minimal movement.
  4. Land application practices shall not exceed crop nutrient budgets determined in accordance with NRCS 590 standard, WPDES permit and s. NR 243.14 and shall be based upon manure and process wastewater analyses, soil tests, as well as other sources of nutrients applied to a field.

5. Manure or process-wastewater may not be applied to saturated soils, nor pond on application sites.
6. Construct and then maintain at least 180 days of liquid manure storage.
7. The NMP shall be reviewed and amended on an annual basis to reflect any changes in operations over the previous year (including incorporation of previous year's amendments to actual crops grown, nutrients applied, etc.) and include projected changes for upcoming year.
8. No surface applications of manure and process wastewater on frozen or snow covered ground, except in emergency.
9. Collect and analyze representative samples of land applied manure and process wastewater and use such sample results to guide application rates of manure and process wastewater to fields.

Groundwater Quantity

The manure spreading/irrigation areas for the Richfield Dairy are located in existing agricultural fields, and most of these fields currently receive irrigation water from high capacity wells. No change in groundwater use on these fields is expected. As such, no groundwater quantity changes are expected due to the manure spreading activities.

For additional information on groundwater quantity environmental effects refer to section IV.A.4.b.

V.A.3.e Manure spreading sites- 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. Richfield 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.3.f Manure spreading sites- Flora

If the nutrient management plan is implemented correctly 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.

V.A.3.g Manure spreading sites- Fauna

Richfield has contracted to use over 16,000 acres of land for the project. Preserving and protecting Adams 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 immediate project area and proposed land spreading sites are existing cropland and would be expected to provide habitat primarily for common animal species acclimated to farm operations. Since the farm and land spreading sites are currently used for agriculture, the proposed land use will not change significantly as a result of the issuance of the WPDES permit.

V.A.3.h Rare species

There should be no impacts to any listed species found to occur within the project areas as the lands do not support the habitat or land conversion has already occurred through decades of farming.

V.A.4 Area Impacts

V.A.4.a Area Hydrography & surface water quality & quantity

<u>Surface Water Quality</u>
The potential for impacts on the water resources of the region from Richfield 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 the dairy will provide a level of manure management equal to or better than the current level of management on these fields.

Additional information can be found in section IV.A.1.d.

Potential water resource impacts associated with manure management are described in Section IV.A.3.c.

Surface Water Quantity

General Discussion

For the purposes of the environmental analysis, DNR considered the impacts of the Dairy's wells (this section), and the past, present and reasonably foreseeable cumulative impacts to water resources within the area influenced by Richfield Dairy's proposed high capacity wells (Section V.A.3). This review considered the potential environmental impacts to the wetlands, streams, lakes, and springs described in section III.A.1.e.

Groundwater Models

Potential impacts to surface waters were evaluated by primarily relying on two numerical groundwater models submitted to DNR. Numerical groundwater modeling is currently the best tool available for evaluating the long-term effects of groundwater withdrawals in a large, complex system. The two models used for the review were 1) a regional model of the Central Sands, modified to predict impacts from Richfield Dairy's wells, submitted by George Kraft of the University of Wisconsin-Stevens Point (referenced as the "Kraft" or "UWSP" model) and 2) a site-specific model created by S.S. Papadopulos & Associates and submitted by Richfield Dairy (referenced as the "SSPA" model). DNR evaluated the numerical depletion amounts predicted in the models to determine whether operation of the proposed wells would result in environmental impacts to the various surface water resources.

SSPA Model:

Richfield Dairy provided DNR with numerical groundwater modeling results and an evaluation of the effects of groundwater pumping on surface water and groundwater in the vicinity of the proposed wells (S.S. Papadopulos & Associates, 2012).

The *MODFLOW* model provided by SSPA is based on the calibrated regional groundwater model of the Central Sands developed by Mechenich and others (2009), with site-specific refinements. Model grid spacing ranged from 125 feet in the vicinity of the Dairy to 1000 feet near the boundaries of the model. The site-specific model was constructed with model layers for the upper sand and gravel aquifer (2 model layers) and for the lower sandstone aquifer (1 model layer). Hydraulic conductivity in the upper aquifer was zoned to reflect different geology east and west of the terminal moraine and modified to produce the best representation of actual conditions using *PEST* parameter estimation software. Pleasant Lake and Lake Burnita were modeled using the *MODFLOW* lake package. High capacity wells with pumping data for the period of 2007-2011 were included in the model. Pumping from existing irrigation wells was explicitly modeled, with an annual average irrigation water loss of 20% (actual water losses are much higher during the irrigation season, and low during the rest of the year). In effect, the modeled net recharge reduction from existing irrigation

wells was approximately 2 inches per year on irrigated acreage. Two inches of recharge reduction is similar to the change in recharge from non-irrigated to irrigated conditions identified in work by Kraft and others, 2012. For the purposes of the model, the proposed Dairy wells were assumed to have 100% water loss.

The SSPA model was run under three scenarios: background conditions (no pumping), current conditions (pumping from all existing irrigation wells), and existing irrigation pumping plus 72.5 MGY withdrawal from the Dairy. The first two scenarios were run at steady state (infinite time). The simulation of the effects of pumping at Richfield Dairy was run in a transient mode, which allows observation of the effects of pumping over time. SSPA indicated (consistent with Dr. Kraft's analysis) that the modeled drawdown and stream depletion amounts are linear with the Dairy's pumping rate, and DNR revised the impact amounts in the final EIS to reflect the Dairy's approved groundwater withdrawal rate of 52.5 MGY.

SSPA's "current conditions" scenario incorporates high capacity wells active in 2011 that had available pumping records, generally for 2007-2011. However, in the northern half of the model domain (an area of about 200 square miles), where Richfield Dairy and potentially-impacted surface waters are located, roughly 13 high capacity wells appear to be missing from the analysis. Nine of these wells are irrigation wells, two are Coloma's municipal wells, and one is an artesian well supplying water to a fish farm. The added pumping from these wells would increase total pumping in the northern part of the model by 7%. Because of this, actual cumulative impacts from wells installed through 2011 should also be slightly greater than modeled. In addition, twelve new high capacity wells have been approved in the Little Roche a Cri, Fordham, Chaffee, and Tagatz Creek watersheds between 2012 and present. Pumping from these wells will also increase cumulative impacts over the modeled amount. <u>There are also 8 pending high capacity well approval applications within these watersheds.</u>

The "current conditions" model scenario was run using a steady state simulation. It depicts impacts that would exist if the system were given infinite time to equilibrate. In reality, some wells were installed recently, and not all impacts have manifested themselves at water bodies distant from the pumping. Additional calculations from SSPA indicate that, currently, Pleasant Lake and Chaffee Creek are experiencing approximately 83% of the total impact of wells existing in 2011, and Fordham Creek is experiencing 89% of the total impact. (Charles Andrews contested case hearing testimony, June 25, 2013 and December 16, 2013)

During the Richfield Dairy pumping scenario, no water withdrawal was simulated from the existing irrigation well on the property, because this well would be abandoned prior to operation of the Dairy wells. Model results were reported at 5 and 25 years of operation. DNR's evaluation of impacts focused on the 25-year pumping scenario. After 25 years of pumping, the modeled system had

equilibrated until groundwater drawdown was no longer increasing significantly with time (see graph of Pleasant Lake drawdowns modeled over time, p. 17 of SSPA, 2012). Stream depletion was also near steady state, with 84% or more of the Dairy's pumping derived from surface water rather than aquifer storage.

UWSP Model:
Dr. George Kraft submitted a numerical groundwater model of impacts to Pleasant Lake and area streams from the Richfield Dairy wells. The model is a version of the modeling referenced in Kraft & Mechenich (2010), which has been calibrated and peer reviewed. Model results were submitted for the dairy's initial expected annual average groundwater pumping of 52.5 MGY and at 131.2 MGY, the initially-approved pumping rate.

The model was run until steady state conditions developed. Drawdown results were linear with pumping rate.

In the UWSP model, existing irrigation pumping was modeled as a 2-inch reduction in recharge on irrigated acreage, and individual existing wells are not explicitly modeled. Lakes were represented as outcroppings of the water table, which is roughly the case for seepage lakes in this area. Because of the regional scale of the base model, headwater areas of streams were not always represented realistically (for example, the model shows dry cells where flow is actually present in the headwaters of Chaffee Creek). All the streams of concern are headwater streams, so using the UWSP model to evaluate stream impacts was problematic. DNR used the UWSP model to evaluate impacts on Pleasant Lake from existing wells and the proposed dairy wells, and also to check whether the SSPA model results were realistic.

<u>Wetlands (described in section III.A.1.e)</u>

The SSPA model predicts that a water table drawdown of less than 1 inch will occur at the Little Roche a Cri headwater wetlands after 25 years of pumping at Richfield Dairy. Any alteration to groundwater regimes will have an effect on groundwater-dependent wetlands and exacerbate any wetland conversion that has already occurred due to existing pumping; however, the effects are not expected to be significant for drawdowns of less than one inch.

The Pleasant Lake wetlands (Turtle Bay, Camp Fairwood, Duck Box) were evaluated to determine if the projected drawdown of less than 2-inches would significantly affect their functional values and overall wetland quality. Potential impacts to wetlands were reviewed based on the current morphology and water regime of the wetlands; the review considered human use, wildlife habitat, fish and aquatic life, shoreline protection, storm and floodwater storage, water quality, and groundwater processes. Based on existing conditions, the modeled drawdown of 1.2" (SSPA) or 1.6" (UWSP) caused by the proposed Richfield

Dairy's wells will not significantly change the current condition of the Camp Fairwood or Duck Box wetlands.

The Turtle Bay wetland is in the southwest corner of Pleasant Lake. The wetland is connected to the lake by a shallow channel and includes an open-water component that may have been created or enlarged by past dredging. The wetland currently supports a diverse community of plants and animals; it is also documented to have a population of Eurasian Water Milfoil, an undesirable invasive. Because Pleasant Lake fluctuates naturally, the species present are adapted to fairly large changes in water level. An August, 2013 on-site visit by DNR staff evaluated the current conditions at the Turtle Bay wetland, and the state of the wetland and potential impacts were discussed at length during hearing testimony. A decrease of approximately two inches in the level of the lake over 25 years would gradually expose less than a foot of lake bed beyond current conditions and could increase the frequency with which the Turtle Bay wetland pond is cut off from the lake. Thus, the ALJ ordered DNR to limit pumping from the dairy to 52.5 MGY in order to minimize these potential impacts.

The wetland at Camp Fairwood is an ephemeral pond roughly 500 feet south of Pleasant Lake. SSPA modeling predicts long-term drawdown due to the Dairy's wells to be 1.2 inches. DNR evaluated whether this amount of drawdown would impact the function of the wetland as habitat for the flora and fauna currently utilizing it. The free-floating plant species present and the timing of the pond's natural dry down period (in late June) are both indicative of water depths much greater than two inches. Therefore, the potential drawdown would not have a significant negative effect on the flora and fauna utilizing the wetland.

The Chaffee Creek calcareous fen is currently an intact, high-quality wetland. SSPA modeled 0.2 inches of drawdown at the wetland from the Dairy's wells after 25 years, and UWSP's steady-state model predicted approximately 1 inch of drawdown at the wetland location. Based on review of the site's current plant community and topography, the DNR's determination is that an additional 0.2-1 inches of drawdown will not significantly change the overall hydrology or plant species composition of the wetland. A gradual decrease in water level on this scale would likely cause the calcareous fen to shift slightly downslope, by less than a couple of feet. Hearing testimony by Quinton Carpenter was that a water table drawdown of 1-1.5 inches could cause about 10% of the fen area to lose its most sensitive, groundwater-dependent species and shift to a different wetland type. At the approved annual pumping limit of 52.5 MGY, the impacted area of the fen would presumably be about 25-30% smaller, depending on the exact geometry of the wetland.

<u>Springs (described in section III.A.1.e)</u>
SSPA model results show that around 15% of the Dairy's total pumping would be diverted from the Chaffee Creek headwater area. This is essentially in agreement with George Kraft's modeling, which estimated that 11% of the water

pumped by the Dairy would be diverted from Chaffee Creek (Kraft, October 7, 2011 letter to Eric Ebersberger).

For the purposes of analyses of flow reduction impacts to the spring, spring flows were based on available information, including past flow measurements, modeling results, and flow measurements for Chaffee Creek at County Highway CH, less than 1 mile downstream of the headwater spring, available from 2005 to present. Average spring flow is estimated to be about 1.7-1.8 cfs.

Flow reduction caused by the Richfield Dairy at the Chaffee Creek headwater/spring area is modeled to be around 0.04 cfs, and water table drawdown is modeled to be 0.2 inches. This represents 2.1% of Chaffee Creek's headwater baseflow of 1.7 cfs (baseflow from the SSPA model scenario that included existing pumping impacts). The 0.04 cfs reduction can also be stated as 2.4% of the average measured flow (1.8 cfs) minus the modeled irrigation impacts (0.33 cfs).

Ch. NR 820 states that "the Department may not approve a proposed high capacity well if it is predicted to result in a reduction in flow from a spring such that the spring does not flow at one cfs or greater at least 80% of the time or that will reduce the average annual flow from a spring by greater than 20%." The predicted flow reduction of 0.04 cfs, or 2%, does not meet these criteria for denying a high capacity well application. The level of flow reduction and water table drawdown predicted will not adversely impact the fish habitat or the species in the Chaffee Creek spring pond or associated wetland area.

<u>Streams (described in section III.A.1.e)</u>
The trout streams whose headwaters are within 5 miles of Richfield Dairy are Little Roche a Cri, Fordham, Chaffee, and Tagatz Creeks. Groundwater withdrawal from the Dairy will slightly decrease groundwater flow to headwater areas of nearby streams and may cause a corresponding slight reduction in trout zone length. SSPA provided model results for flow reduction at locations with available flow data, and in the headwater areas of trout streams near the Dairy. The modeled baseflow reductions after 25 years of pumping ranged from 0.005-0.07 cfs, or 0.3%-2.1% of modeled streamflow[4] (Table 2). Any changes in stream length due to the Dairy are small enough that modeled stream lengths are unchanged from background conditions. Given the small amount of flow reduction, the degree of change that could be reasonably expected would not be significant to the health of the stream or fishery. The Dairy's small impacts will, however, be additive with the impacts of existing pumping, which in the

[4] Note that percent reductions are taken from modeled baseflow in the SSPA scenario including irrigation pumping. In Supplemental Environmental Assessment Table 1, percentages were taken from average measured flows. The reason for the change in calculation method here is because measured flows were not available for most headwater reaches.

headwater areas of streams near the dairy have been found to be significant (see section V.A.3).

Streams Near Richfield Dairy (within 5 miles)				Baseflow reduction due to Richfield Dairy	
Stream	Location	Avg Measured Flow (cfs)	Modeled Baseflow (cfs)	cfs	%
Little Roche a Cri	Unnamed Trib (Sec 19-20 T18N R7E)	NA	0.9	0.005	0.5%
	Ditches (Sec 16 + 9 T18N R7E)	NA	5.7	0.037	0.6%
	10th Ave.	34	35.1	0.069	0.2%
Fordham	6th Ct.	NA	1.8	0.013	0.7%
Chaffee	CTH CH	1.8	1.7	0.035	2.1%
	CTH JJ	14	14.3	0.044	0.3%
Tagatz	4th Ave.	NA	4.8	0.035	0.7%
	near Westfield	7.6	6.0	0.044	0.7%

Other Streams in Model Domain (> 5 miles from Richfield Dairy)				Baseflow reduction due to Richfield Dairy	
Stream	Location	Avg Measured Flow (cfs)	Modeled Baseflow (cfs)	cfs	%
Campbell	CTH A	2.4	2.3	0.001	0.03%
Carter	CTH G	2.5	3.3	0.008	0.24%
Lawrence	at Eagle	20	17.5	0.008	0.05%
	near Westfield	16	14.7	0.006	0.04%
Mecan R.	CTH GG	13	12.3	0.005	0.04%
Neenah	CTH G	0.8	1.0	0.000	0.05%
	CTH A	>42	31.4	0.001	0.00%
Schmudlack	4th Ave.	1.2	2.0	0.003	0.16%
S Br Wedde	CTH JJ	7	2.2	0.005	0.22%

Table 1 Streamflow Reductions due to Richfield Dairy Pumping (SSPA model)

<u>Lakes (described in section III.A.1.e)</u>

Pleasant Lake is the lake that is expected to experience the greatest impact from the Richfield Dairy wells. Modeled predictions of water level drawdown at the lake were submitted by George Kraft and by SSPA (2012). At a pumping rate of 52.5 MGY, both models predicted drawdown of between 1 and 2 inches. (UWSP predicted steady state drawdown at Pleasant Lake of about 1.6 inches, and SSPA predicted the 25-year drawdown to be 1.2 inches).

The effect of the Dairy's pumping on Pleasant Lake will be a continuous small reduction in water level imposed over the hydrograph of the lake (seasonal, annual, and decadal water level fluctuations). It is very likely that Pleasant Lake is currently experiencing water level declines of a foot or or more due to existing irrigation pumping. 1.6 inches of drawdown represent about 4.4% (3.5-8.8%) of additional impact of the entire hydrograph using Kraft's existing drawdown estimate of 3 feet (1.5-3.8 ft.).

As described in Section III.A.1.e, Pleasant Lake experiences natural seasonal water level fluctuations of approximately 0.5 to 1 foot and year-to-year fluctuations of several feet. The natural existing water level fluctuations indicate that lake ecology is adapted to changes in lake level of several feet and is unlikely to be extremely sensitive to small water level changes. The Department considered this and other factors (potential changes in lake volume, loss of groundwater input, surface area, and existing vegetation) to determine the significance of the projected drawdown.

Changes in the lake volume and surface were assessed using the minimum recorded water level as a baseline. The modeled drawdown would constitute a percent change in lake surface area and volume of less than 2%. (Evaluation of the bathymetry of Pleasant Lake and historical air photos indicates that for historically-observed lake levels, a one-foot change in lake elevation results in a change of 2 - 5.3 acres in the surface area of the lake.)

Reductions in groundwater inputs to a seepage lake have the potential to impact water quality, chemistry, temperature, and aquatic life, including aquatic vegetation and fisheries. The Department evaluated data regarding lake morphometry, water budget, water chemistry, aquatic and nearshore vegetation, and historic lake levels to determine whether the projected ~1-2 inches of additional drawdown and 1.2% reduction in groundwater inflow to Pleasant Lake could result in significant impacts. The projected water level drawdown represents a small percentage change in lake area and volume. Therefore, changes in lake clarity, temperature or dissolved oxygen concentrations due to changes in lake depth are unlikely. Because Pleasant Lake's water budget is dominated by groundwater and well-buffered, the expected change in groundwater input is small enough that no measureable changes to lake chemistry or clarity are expected.

Department staff reviewed information on aquatic vegetation gathered by UW Stevens Point investigators. Pleasant Lake currently supports little emergent vegetation of the type that would be most susceptible to small changes in lake level. Shoreline ecology has been significantly altered by existing human development. It is not expected that the lake's plant communities will experience significant changes due to pumping from the proposed wells. Because habitat (chemistry/temperature/vegetation) will not be significantly

altered, it is not expected that there will be any impacts to the fishery, including the banded killifish, a state Special Concern species found in Pleasant Lake (discussed in Sections III.A.1.e and III.A.1.h). It is unlikely that the projected drawdown due to operation of the dairy's wells would result in measurable changes or significant impacts to aquatic plant life, wildlife, or water temperature. However, the dairy's impacts will be additive with the impacts of drawdown due to existing pumping, which have been determined to be significant (see section V.A.3).

DNR wetland staff evaluated the impact of the projected 1-2-inch reduction in lake level on wetlands adjacent to Pleasant Lake, as described in the Wetlands section, above.

V.A.4.b Area Groundwater quality & quantity

Groundwater quality

Groundwater quality in the area is generally considered fair to good. However, nitrate levels are high in many wells, with 24% exceeding the Enforcement Standard threshold of 10 mg/l (ppm). Due to the preexisting nitrate issue at the site, the high capacity well application indicates that the dairy wells will be completed in the sandstone bedrock aquifer.

According to driller construction reports, groundwater depth near the production area and land application sites varies between 1 and 192 feet below the ground surface with 89% of the wells showing static water level in wells at 10 feet or greater below the ground surface. It indicates that there may be shallow groundwater in areas near land application sites. Under NR 243, there must be a two foot separation between the ground surface where manure is applied and groundwater as measured in a hole dug just prior to manure application.
The Richfield Dairy NMP depicts planned manure spreading on many fields that contain sandy, highly permeable soils. These soils, in general, have a higher risk for leaching of nitrates and other pollutants to groundwater.

Increased concentrations of nitrates in the groundwater throughout the area are not likely to occur as a result of the issuing a permit to Richfield Dairy. Richfield Dairy will be required, via WPDES permit and NR 243, to meet more stringent nutrient management requirements than current agricultural activities on the over 16,000 acres within their NMP. Current agricultural activities in the area either do not have a NMP or do not follow the requirements of a NRCS 590 NMP, including UW crop recommendations. Nor are growers in the area required, by state regulations, to have a WPDES permit that regulates how, where and when they apply nutrients (commercial fertilizer) to their fields and discharge to waters of the state. The Richfield Dairy proposed WPDES permit requires the farm to not only develop and implement the NMP, but also meet strict record keeping and reporting requirements. The land spreading and nutrient management practices and procedures as well as record keeping and reporting requirements

within the NMP are all enforceable conditions via the proposed WPDES permit. Richfield Dairy is required to meet higher regulatory and recordkeeping standards for nutrient management than current growers in the area.

It is the intent of the WPDES permit for Richfield Dairy to avoid impacts to human health and exceedences of groundwater and surface water quality standards. There are a number of standard WPDES permit conditions as well as additional restrictions specific to Richfield Dairy that provide additional levels of water quality protection beyond what is required of operations that do not require coverage under a WPDES permit. These restrictions have been adopted in part, in response to practices that have resulted in impacts in the past. While these restrictions and the WPDES permit do not completely eliminate the risk for impacts, they significantly reduce the potential for such impacts to occur.

There are a number of existing WPDES permitted facilities located within the Central Sands. The Department evaluated the compliance record of three existing CAFO permitted farms (Central Sands, Gordondale Farms and Ostrowski Farms) who have repeatedly applied liquid manure, over multiple years, to fields with sandy, highly permeable soils. The Department found no direct or circumstantial evidence that these three farms have caused any nitrate and bacterial contamination of drinking water wells, groundwater or lakes or streams from repeatedly applying manure to fields with sand soils over the multiple years they have applied manure to sand soils.

Additional information regarding the facilities NMP can be located in section IV.A.3.b.

<u>Groundwater Quantity</u>
The sand and gravel and sandstone aquifers in the area of the Richfield Dairy are each highly productive, and the aquifer is generally unconfined. Water level drawdown per volume of water pumped is low. The proposed project area has a relatively high water table (around 35 feet below ground surface) and a high groundwater recharge rate. Due to these factors, large quantities of groundwater are readily available.

Water withdrawals associated with the proposed wells do not pose a risk of significant adverse impacts to neighboring wells if operated at the maximum annual rate of 52.5 MGY and 30-day maximum rate of 21.6 million gallons.

Additional information is located in Section IV.A.1.e.

V.A.4.c Area 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 Richfield 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 Richfield 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 Richfield 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.

V.A.4.d Area Flora

Direct impacts to the local area should be minimal since the majority of the lands are used for agriculture or are woodlands. The dominant flora in the area is comprised of common agricultural crops, associated weeds, and mixed woodlands. 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 and additional long-term significant impacts to the area flora are not expected.

V.A.4.e Area Fauna

Richfield Dairy will be utilizing existing croplands that will protect and preserve the local agricultural land base. With the majority of Adams County being woodlands, long-term significant impact to local wildlife is not expected.

V.A.4.f Area Rare species

There should be no impacts to any listed species found to occur within the project areas as the lands do not support the habitat or land conversion has already occurred through decades of farming.

Three state Special Concern species: Banded Killifish, Least Darter, and Tufted Hair Grass, are found in areas evaluated for environmental impacts due to water quantity reductions. DNR staff evaluated Turtle Bay and other shallow wetland areas of Pleasant Lake and concluded that the predicted water level reduction would not negatively impact habitat or aquatic life, including banded killifish. Fisheries staff also notes that it is likely that shoreline development and habitat degradation may have already had some impact on the species. Least darter and tufted hair grass are found in the vicinity of the Chaffee Creek spring pond/wetland. No significant impacts to either of these species are expected (see Sections III.A.1.e, III.A.1.j, and IV.A.4.a).

V.B Socioeconomic environment

V.B.1 Production site

V.B.1.a Land use

The land use at the production site has changed from open agricultural land, to more intensive industrial agriculture use.

V.B.1.b Zoning

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

V.B.1.c Prime farmlands

No impact. Contact with the Adams County Land and Water Conservation Department revealed that prime farmland has not been identified in or near the project location.

V.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.

V.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.

V.B.1.f Noise

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. 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.

V.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 change from the

open agricultural row crop landscape. While agricultural in function, Richfield Dairy appears to be an industrial site.

The production site facilities are visible from 1st Drive, Cypress Avenue, and 1st Avenue.

V.B.2 Manure spreading sites

V.B.2.a Land use

Agriculture is the current land use at all of fields used by Richfield Dairy for manure spreading. The project will continue agricultural land use at these locations.

The Department has reviewed the NMP and determined it to be in compliance with applicable NRCS 590 criteria and all NR 243 requirements. Additional information regarding the NMP can be found in Section IV.A.3.b.

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 project.

V.B.2.b Zoning

The Department did not complete a detailed review to assess potential zoning changes associated with the projects manure application fields. The Richfield Dairy NMP contains maps and other documents that describe manure spreading locations (fields) and sizes (acreage). Richfield Dairy will be utilizing existing croplands that will protect and preserve the local agricultural land base however it is the local government's jurisdiction and expertise to make legal zoning determinations.

V.B.2.c Archaeological & Historical

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. Any proposed activities of this nature related to either farm or the NMP would be reviewed by the Department.

V.B.2.d Light

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

V.B.2.e 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 Richfield 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.

V.B.2.f 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.

V.B.3 Local community

V.B.3.a Community features

V.B.3.a.01 Municipal & non-community public wells

The nearest public utility well is the Village of Coloma Well #1 (BH502). The village well is 4.8 miles northeast of the proposed Richfield Dairy wells. SSPA modeling predicts that after 25 years of pumping at 52.5 MGY, water table drawdown at Well #1 will be about 1 inch; this would not impair the water supply to the Village of Coloma Well #1. (Predicted drawdown of 10 feet or more in a public utility well after 30 days of continuous pumping from a proposed high capacity well would indicate reduced availability of groundwater to a public utility well, under s. NR 812.09(4)(a), Wis. Adm. Code.)

V.B.3.a.02 Schools

No direct impacts to either the Adams-Friendship Area Schools from Richfield Dairy operations are anticipated.

V.B.3.a.03 Hospitals, clinics & nursing homes

The hospitals and clinics would treat any accidents directly related to the Richfield Dairy operations. No impacts to nursing homes are anticipated.

V.B.3.a.04 Parks & recreation areas & facilities

No direct impacts to local area recreational are anticipated.

V.B.3.b Local roads and use

V.B.3.b.01 Description

Once Richfield Dairy is fully operational there will be a yearly additional of an estimated 14,890 heavy trucks coming or going from Richfield 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.

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 14,890 heavy trucks a year, plus additional large farm machinery will accelerate wear and deterioration of the local road system. This will conceivably place a financial burden on the county and town to repair or reconstruct the roads.

V.B.3.b.02 School bus routes

Local school districts will likely bus routes that overlap with the haul routes and landspreading routes of the Richfield 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.B.3.b.03 Safety

Once Richfield Dairy is fully operational there will be an estimated additional 14,890 heavy trucks coming or going from Richfield 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.

V.B.3.b.04 Emergency vehicles

Accidents and incidents on Richfield Dairy farmland may result in more ambulance and fire response services being utilized.

V.B.3.c Residential neighbor wells

There are 5 known private residences within a mile of the Richfield dairy facility, with the nearest private well approximately 400 feet from the proposed high capacity wells. Potential impacts to private wells related to the project are water level drawdowns related to the operation of the dairy's high capacity wells and groundwater contamination (nitrate or bacteria) from manure either at the facility or at the manure spreading sites.

Quantity
For the maximum approved monthly pumping limit of 21.6 million gallons, drawdown at the nearest private well would be 4.8 feet. For 30 days of pumping at the maximum approved annual pumping rate, drawdown at the nearest well is predicted to be 0.9 feet. These drawdown amounts were derived using the Theis analytical method (see also Section IV.A.1.e). Numeric groundwater modeling by SSPA indicates that the long-term drawdown at the nearest well due to the dairy's water withdrawals to be roughly 1.0 feet. Drawdown amounts decrease with distance away from the high capacity wells, so all of the more distant private wells will experience lesser levels of drawdown.

Existing high capacity irrigation wells in the area also cause water table drawdown in the vicinity of the dairy productions area. SSPA modeling estimates that existing irrigation wells in the vicinity have cumulatively caused a steady state water table drawdown of 2.8 feet at the dairy site. Because irrigation pumping is seasonal and irrigation wells are relatively close, actual water table drawdowns from irrigation would be greater than average during the summer months and lower during winter months.

Based on DNR staff experience with private wells, drawdowns of less than five feet are not expected to cause significant changes in well function. There may be cases where a smaller drawdown could cause impacts, but for wells constructed according to legal standards, this would be rare. If the modeled water level drawdown associated with the Dairy wells pumping at the maximum approved annual pumping rate (1.0 feet after 25 years) is added to existing pumping effects (2.8 feet), drawdown is still less than five feet. Therefore, no impairment of well function is likely.

However, if water use by one landowner causes unreasonable harm by lowering the groundwater table, such that a neighboring landowner's use of the groundwater is affected, the adversely impacted landowner could attempt to

resolve the conflict by bringing a civil suit. {See *State v. Michels Pipeline Construction, Inc*., 63 Wis.2d 278 (1974)}. The high capacity well approval includes language stating that issuance of the approval does not relieve the well owner from any liability for claims brought by nearby landowners related to potential harm to their water supplies.

Quality

Groundwater in Adams County has high levels of nitrate in agricultural areas. Limiting the amount of commercial fertilizer, manure and other sources of nitrogen to the level needed by crops will limit the amount of nitrate reaching groundwater over the long term. DNR recommends that owners of private wells near the facility and spreading sites have their wells inspected and sampled for baseline drinking water quality and that the well is tested annually for nitrate and bacteria or if there is a change in the taste or smell of the water.

V.B.4 Area

V.B.4.a Demographics

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

Employment

Richfield Dairy proposes to employ 40 people with a projected annual payroll of $1.5 million and an increase in the area's tax base from farm improvements. It is also estimated that $16 million will annually enter the local economy as a result of added business such as the purchase of services, equipment and feed.

V.B.4.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.

V.B.4.c Transportation

See section IV.B.3.b.

V.B.4.d Zoning

No zoning changes (currently A-1 agriculture) will be required for the new farm operation. Since the farm and land spreading sites are currently used for agriculture the proposed land use will not change significantly as a result of this operation. In the long term the presence of Richfield Dairy may result in fewer parcels being rezoned or given conditional use permits to allow non-compatible use.

V.B.4.e Economy

There will be a positive short-term impact to contractors and vendors during construction of Richfield Dairy. Anticipated construction costs are $35 million.

The applicant provided the following information:
Long-term positive impacts will be generated by wages for the 40 employees with an estimated annual payroll of $1.5 million. The dairy’s annual operating budget will add another $16 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 7x multiplier effect on dairy investments. The applicant claims that each dairy cow generates more than $20,000 a year in economic activity. At this rate, with 4,300 cows, the annual economic impact of Richfield Dairy would be about $86 million.

V.B.4.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 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)

V.B.4.g Agriculture

A new CAFO will operate on what used to be a 152-acre crop field in an existing agricultural area. Richfield Dairy owns or has agreements for land spreading manure and process wastewater on 16,290 acres, which are generally located within a five mile radius of the farm site.

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. Land application of this manure will provide for an alternative to purchasing commercial fertilizers to enhance the soil and grow crops. The NMP 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 or follow NMPs, this should result in more protection of water quality conditions.

V.B.4.h Archaeological & historical

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 will be reviewed by the Department.

VI Evaluation

VI.A Cumulative effects

VI.A.1 Industry

There are currently two other WPDES permitted CAFO facilities located within a 12 mile radius of the proposed Richfield Dairy. Burr Oak Heifers (formerly known as Optiz Custom Heifers) is located approximately one mile south of the proposed Richfield Dairy while New Chester Dairy is located approximately 12 miles to the southwest.

There is a trend in the livestock industry towards larger-scale facilities of this kind. Large scale 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, primarily with respect to costs associated with hauling manure long distances for landspreading. NMPs submitted to the DNR by Burr Oak Heifers and New Chester Dairy demonstrate that there is currently an adequate land base available for land application of all of the manure and process wastewater that is to be generated by these operations. The Department is not aware of additional projects of this type in the vicinity in which the availability of land for manure application would be inadequate.

Any proposed future projects will be examined at the appropriate time. With each new operation or expansion proposed, cumulative effects such as impacts from manure landspreading activities are considered. Unless these facilities are poorly sited or concentrated in a small area, the cumulative impacts to the environment should not be significant.

VI.A.2 Manure management

The basis of the WPDES permit program is to require CAFOs such as Richfield Dairy to implement 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 storm water from impervious surfaces were designed to meet or exceed the applicable regulatory requirements.

The NMP has been reviewed by the Department and determined to be in compliance with applicable NRCS 590 criteria and all ch. 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 and WPDES Permit will minimize the risk of a manure discharge to surface waters and groundwater. All of the potential impacts on water quality, habitat, and biological communities described in Section IV are unlikely to be increased above current conditions if there are no new acute or chronic releases of manure associated with the activities of Richfield Dairy.

VI.A.3 Surface water & Groundwater

For the purposes of its environmental analysis, DNR considered the impacts of the Richfield Dairy wells (section IV.A.4.a), and the past, present and reasonably foreseeable cumulative impacts to water resources within the area influenced by Richfield Dairy's proposed high capacity wells. This review considered the potential environmental impacts to the wetlands, streams, lakes, and springs described in section III.A.1.e. Resources used for this evaluation included groundwater modeling results and evaluations of the impacts of irrigation pumping for the entire Central Sands region by Kraft and Mechenich (2010) and Kraft et al. (2012), modeling of cumulative impacts in the area around the proposed wells by SSPA, Department records regarding nearby high capacity

wells and groundwater withdrawal capacity, and records of historic changes to water bodies. The Department also considered expert witness testimony presented at the contested case hearing regarding the potential impacts from the high capacity wells, since the hearing was held prior to the time this document was prepared.

As described in section III.A.1.f, the proposed dairy is located in an area with a high concentration of irrigated agriculture (128 high capacity irrigation wells within five miles). Unlike the dairy, which will pump groundwater year-round at rates of around 100-250 gpm, irrigated agriculture requires very high rates of seasonal pumping during the summer months (600-1200 gpm) with no operation for about eight months of the year. For water bodies that are near the irrigation wells, this means that most impacts occur during or shortly after irrigation (late summer/early fall), with an opportunity for water levels to recover during the remainder of the year. At distances of several miles from the irrigation pumping, these seasonal peaks of drawdown are damped to a more or less constant drawdown, similar to the effect from the dairy (Barlow and Leake, 2012, p. 28).

Groundwater modeling and observations of various water bodies indicate that a reduction in water quantity has occurred due to the high volume of irrigation and other water withdrawals in the Central Sands region, including the proposed Richfield Dairy well locations.

The addition of the Richfield Dairy wells, or any additional water withdrawal in the area, will increase existing stresses on the availability of groundwater to supply surface water bodies. The effects of this type of cumulative reduction in groundwater availability include decreased flow and increased temperature in headwater streams, and lowered lake levels in nearby lakes (such as Pleasant Lake).

<u>Wetlands (described in section III.A.1.e)</u>
Existing water table drawdown is present at all of the wetlands reviewed for this EIS: the Little Roche a Cri Creek headwater wetlands, the three wetlands near Pleasant Lake, and the Chaffee Creek calcareous fen wetland east of Pleasant Lake.

The Little Roche a Cri wetlands are located in an area of concentrated irrigation (6 irrigation wells within 1 mile), so wetland impacts from existing groundwater withdrawals in the area are likely. SSPA modeling predicts water table drawdowns due to existing pumping to be 0.5-1 foot at the Little Roche a Cri headwater wetlands. Predicted drawdown is 0.7 feet on the west end of Pleasant Lake (Turtle Bay wetland), and 0.25 feet in the vicinity of the Chaffee Creek spring pond (calcareous fen wetland). UWSP groundwater modeling indicated drawdowns similar to those predicted by SSPA (Kraft and Mechenich, 2010, figure VII-3). UWSP statistical analyses indicated a somewhat greater drawdown near Pleasant Lake, up to 1.5 feet or more.

The degree of impact a drawdown causes a wetland depends on several factors, including a wetland's morphology, soil properties, water regime, and plant community. For groundwater-dependent wetlands, a steady-state water table drawdown on the scale of the predicted drawdown is likely to cause stress to existing wetland plant communities or loss of wetland function if water levels decline below the root zone.

The Little Roche a Cri wetlands are in an area of high water table and are very likely to be groundwater dependent. The existing drawdown of 0.5 to 1 foot has likely resulted in significant changes to some of the wetlands in that area. Changes that have likely occurred include conversion of wetland type (wet and sedge meadow to shrub and forested wetland) and conversion from wetland to upland, causing local impacts to wildlife, aquatic life, and overall groundwater processes.

The existing drawdown of about 0.7-1.5 feet in the vicinity of Pleasant Lake has likely resulted in changes to the Turtle Bay, Camp Fairwood, and Duck Box wetlands, including an earlier dry-down period for the Camp Fairwood and Duck Box wetlands, and increased exposure of pond/lake bed, decreased area and volume of standing water, and plant community migration at all three wetlands. Site reviews at the Pleasant Lake wetlands indicate that existing drawdown has not significantly affected the functional values or quality of the wetlands, due largely to their morphology and water regime. In the Turtle Bay wetland, the highest-quality and most diverse of the Pleasant Lake wetlands, the presence of the invasive species Eurasian Water Milfoil and increased frequency of drying of the channel between the lake and the wetland have been identified as likely results of water table drawdowns and loss of groundwater inflow.

While some cumulative drawdown impacts (0.25 feet) are predicted at the Chaffee Creek spring pond, the current condition of the calcareous fen wetland is exceptional under the Wisconsin Rapid Assessment Methodology. Based on the current site conditions, the functional values and overall wetland quality of the fen area do not appear to have been affected by groundwater pumping activities to date. However, some areas may have transitioned from calcareous fen to other wetland types. Dr. Quentin Carpenter analyzed historic air photos and testified that he identified changes in upslope areas of the wetland over time to a shrubbier, less groundwater dependent, plant community. The area of this transition zone is on the west end of the fen area. During a September, 2013 site visit, Dr. Carpenter also identified signs of plant stress in the upslope areas of the Chaffee Creek wetland (outside of the existing calcareous fen area). Future increases in irrigation pumping and the resulting decrease in water level and groundwater inflow would exacerbate changes to wetland ecology.

Springs (described in section III.A.1.e)
Based on its proximity to high numbers of irrigation wells, it is probable that the Chaffee Creek spring has experienced flow reductions in the last 50 years. SSPA modeled flow reductions of 0.33 cfs due to the cumulative impacts of existing irrigation pumping in the headwaters of Chaffee Creek. This is 18% of the model-calculated baseflow of 1.7 cfs. This reduction is also discussed in the Stream Impacts section, below. Water table drawdown of about 0.25 feet (3 inches) was modeled at the wetland/spring pond due to existing pumping. The possible impacts of cumulative water table drawdown or decreased groundwater inflow are discussed in the preceding section.

Streams (described in section III.A.1.e)
Base flow amounts in the streams of the Central Sands region, including those closest to Richfield Dairy, have been reduced to varying degrees by groundwater withdrawals, mainly for irrigation purposes (Kraft and Mechenich, 2010). Base flow reductions are a concern due to loss of habitat for aquatic species. Decreased groundwater inflow results in warmer stream temperatures, causing stress for the cold-water species, including trout, which are found in the cold or cool-cold streams in the Central Sands. In addition, reduced flows can eliminate spawning substrate through increased sedimentation and generally decrease habitat space for fish and other aquatic life. For example, the tops of overhead habitat structures initially installed significantly below anticipated low-flow water levels have been exposed in mid to late summer in recent years.

SSPA modeling results quantify reductions in average streamflow from existing irrigation pumping (Table 3). For the stream reaches that were assessed, baseflow reduction due to existing irrigation pumping ranged from 1-30%[5], with the highest percent reductions in headwater areas of streams.

One approach to determining whether flow reduction could cause significant impacts is the method currently used by the state of Michigan (Hamilton and Seelbach, 2011). That method assesses the significance of impacts based on changes in projected suitability for fish populations with changes in baseflow for several different stream types. The Michigan model is used as one tool in Wisconsin, along with DNR staff experience, expertise and professional judgment, to guide determinations of whether a certain amount of flow reduction is likely to be significant to a particular stream. Using the Michigan methodology, the modeled cumulative impacts to the headwater reaches of all of the streams near Richfield Dairy (Table 3.A), as well as many of the more distal streams (Table 3.B), would be considered significant.

A

[5] Note that percent reductions are taken from modeled baseflow. In Supplemental Environmental Assessment Table 3, percentages were taken from average measured flows. The reason for the change in calculation method here is because measured flows were not available for most headwater reaches.

Streams Near Richfield Dairy (within 5 miles)				Baseflow reduction due to existing pumping	
Stream	Location	Avg Measured Flow (cfs)	Modeled Baseflow (cfs)	cfs	%
Little Roche a Cri	Unnamed Trib (Sec 19-20 T18N R7E)	NA	0.9	0.07	8.0%
	Ditches (Sec 16 + 9 T18N R7E)	NA	5.7	0.76	13.2%
	10th Ave.	34	35.1	1.81	5.2%
Fordham	6th Ct.	NA	1.8	0.40	22.0%
Chaffee	CTH CH	1.8	1.7	0.33	19.3%
	CTH JJ	14	14.3	0.47	3.3%
Tagatz	4th Ave.	NA	4.8	0.28	5.9%
	near Westfield	7.6	6.0	0.47	7.9%

B

Other Streams in Model Domain (> 5 miles from Richfield Dairy)				Baseflow reduction due to existing pumping	
Stream	Location	Avg Measured Flow (cfs)	Modeled Baseflow (cfs)	cfs	%
Campbell	CTH A	2.4	2.3	0.2	8.7%
Carter	CTH G	2.5	3.3	1.0	30.3%
Lawrence	at Eagle	20	17.5	0.5	2.9%
	near Westfield	16	14.7	0.4	2.7%
Mecan R.	CTH GG	13	12.3	0.3	2.4%
Neenah	CTH G	0.8	1.0	0.2	20.0%
	CTH A	>42	31.4	0.4	1.3%
Schmudlack	4th Ave.	1.2	2.0	0.2	10.0%
S Br Wedde	CTH JJ	7	2.2	0.1	4.5%

Table 2 Streamflow reductions due to cumulative impacts of existing pumping (SSPA model).

The impacts discussed above would occur under steady-state, average conditions. Impact evaluations and permitting decisions are typically based on this type of low-average baseflow condition rather than absolute minimum flows. Flow in streams is lower in drought years. Irrigation pumping also increases in dry years, so drought tends to intensify the cumulative impacts of pumping. Depending on the distance from the pumping wells to the water body of concern, this increased pumping impact may be felt during or after the drought period. As an example of how stream flow changes during drought conditions, Little Roche-

a-Cri Creek at 10th Avenue experienced a 9% decrease in flow in 2007, a moderate drought year, compared to average measured baseflow. In the same year, Chaffee Creek at County Highway CH experienced an 83% flow reduction from an average flow of 1.8 cfs to a minimum flow of 0.3 cfs. These measured decreases reflect both natural and pumping-related reductions.

Lakes (described in section III.A.1.e)

Pleasant Lake is the lake located closest to Richfield Dairy, about 2.8 miles from the proposed high capacity wells. Lake level records show that the lake has experienced a decline in water levels over the past two decades, from high water levels in the mid-1990s to a historic low level in summer of 2007 (water level change of 5.5 feet). Water levels observed in 2007 were similar to those observed during a period of sustained drought in the 1950s and in 1964. The recent downward trend may be slightly exaggerated because lake levels in the 1990s were atypically high. but even accounting for this, lake level records suggest that water level decline over the last two decades is on the order of several feet.

Climate or other factors could be the cause of some portion of the observed decline. A 2014 study of Wisconsin lake levels reported recent water level declines on the order of 1-2 feet, starting in the late 1990s (Watras et al., 2014). The declines were observed both in small lakes in northern Wisconsin and in Lake Michigan and Lake Superior (that is, they appear to be regional in nature). It is therefore likely that some part of the decline observed at Pleasant Lake is climate-driven.

However, based on statistical analysis by Kraft and Mechenich (2010) and groundwater modeling by Kraft and Mechenich (2010, 2011) and by SSPA (2012), approximately 1-3 feet of the observed water level decline in Pleasant Lake in recent years could be attributed to existing groundwater pumping.

There is evidence that the water level declines and other stressors have caused adverse impacts to the lake and lake users. Lower water levels have led to difficulty in reaching navigable water. Compared to other seepage lakes in the area with less recreational use and riparian development (e.g. Wolf Lake, Portage Co, and Patrick Lake, Adams Co), vegetation is sparse to non-existent in the areas exposed by lower water levels. In addition, heavy recreational use of the lake may be contributing to loss of vegetation in shallow areas and increased turbidity due to lower water conditions. This limits spawning areas for fish, including game fish and the banded killifish, a Special Concern Species. However, there is no evidence that water clarity or water quality has changed significantly due to lower water levels. Secchi disk readings were comparable during times of relatively high water (mid-1990's), and times of relatively low water (mid to late 2000's). Water clarity in 2012 and 2013 was relatively low, but this could be due to unusually warm water temperatures which led to increased algal growth.

Cumulative Impacts Summary

The total modeled impacts of existing groundwater withdrawals plus Richfield Dairy's wells (pumping at 52.5 MGY) are as follows. Water table drawdowns due to existing wells are approximately 2.5 feet in the vicinity of the Richfield Dairy, with approximately 1 foot of additional drawdown due to the Dairy wells expected in the immediate vicinity of the production area. At Pleasant Lake and its adjacent wetlands, water table/lake level drawdown due to existing pumping is 1-3 feet, with approximately 1-2 inches of additional drawdown accruing over 25 years or more due to the Dairy. At the Little Roche a Cri headwater wetlands, water table drawdown due to existing pumping is 0.5-1 foot, with less than one inch of additional drawdown expected due to the Dairy. Stream depletion amounts at headwater streams in the vicinity of the dairy are modeled to be 8.0-13.2% (Little Roche a Cri Creek), 22.0% (Fordham Creek), 19.3% (Chaffee Creek), and 5.9% (Tagatz Creek) relative to steady state baseflow (SSPA). Kraft and Mechenich (2010) calculated existing stream depletion on a similar scale to SSPA (1.5-15%). Including modeled long-term impacts from the Richfield Dairy, the total impacts to these headwater reaches are 8.6-13.9% (Little Roche a Cri Creek), 22.8%, (Fordham Creek), 21.3% (Chaffee Creek), and 6.7% (Tagatz Creek) Other streams within the SSPA model domain but not in areas directly affected by the dairy had modeled reductions in baseflow of up to 30%. (Changes in these streams due to the Dairy were 0.2% or less.) DNR Fisheries staff are concerned about the cumulative impacts of existing pumping on stream health for several of the streams in the model area and consider the existing cumulative impacts significant.

Future impacts

In three watersheds near the project, groundwater modeling predicted that the Richfield Dairy wells could cause stream baseflow reductions of 0.5% or more: Fordham/Little Roche a Cri Creek, Chaffee Creek, and Tagatz Creek. These watersheds were analyzed to identify their potential for future expansion of irrigation-dependent agriculture (Figure 12).

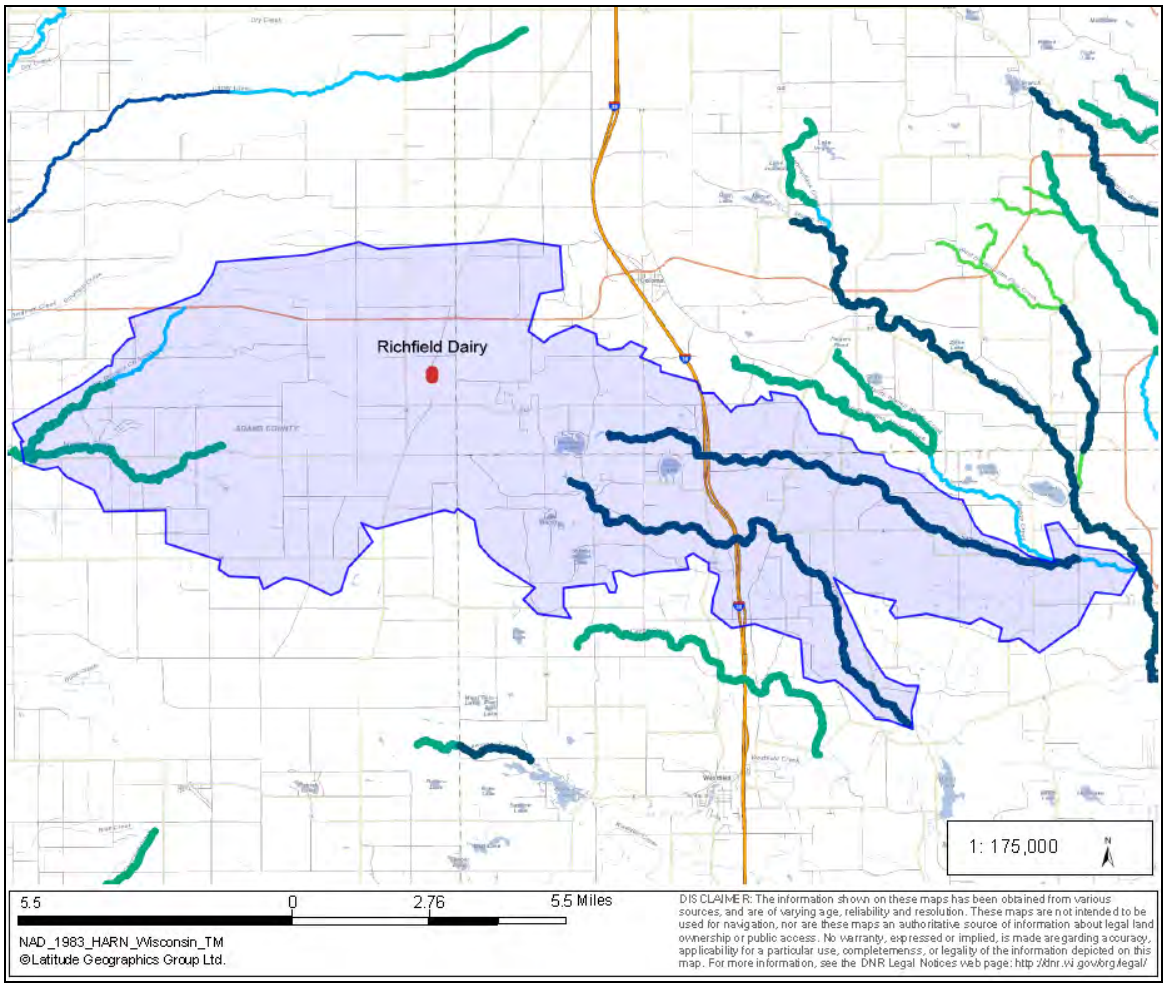


Figure 12 Future Impacts Analysis Area - Fordham/Little Roche a Cri Creek, Chaffee Creek, and Tagatz Creek Watersheds

Potentially arable lands within the three watersheds were identified by excluding areas where agriculture is impossible or highly unlikely (lakes, wetlands, publicly owned lands, municipalities, conservation easements, and tribal lands). Using these criteria, roughly 81% of the 61,000 acres in the three watersheds was deemed to be potentially arable.[6]

The U.S. Department of Agriculture's 2013 Crop Data Layer shows that 38% of land in the area of the analysis is currently being farmed. Most of the current cropland is densely concentrated in a north-south swath west of the Johnstown Moraine near the proposed Richfield Dairy, with the remainder in pockets throughout the watersheds.

Using a calculation based on the pumping capacity of existing wells in the three-watershed study area, the Department determined that approximately 59% of the

[6] This analysis did not exclude steep hill slopes, poor agricultural soils, or land covered by roads or rivers. As a result, the potential for future agriculture is likely overestimated.

current agricultural land is currently irrigated (22% of the total potential arable land).

Within the study area, approximately 7,618 acres of current cropland could become irrigated with the installation of a high capacity well and irrigation system; this would constitute a 70% increase over current irrigated acres. In addition, approximately 30,914 acres could be irrigated if all existing non-agricultural land cover was converted to cropland, a 183% increase over current irrigated acres.

Watershed	Total Watershed Area	Potential Irrigable Area		Current Agricultural Land		Currently Irrigated (Estimate)	
	Acres	Acres	% of Total Acres	Acres	% of Potential Ag Land	Acres	% of Current Ag Land
Fordham - Little Roche a Cri Creek	30,916	26,051	84.3%	11,688	44.9%	9,088	77.8%
Chaffee Creek	16,039	11,011	68.7%	3,556	32.3%	1,277	35.9%
Tagatz Creek	14,047	12,381	88.1%	3,285	26.5%	546	16.6%
Total	61,002	49,443	81.1%	18,529	37.5%	10,911	58.9%

Table 3 Current and Potential Irrigated Agriculture

Since 1958, WDNR approved 131 high capacity wells in the three-watershed area at an average rate of 2.38 per year. These wells range in capacity from 125 gallons per minute to 1400 gpm; most of the wells are for crop irrigation. The mean pump capacity of approved high capacity wells is 790 gpm.

The annual rate of applications for new wells within the watersheds ranged from a high of 17 in 1984 to no new well applications in multiple years. Recent well approval rates within the study area are: 4 high capacity wells approved in 2012, 5 in 2013, and 4 in 2014. As of March 18, 2015, there are also eight applications for high capacity wells within the study area pending review.

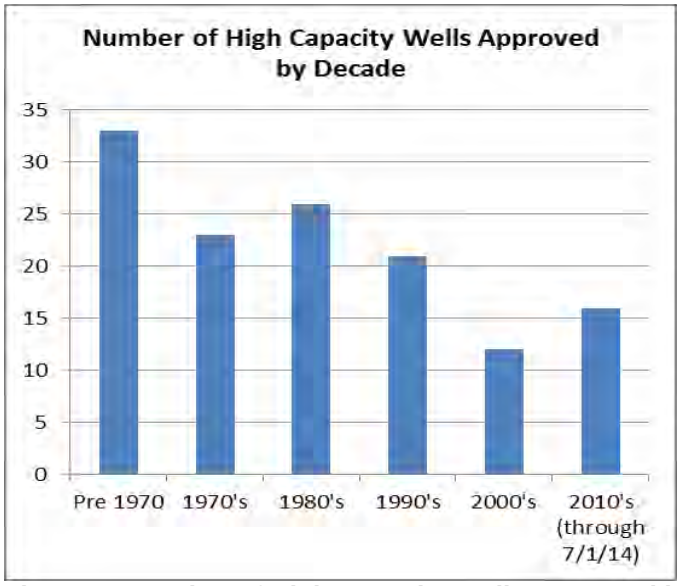


Figure 13 Number of High Capacity Wells Approved by Decade

Time Period	# of Well Approvals
Pre 1970	33
1970's	23
1980's	26
1990's	21
2000's	12
2010's (through 7/1/14)	16
Total	131

Given the existence of ample land available for the expansion of irrigated agriculture, especially in the Chaffee and Tagatz Creek watersheds, it is reasonable to anticipate that the Department will continue to receive applications for new irrigation wells at a rate similar to the last two decades. The higher-than-average rate of new applications in the last several years may be part of an increasing trend that will continue into the future, and/or may be the result of high crop prices and several recent dry growing seasons in the region. However, the number of new wells that may be approved in the future may be limited by considering cumulative impacts of all wells.

There is currently one other CAFO permitted within the three-watershed region used for the future impact analysis (Burr Oak Heifers, formerly Opitz Custom Heifers, less than one mile south of the Richfield Dairy Site). New Chester Dairy, another permitted CAFO in the area, is approximately 9 miles south of Richfield Dairy but is outside of the watersheds identified as potentially impacted by Richfield Dairy's wells. It is difficult to determine if other CAFOs would locate within the region. Many factors affect the ability of a CAFO to locate near other CAFOs (e.g., size of the CAFOs, actual available farming acreage, other non-CAFO farms in the area). It is possible that one or more additional CAFOs could be sited within the future impact study area. WPDES permits require that CAFOs obtain adequate acreage to land apply manure and process wastewater in accordance with a Nutrient Management Plan that reflects the requirements of ch. NR 243 and the permit, regardless of the location or size of an operation.

If additional acres within the three-watershed region were irrigated (for a CAFO or other agricultural use) or if additional groundwater withdrawals occurred for other reasons (such as industrial, municipal or commercial use), the impacts on surface waters within the region would depend on where the high capacity wells were located and how much groundwater was pumped. The anticipated future increases in groundwater withdrawals would add to stresses on surface water features, but additional groundwater modeling would be necessary to more specifically predict the future impacts of any proposed withdrawals. Existing groundwater modeling and statistical analyses show that water levels and stream baseflows in parts of all three watersheds, mainly headwater areas, have been reduced by existing groundwater withdrawals. Additional stresses from future withdrawals would tend to exacerbate those impacts. Withdrawals that reduce groundwater levels more than 12 inches below the soil surface will convert a wetland area to a non-wetland area. In flat areas that are temporarily saturated or ponded with groundwater, drawdown of only two to three inches may lower the water table enough to convert herbaceous wetlands (wet and sedge meadows) to shrub/forested wetlands. In other areas, a larger drawdown would be necessary before a wetland would be converted to a different wetland type. The wetlands that are at most risk for losing wetland function are in the Little Roche a Cri headwater area. Future drawdowns could also cause resources that are currently in good condition, such as the Chaffee Creek spring pond/calcareous fen, to experience changes in plant and animal species assemblages, decreasing their functional values.

In addition to ecological changes to surface waters, lowered water levels in seepage lakes such as Pleasant Lake could further decrease recreational opportunities. In streams, decreased groundwater inputs that resulted in significant impacts to trout populations would diminish their value for fishing.

VI.A.4 Economics

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

The tax base in local areas may go up in response to the increase in property values and improvements at production sites. Property values may also go up for parcels used for growing crops and application of manure. The value of nearby residential properties may go down due to the close proximity of CAFO's. On a large scale there may be little or no change in the tax base due to the presence of CAFO's (Purdue Extension Guide AY-318-W http://www.ansc.purdue.edu/cafo/).

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 a 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 Guide AY-318-W http://www.ansc.purdue.edu/cafo/).

The value of housing is based on both the value of the land and the value of the buildings and other improvements to the land. Between 1940 and 2000, median home values in Wisconsin increased from $33,600 to $112,000. Generally, Wisconsin housing values have been consistent with national trends. Land values have gone up primarily due to general demand, but also due to the demand for vacation property. Residential improvements have also increased in value because of increasing house sizes and building quality, both for new houses and for renovations. (Housing Megatrends, UW Extension)

A 2003 study of property values in Berks County, Pennsylvania sheds some light on the effects of CAFOs on nearby residential properties. The following summary is from the executive summary of the report (Ready and Abdalla, 2003, *The Impact of Open Space and Potential Local Disamenities on Residential Property Values in Berks County, Pennsylvania.* Department of Agricultural Economics and Rural Sociology, The Pennsylvania State University. See: http://landuse.aers.psu.edu/study/BerksLandUseShort.pdf).

> *"Several potential local disamenities were found to have a negative impact on nearby house prices. Of the potential local disamenities investigated, the impact of landfills on house price was largest, and extended the farthest (up to 3200 meters). A landfill located 800 meters from a house decreases that house's sale price by an estimated 6.9%. The impact of a large-scale animal production facility (over 200 animal equivalent units or aeu's) on house price was about one half to two thirds as large as that from a landfill (4.1% at 800 meters), and did not extend as far (up to 1600 meters). The impacts on house price from mushroom production and from the regional airport were much less (0.4% and 0.2%, respectively, at 800 meters). The impact from high traffic roads was small, and extended only a short distance. No significant impact was found for sewage treatment plants. Additional analysis attempted to investigate whether different types of animal production facilities had different impact on nearby house prices. Differences in the impact due to differences in the size of the operation (number of aeu's) were not statistically significant. Further, medium-sized production facilities (200 to 300 aeu's) were found to have a statistically significant negative effect on house prices when considered apart from larger facilities. Similarly, the impact did not vary significantly by species (poultry, swine, and beef/dairy). An analysis of proximity of animal production facilities and residential properties showed that the density of single family homes around animal production facilities was lower than the average for rural parts of the county. An implication is that some potential for conflicts is avoided due to the way in which these land uses are located on the land.*
>
> *The total impact on surrounding house prices was calculated for a landfill, the*

regional airport, and an animal production facility. The average impact on the value of 3342 houses located within 3200 meters was $2442 (all values are in 2002 dollars). The total impact on all houses was $8,162,000, which is 2.6% of the assessed value of the affected properties. The average impact of the regional airport on 2256 houses located within 1600 meters of the airport runway and its flight paths was $104, and the total impact on the value of these properties was $235,000, or 0.1% of the assessed value of the affected properties. This calculation does not include 2391 properties located near the airport within the City of Reading. The average impact of a single animal production facility on 119 single family residences located within 1600 meters of the facility $1,803. The total impact on all 119 houses is $215,000, or 1.7% of the assessed value of the affected houses. These figures are intended as illustrations, and should not be considered averages for similar facilities. The impact from any given landfill, airport, or animal production facility will depend on the number of houses located near the site, and on the market value of those houses absent the facility."

There are typically positive short-term economic effects to contractors and vendors during the construction phase of CAFOs.

Long-term positive effects are also generated by wages and additional economic activity with vendors, suppliers, and maintenance contractors over the length of CAFO operations.

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 large dairies may add significantly to the economy in Wisconsin, there may be little or no positive impact on local economies other than those resulting from wages and field crops.

A recent CAFO 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 (Rosendale Dairy WPDES permit application).

The tendency for dairy farming operations to become larger (and some to enlarge to the point they must be permitted as CAFOs) in order to remain economically viable, may help to maintain the dairy-based economies of the state."

VI.B Degree of risk or uncertainty

The requirements of a WPDES permit, including the requirement to develop and implement an NMP, will not guarantee that water quality will be protected from impacts. The proposed designs of the facilities and systems exceed minimum

design standards and are expected to protect groundwater and surface water to the extent required by law, meaning the production site is not expected to cause exceedance of groundwater water or surface water standards. While it is still possible such an event could occur, the DNR acknowledges the need to balance the level of protection with what is deemed likely and reasonable, particularly in light of codified requirements in ch. NR 243. Only limited data exists on failure rates of manure storage impoundment liners, but the data indicates some level of protection above the minimum is appropriate for higher risk sites, such as this one. An appropriate level of additional protection is provided by the proposed designs. In addition, the Department has added a requirement for the permittee to conduct leak detection and groundwater monitoring as part of the WPDES permit.

VI.C Degree of precedence

All future projects will be evaluated by their own specific adverse and beneficial impacts. There are other similarly sized operations in Wisconsin. Each individual project is considered separately based on its own merits. In fact, permitting dairy CAFO's has become a fairly common practice and the Department has prepared an environmental assessment that was signed in April 2011 associated with the creation of a CAFO WPDES general permit for Dairy CAFOs with 1000 to 5720 AU.

The Department considered issues that fall under its regulatory authority, as well as broader issues, as part of this analysis. The project is not known to conflict with plans or policy of local, state, or federal agencies. The operation will need to apply for and receive the appropriate approvals from all involved agencies prior to operating. Permitting this operation would not foreclose future options for taking necessary actions to protect the environment (i.e., revocation, modification of the permit or approvals). Through enforcement of the WPDES permit, the Department has a means to avoid or address possible environmental impacts associated with the operation.

VI.D Degree of controversy

This proposal has generated a high level of public controversy. State and local residents have expressed concerns about the environment such as possible air and water quantity/quality issues. The public has also expressed concerns over socio-economic issues such as property values, wells (both quantity and quality), flora, fauna, air quality, animal treatment 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.

Legal challenges to the environmental review process have focused on cumulative impacts of groundwater withdrawals in the central sands and the potential impacts of the proposed high capacity wells for the dairy on those watershed conditions and local resources. On March 26, 2014, pursuant to the Court of Appeals decision, the Dane County Circuit Court issued a Supplemental Remand Order, directing DNR to consider the cumulative effects of the two high capacity wells, consistent with the Court of Appeals decision (case # 11CV3375).

In response to the Court remand order, the department has provided additional information in this EIS relative to cumulative impacts, including an evaluation of the cumulative impacts of past, present and reasonably foreseeable high capacity wells in the region.

VII Alternatives

VII.A Department Alternatives

VII.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 Department has reviewed the proposed project plans and specs and issued the following approvals: WPDES CAFO Permit No. WI-0064815-01-0; WPDES Plans and Specifications Approvals R-2011-0029, R-2012-0057 and R-2013-0180; WPDES Nutrient Management Plan WI-00648; WI-S067831-3 Construction Site Storm Water Runoff; and Conditional High Capacity Well Approvals for high capacity wells 71786 and 71787 on high capacity property No. 01-03-0009.

VII.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:

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

Denial of the permit would require that Richfield Dairy either not populate its operation with animals or that it populate the operation with fewer than 1,000 AU. 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 ground. In addition, there would not be the potential economic benefits and water quality benefits associated with nutrient management planning on acreage planned to receive Richfield Dairy manure and process wastewater.

Within the constraints of the Department's existing permitting authority for CAFOs, the Department has limited alternatives to the issuance of a WPDES permit for the operation. Based on the information available, the Department was not able to justify denial of the proposed WPDES permit for the operation since it was expected that the operation will be able to comply with the conditions of the proposed permit and not cause an exceedance of water quality standards. The Department could have required more stringent conditions in the permit if it had determined such conditions were necessary to protect water quality. The Department used the information collected as part of the environmental analysis as well as part of the public comment period associated with the issuance process of a WPDES permit to makes its final determination on issuance of the permit and to determine if additional restrictions in the permit are necessary. The WPDES permit for Richfield Dairy (WI-0064815-01-0) was issued on November 3, 2011. The permit was adjudicated and will be modified.

VII.A.2.b 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 BMPs to protect groundwater, surface waters and wetlands for all operations covered under a WPDES permit. The Department does have authority to require more restrictive BMPs 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 proposed and finalized WPDES permit contains permit conditions that protect groundwater and surface water and are consistent with ch. NR 243, Wis.

Adm. Code, the code that establishes permit requirements for CAFOs throughout the state. (See Section I.E.4.c for site specific permit conditions)

VII.A.2.c Require manure/process wastewater treatment

See Section I.E.2 and I.E.4.

VII.A.3 Department high capacity well review

The Department's alternatives for review of the high capacity well application are:

1) Deny the application for high capacity well(s) based on probable significant adverse environmental impacts to waters of the state that cannot be avoided by placing conditions on the construction or use of the well(s).
2) Approve the application for high capacity well(s) without conditions.
3) Approve the application for high capacity well(s) with conditions designed to avoid significant adverse environmental impacts to waters of the state.

The selected alternative is to approve the high capacity well application with conditions to avoid significant adverse environmental impacts. Approval conditions are described in sections I.E.4.c and II.A.

VII.B Applicant alternatives

VII.B.1 Production site

Richfield Dairy has indicated that they reviewed three alternatives as part of its decision to build at the proposed site:

<u>(1) No build</u>
According to information provided by Richfield Dairy, the "No build" alternative would not have provided for economic development, additional employment opportunities, or tax revenue at the local and state levels.

<u>(2) Expand at one of its existing facilities</u>
With current manure handling technologies and the need to secure additional cropland, expansion 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
Richfield Dairy has indicated that they have investigated sites in both northeast and north central Wisconsin. Other sites were eliminated due to presence of other large dairies, lack of available cropland for feed production or manure application, topography or other reasons.

VII.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 BMPs, 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 Richfield Dairy has submitted includes some BMPs 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.

VII.B.3 Operations

The applicant considered moving the wells to a different location in order to minimize the potential impact to waters of the state. This alternative was not chosen because of the uncertainty of finding a feasible site where overall impacts would be lessened relative to the current site.

VII.B.4 Other environmental management & monitoring

The DNR included WPDES requirements for groundwater monitoring around the manure storage lagoons using monitoring wells constructed as per chapter NR 141, Wis. Adm. Code. The WPDES permit also requires a leak detection monitoring system for the Attenuation Basin and Sweet Corn Silage Bunkers.

Given that the sandy soils present at the production area are porous in nature, the Department recognizes there is an increased risk of groundwater impacts at the site. The Department believes that additional monitoring requirements (groundwater monitoring wells, leak detection) were warranted to determine if manure and process wastewater structures/systems have been constructed and are operated properly. The following changes were made to the permit to reflect these concerns.

- Section 2, “Production Area Monitoring Requirements,” has been added to the permit requiring the installation and monitoring of groundwater monitoring wells for the production area. In addition, chemical monitoring of the leak detection systems installed underneath the Attenuation Basin and Sweet Corn Silage Bunkers is being required.
- A construction schedule (section 3.3 “Production Area Monitoring-Groundwater Monitoring Well Installation) has been added to the “Schedules” section of the permit outlining the timing of the required installation of groundwater monitoring wells at the production area.
- Section 4.2, “Groundwater Standard Requirements,” has been added to the Standard Requirements of the permit associated with the groundwater monitoring requirements.

For land application areas:
The Department has added three conditions to section 1.6.3, “Additional Nutrient Management Plan Requirements,” designed to provide information on timing of incorporation and planting following manure and process wastewater applications on highly permeable soils and to address applications of materials with low solids content on highly permeable soils.

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.

VIII Reference Materials

Environmental Assessment and Addendum, certified on November 1, 2011. Supplemental Environmental Assessment, certified on March 12, 2013. http://dnr.wi.gov/topic/agbusiness/cafo/richfielddairy.html

Andrews, Charles., 2013. Contested case hearing testimony, June 25, 2013 and December 16, 2013)

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House, Leo B., 1985, Stage Fluctuations of Wisconsin Lakes, USGS Information Circular No. 49, Wisconsin Geological and Natural History Survey, 84 pp.

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S.S. Papadopulos & Associates, Inc., 2013a, Response to DNR Request for Additional Information, February 12, 2013.

S.S. Papadopulos & Associates, Inc., 2013b, Response to DNR Request for Additional Information on Irrigation Water Use, February 25, 2013.

Watras, C. J., J. S. Read, K. D. Holman, Z. Liu, Y.-Y. Song, A. J. Watras, S. Morgan, and E. H. Stanley (2014), Decadal oscillation of lakes and aquifers in the upper Great Lakes region of North America: Hydroclimatic implications, Geophysical Research Letters, 41, 456–462, doi:10.1002/2013GL058679.

STATE OF WISCONSIN
DIVISION OF HEARINGS AND APPEALS

In the Matter of a Conditional High Capacity Well Approval for Two Potable Wells to be Located in the Town of Richfield, Adams County Issued to Milk Source Holdings, LLC	Case No. IH-12-03
In the Matter of a Conditional High Capacity Well Approval for Two Potable Wells to be Located in the Town of Richfield, Adams County Issued to Milk Source Holdings, LLC, and Conditional Approval Modification of Plans and Specifications for Richfield Dairy Located in Adams County	Case No. IH-12-04
In the Matter of a Conditional High Capacity Well Approval for Two Potable Wells to be Located in the Town of Richfield, Adams County Issued to Milk Source Holdings, LLC	Case No. IH-12-05
In the Matter of the Wisconsin Pollutant Discharge Elimination System Permit No. WI-0064815-01-0 (WPDES Permit) Issued to Richfield Dairy, Town of Richfield, Adams County	Case No. IH-12-08

RICHFIELD DAIRY, LLC'S SUPPLEMENTAL RESPONSES TO PETITIONERS FAMILY FARM DEFENDERS, FRIENDS OF THE CENTRAL SANDS, AND INDIVIDUAL PETITIONERS SECOND SET OF WRITTEN DISCOVERY TO RICHFIELD DAIRY, LLC

Richfield Dairy, LLC, by its counsel, Michael Best & Friedrich LLP, submits the following supplemental response to Petitioners Family Farm Defenders, Friends of the Central Sands and Individual Petitioners' Second Set of Written Discovery as follows:

INTERROGATORY

Interrogatory No. 7: Identify your methodologies for calculating water usage for Richfield Dairy.

EXHIBIT A

Supplemental Response: Subject to the general and specific objections set forth in Richfield Dairy's response dated June 11, 2013, and without waiving them, Richfield Dairy further responds as follows. Richfield Dairy originally estimated annual water usage at 44,000,000 gallons per year (gpy) for watering and cleaning cows, plus 8.5 million gpy for evaporative cooling. This total estimate was 52.5 million gpy and this figure was included in the Environmental Assessment Questionnaire for Richfield Dairy's WPDES permit application.

When Richfield Dairy requested a change in its high capacity well approval from 131.2 million gpy to 72.5 million gpy, it recalculated its water usage estimate. The recalculated estimate was a proportion of the estimate generated for New Chester Dairy, based on a comparison of the number of cows proposed at each dairy. New Chester Dairy was proposed to house 8,600 milking and dry cows and 500 steers; Richfield Dairy was proposed to house 4,300 milking and dry cows and 250 steers.

Actual water use at Rosendale Dairy for 2011-2012 was used to develop the estimated water use for New Chester Dairy. Between 2011 and 2012, Rosendale Dairy used approximately 130 million gallons per year, and in 2012 had approximately 8600 cows. To ensure New Chester Dairy would not exceed a permitted water use limit if an unexpected water need arose, a 15 million gpy cushion was built in, bringing the total estimate for New Chester Dairy to 145 million gpy.

DOCUMENT REQUESTS

Document Request No. 19: All documents relating to any and all calculations of water usage needs for Richfield Dairy.

Supplemental Response: Subject to the general and specific objections set forth in Richfield Dairy's response dated June 11, 2013, and without waiving them, Richfield Dairy further responds as follows: See Documents No. RD-000721 to RD-000728.

Dated this 27th day of June, 2013.

MICHAEL BEST & FRIEDRICH LLP
Attorneys for Richfield Dairy, LLC and
Milk Source Holdings, LLC

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Withdrawal Report - 2012

State of Wisconsin
Department of Natural Resources
Water Use Section - DG/5
PO Box 7921
Madison, WI 53707-7921

Property Name : Rosendale Dairy
Wateruse Property Number : 10337
This Report was printed on : 2/6/2013

Owner	**Operator**
TODD WILLER N3569 VANDEN BOSCH RD KAUKAUNA, WI 54130 Phone : (920) 766-5335 E-Mail : twiller@milksource.net	SARAH BABCOCK N3569 VANDEN BOSCH RD KAUKAUNA, WI 54130 Phone : (920) 766-3579 E-Mail : sbabcock@milksource.net
Source Information Source Name : SOUTH WELL #4 (FORMERLY SOUTH 1) County : Fond Du Lac High cap well # : 69599 PLSS : SE¼ of the SW¼, Section 09 Township 16N, Range 15East Pumpage Year : 2012 Method Code : TFM Water Use Code : LV10	

Did you withdraw water from this source this year? Y

Month	Gallons Withdrawn
January	9,500
February	4,600
March	7,100
April	10,000
May	52,800
June	148,800
July	206,300
August	138,900
September	456,500
October	138,900
November	11,500
December	3,900

Withdrawal Comment

Withdrawal Report - 2012

State of Wisconsin
Department of Natural Resources
Water Use Section - DG/5
PO Box 7921
Madison, WI 53707-7921

Property Name : Rosendale Dairy
Wateruse Property Number : 10337
This Report was printed on : 2/6/2013

Owner	**Operator**
TODD WILLER N3569 VANDEN BOSCH RD KAUKAUNA, WI 54130 Phone : (920) 766-5335 E-Mail : twiller@milksource.net	SARAH BABCOCK N3569 VANDEN BOSCH RD KAUKAUNA, WI 54130 Phone : (920) 766-3579 E-Mail : sbabcock@milksource.net
Source Information Source Name : SOUTH WELL #3 (FORMERLY SOUTH 2) County : Fond Du Lac High cap well # : 69600 PLSS : SE¼ of the SW¼, Section 09 Township 16N, Range 15East Pumpage Year : 2012 Method Code : TFM Water Use Code : LV10	

Did you withdraw water from this source this year? Y

Month	Gallons Withdrawn
January	3,996,500
February	3,620,500
March	4,509,600
April	3,832,500
May	4,362,000
June	5,569,600
July	6,297,700
August	6,041,400
September	2,801,300
October	4,029,700
November	4,292,900
December	4,040,900

Withdrawal Comment

Withdrawal Report - 2012

State of Wisconsin
Department of Natural Resources
Water Use Section - DG/5
PO Box 7921
Madison, WI 53707-7921

Property Name : Rosendale Dairy
Wateruse Property Number : 10337
This Report was printed on : 2/6/2013

Owner	**Operator**
TODD WILLER N3569 VANDEN BOSCH RD KAUKAUNA, WI 54130 Phone : (920) 766-5335 E-Mail : twiller@milksource.net	SARAH BABCOCK N3569 VANDEN BOSCH RD KAUKAUNA, WI 54130 Phone : (920) 766-3579 E-Mail : sbabcock@milksource.net
Source Information Source Name : NORTH WELL #2 (FORMERLY NORTH 1) County : Fond Du Lac High cap well # : 69602 PLSS : SE¼ of the SW¼, Section 09 Township 16N, Range 15East Pumpage Year : 2012 Method Code : TFM Water Use Code : LV10	

Did you withdraw water from this source this year? Y

Month	Gallons Withdrawn
January	717,300
February	792,800
March	1,063,200
April	1,096,400
May	1,760,900
June	3,081,000
July	4,156,000
August	3,797,600
September	2,565,700
October	3,406,900
November	4,783,500
December	5,263,300

Withdrawal Comment

Withdrawal Report - 2012

State of Wisconsin
Department of Natural Resources
Water Use Section - DG/5
PO Box 7921
Madison, WI 53707-7921

Property Name : Rosendale Dairy
Wateruse Property Number : 10337
This Report was printed on : 2/6/2013

Owner	**Operator**
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Source Information Source Name : NORTH WELL #1 (FORMERLY NORTH 2) County : Fond Du Lac High cap well # : 69601 PLSS : SE¼ of the SW¼, Section 09 Township 16N, Range 15East Pumpage Year : 2012 Method Code : TFM Water Use Code : LV10	

Did you withdraw water from this source this year? Y

Month	Gallons Withdrawn
January	5,458,900
February	4,540,200
March	5,464,400
April	4,282,600
May	4,172,500
June	4,268,100
July	3,874,400
August	4,357,500
September	2,161,600
October	1,985,400
November	1,215,400
December	990,800

Withdrawal Comment

Withdrawal Report - 2011

State of Wisconsin
Department of Natural Resources
Water Use Section - DG/5
PO Box 7921
Madison, WI 53707-7921

Property Name : Rosendale Dairy
Wateruse Property Number : 10337
This Report was printed on : 2/20/2012

Owner	**Operator**
TODD WILLER N3569 VANDEN BOSCH RD KAUKAUNA, WI 54130 Phone : (920) 766-5335 E-Mail : twiller@milksource.net	SARAH BABCOCK N3569 VANDEN BOSCH RD KAUKAUNA, WI 54130 Phone : (920) 766-3579 E-Mail : sbabcock@milksource.net
Source Information Source Name : SOUTH WELL #4 (FORMERLY SOUTH 1) County : Fond Du Lac High cap well # : 69599 PLSS : SE¼ of the SW¼, Section 09 Township 16N, Range 15East Pumpage Year : 2011 Method Code : TFM Water Use Code : LV10	

Did you withdraw water from this source this year? Y

Month	Gallons Withdrawn
January	5,700
February	6,800
March	3,500
April	10,100
May	15,700
June	62,200
July	54,800
August	70,300
September	24,400
October	24,500
November	7,000
December	7,000

Withdrawal Comment

Withdrawal Report - 2011

State of Wisconsin
Department of Natural Resources
Water Use Section - DG/5
PO Box 7921
Madison, WI 53707-7921

Property Name : Rosendale Dairy
Wateruse Property Number : 10337
This Report was printed on : 2/20/2012

Owner	**Operator**
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Source Information Source Name : SOUTH WELL #3 (FORMERLY SOUTH 2) County : Fond Du Lac High cap well # : 69600 PLSS : SE¼ of the SW¼, Section 09 Township 16N, Range 15East Pumpage Year : 2011 Method Code : TFM Water Use Code : LV10	

Did you withdraw water from this source this year? Y

Month	Gallons Withdrawn
January	3,443,300
February	3,046,300
March	3,490,800
April	3,660,000
May	4,262,800
June	5,385,000
July	5,742,000
August	4,651,100
September	4,077,100
October	4,349,200
November	3,615,200
December	4,162,400

Withdrawal Comment

Withdrawal Report - 2011

State of Wisconsin
Department of Natural Resources
Water Use Section - DG/5
PO Box 7921
Madison, WI 53707-7921

Property Name : Rosendale Dairy
Wateruse Property Number : 10337
This Report was printed on : 2/20/2012

Owner	**Operator**
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Source Information Source Name : NORTH WELL #2 (FORMERLY NORTH 1) County : Fond Du Lac High cap well # : 69602 PLSS : SE¼ of the SW¼, Section 09 Township 16N, Range 15East Pumpage Year : 2011 Method Code : TFM Water Use Code : LV10	

Did you withdraw water from this source this year? Y

Month	Gallons Withdrawn
January	5,483,000
February	4,700,200
March	4,970,700
April	6,005,000
May	5,906,300
June	4,683,700
July	7,006,300
August	6,973,200
September	5,428,100
October	5,418,700
November	4,951,500
December	5,317,600

Withdrawal Comment

Withdrawal Report - 2011

State of Wisconsin
Department of Natural Resources
Water Use Section - DG/5
PO Box 7921
Madison, WI 53707-7921

Property Name : Rosendale Dairy
Wateruse Property Number : 10337
This Report was printed on : 2/20/2012

Owner	**Operator**
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Source Information Source Name : NORTH WELL #1 (FORMERLY NORTH 2) County : Fond Du Lac High cap well # : 69601 PLSS : SE¼ of the SW¼, Section 09 Township 16N, Range 15East Pumpage Year : 2011 Method Code : TFM Water Use Code : LV10	

Did you withdraw water from this source this year? Y

Month	Gallons Withdrawn
January	180,500
February	133,200
March	812,100
April	484,100
May	297,200
June	336,800
July	1,207,200
August	119,900
September	429,700
October	718,400
November	869,900
December	624,500

Withdrawal Comment

Opitz Custom Heifers **Burr Oak Farm site**

	Nitrate+Nitrite (as N) (mg/L)			Chloride (mg/L)				GW Elev (ft, msl)		
Sample Date	MW-1 (BOF-1)	MW-2 (BOF-2)	MW-3 (BOF-3)	MW-1 (BOF-1)	MW-2 (BOF-2)	MW-3 (BOF-3)	Sample Date	MW-1 (BOF-1)	MW-2 (BOF-2)	MW-3 (BOF-3)
12/21/2004	9.8	12	18	24	11	37	12/21/2004	1028.17	1026.73	1026.03
01/28/2005							01/28/2005			
03/29/2005	14	17	40	43	19	50	03/29/2005	1027.95	1027.02	1025.78
06/23/2005	9.1	25	48	32	41	65	06/23/2005	1027.47	1025.79	1024.75
09/29/2005	11	22	24	32	21	23	09/29/2005	1026.13	1024.57	1023.25
12/19/2005	5.3	20	21	22	24		12/19/2005	1026.25	1024.78	1023.91
03/30/2006	6.6	22	26	26	24	32	03/30/2006	1025.81	1024.40	1023.67
06/28/2006	5.7	18	22	24	21	27	06/28/2006	1024.92	1023.45	1022.28
09/27/2006	3.8	29	43	78	26	58	09/27/2006	1024.03	1022.65	1021.43
12/18/2006	9	27	19	58	32	31	12/18/2006	1024.49	1023.03	1022.20
03/19/2007	14	13	18	75	24	35	03/19/2007	1024.39	1023.03	1022.22
06/25/2007	27	12	23	71	17	48	06/25/2007	1023.62	1021.97	1020.92
09/25/2007	26	12	40	51	12	62	09/25/2007	1023.74	1022.03	1021.53
12/17/2007	7.3	13	40	14	16	47	12/17/2007	1023.92	1022.59	1021.81
03/17/2008	8.4	12	70	50	18	230	03/17/2008	1024.04	1022.81	1021.81
06/29/2008	7.8	2.5	20				06/29/2008	1025.39	1023.97	1022.27
09/22/2008	6.6	3.2	42	19	9.8	160	09/22/2008	1026.07	1024.63	1023.42
12/16/2008	14	2.9	72	53	11	200	12/16/2008	1026.48	1025.03	1024.22
03/23/2009	13	19	63	54	35	230	03/23/2009	1026.82	1025.52	1024.46
06/24/2009	33	10	65	85	21	180	06/24/2009	1025.86	1024.50	1023.52
09/28/2009	15	13	18	68	28	67	09/28/2009	1024.12	1022.83	1021.37
12/14/2009	22	13	24	57	16	37	12/14/2009	1024.39	1023.08	1022.14
03/16/2010	8.2	18	53	110	26	110	03/16/2010	1024.67	1023.69	1022.41
06/14/2010	50	16	42	85	22	98	06/14/2010	1024.31	1022.92	1021.83
09/29/2010	45	15	52	62	26	150	09/29/2010	1026.03	1024.92	1023.62
12/16/2010	40	17	41	77	23	120	12/16/2010			
03/21/2011	45	17	49	110	29	85	03/21/2011	1027.28	1026.95	1025.09
06/06/2011	43	7.9	44	110	14	99	06/06/2011	1027.55	1026.20	1025.14
09/29/2011	46	14	22	54	27	34	09/29/2011	1026.25	1024.62	1023.31
12/21/2011	<0.24	16	44	64	23	57	12/21/2011	1026.47	1024.95	1024.04
03/28/2012	30	12	44	70	17	74	03/28/2012	1026.31	1024.90	1024.17
06/27/2012	120	1.1	48	95	21	69	06/27/2012	1026.30	1024.82	1023.38
09/27/2012	4.7	17	56	93	28	71	09/27/2012	1024.24	1022.85	1021.64
12/11/2012	14	18	38	69	28	61	12/11/2012	1024.37	1023.09	1022.32
03/21/2013	30	16	39	88	31	61	03/21/2013	1024.41	1023.30	1022.45
06/27/2013	45	12	37	29	29	47	06/27/2013	1025.50	1024.22	1022.91
09/23/2013	42	22	31	66	46	40	09/23/2013	1025.26	1023.72	1022.27
AVE		**14.91**			**23.34**					
STDEV		**6.45**			**8.09**					
AVE + 2* STDEV		**27.80**								
AVE + 1* STDEV + PAL		**23.35**								

Crop	Average Annual ET (mm)	Year of Data Collection	Author (year published)
Forest	699		Weeks (1965) from CB Tanner written Communication
Evergreen forest	480		Weeks and Stangland (1971)
Forest (pines)	465		Naber (2010)
Evergreen forest	493		Weeks and Stangland (1971)
Phreatophytes	630		Weeks and Stangland (1971)
Deciduous forest	435		Naber (2010)
Deciduous forest	483		Weeks and Stangland (1971)
Irrigated beans	480		Weeks and Stangland (1971)
Irrigated beans	480		Wang et al, in prep
Irrigated corn	508		Weeks (1965)
Irrigated corn	533		Weeks and Stangland (1971)
Irrigated corn	506		Naber (2010)
Irrigated potatoes	560		Weeks and Stangland (1971)
Irrigated alfalfa-brome	610		Weeks (1965)
Irrigated grain	508		Weeks (1965)
Scrub	384		Naber (2010)
Unirrigated row crops	396		Weeks and Stangland (1971)
Unirrigated crops	410		Weeks and Stangland (1971)
Grasslands	406		Weeks and Stangland (1971)
Prairie	410		Weeks and Stangland (1971)
Prairie	346		Naber (2010)
Bareground	358		Weeks and Stangland (1971)

Table 3. Average annual evapotranspiration for vegetation types in the Central Sands.

Pleasant Lake

Waushara County, Wisconsin

Supplemental Lake Management Planning Project

September 2014

Sponsored by:

Pleasant Lake Management District

WDNR Grant Program

LPL-1524-13

Onterra, LLC
815 Prosper Road
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Onterra, LLC
Lake Management Planning

Pleasant Lake
Supplemental Lake Management Planning Project

Waushara County, Wisconsin
September 2014

Created by: Brenton Butterfield, Tim Hoyman, Eddie Heath, & Dan Cibulka
Onterra, LLC
De Pere, WI

Funded by: Pleasant Lake Management District
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APPENDICES

A. Survey of Littoral Zone and Associated Wetlands of Pleasant Lake (Mary Linton)
B. Pleasant Lake Freshwater Mussel Survey Specimen Photographs

1.0 INTRODUCTION

Pleasant Lake, Waushara County, is an approximate 131.5-acre mesotrophic seepage lake (Map 1) with a maximum depth of 30 feet and mean depth of 15 feet at baseline water levels. Pleasant Lake's surficial watershed encompasses approximately 730 acres, the majority of which is comprised of forests (38%) and agricultural lands (28%) (UW-Stevens Point and Waushara County 2013).

Photo 1.0-1. Pleasant Lake, Waushara County, Wisconsin.

Since its creation in 2003, the Pleasant Lake Management District (PLMD) has worked to assure to the lake's continued health by annually monitoring the Pleasant Lake's water quality through the Wisconsin Department of Natural Resources (WDNR) Citizen Lake Monitoring Network, conducting watercraft inspections under the Clean Boats Clean Waters Program, and being involved with the Waushara County Lakes and Watershed Council, the Marquette County Lakes Association, and the Central Sands Water Action Coalition.

Over the past approximately 20 years, Pleasant Lake residents have seen water levels steadily recede. In addition to Pleasant Lake, other area lakes have recorded statistically significant water level reductions (Kraft and Mechenich 2010). In an effort to understand the factors driving this precipitous decline, the PLMD requested assistance from the UW-Extension. Dr. George Kraft, who has conducted studies on the hydrology of the Central Sands Region, was asked to complete two reports specifically addressing Pleasant Lake's hydrology. The conclusion drawn from his investigations is that pumping from high capacity wells has had a significant impact on the lowering water level of Pleasant Lake. Data collected by Waushara County indicate that Pleasant Lake's water level has fallen 4.43 feet since 1993.

To not only gain a more holistic understanding of the Pleasant Lake ecosystem, but to understand the current impacts the low water levels are having on the lake's ecosystem and future impacts incurred by continual water level decline, the PLMD has worked with several agencies and consultants that have carried out numerous surveys on Pleasant Lake. In 2010, Waushara County teamed with the UW-Stevens Point Center for Watershed Science to begin assessing the lake management planning needs of the 97 lakes in Waushara County. As the program progressed, lake, watershed, and stakeholder data were collected on many of the lakes, and now, in 2014, the project is in the process of constructing a lake management plan for Pleasant Lake.

The Waushara County project is comprehensive in nature and covers many of the important aspects of lake management planning, including assessments of the lake's water quality, surficial- and ground-watersheds, shoreland zone condition and habitat function, and aquatic plant composition. However, the nature of the project lacks in its ability to help groups such as the PLMD with the development of specific management actions aimed at understanding the

impacts of falling water levels and managing aquatic invasive plants. The primary objective of Onterra, LLC's involvement is to supplement the Waushara County planning efforts with two additional components: 1) investigate the impact of falling water levels of the lake's littoral area, and 2) develop hybrid water milfoil (HWM), curly-leaf pondweed (CLP), and other non-native species management strategies for Pleasant Lake. Following its discovery in 2007, HWM has been targeted with herbicide treatments since 2008 in an effort to reduce this population and its impact to Pleasant Lake's ecology, recreation, and aesthetics. While CLP has likely been in Pleasant Lake for some time, its populations have remained low, and no control actions have yet been implemented. Both continued water level decline and the presence of aquatic invasive species are ecologically significant to Pleasant Lake, and are primary concerns among district members.

Because the most recent bathymetric data from Pleasant Lake was nearly 50 years old, an acoustic survey was conducted by Onterra in 2013 to obtain updated bathymetric data. These data in combination with aquatic plant data were used to create water level reduction scenarios to assess the impact to the floral habitat in Pleasant Lake. To aid in understanding the ecological effects of receding water levels in Pleasant Lake, data collected from a WDNR 2012 fisheries assessment and from a littoral zone habitat survey conducted by Ecological Research Partners, LLC were also employed. In 2013, Onterra ecologists also conducted a freshwater mussel species assessment to catalogue the abundance and species present within the lake. Surveys aimed at locating and quantifying the levels of hybrid water milfoil and curly-leaf pondweed were also conducted in 2013.

First, this report discusses the current condition of Pleasant Lake's native and non-native aquatic plant communities. Aquatic plant data collected in 2012 and 2013 are compared with data collected in 2009 to gain an understanding of how the plant community has changed over this time period. Following discussion on Pleasant Lake's aquatic plant community, the current and potential future impacts of continual water level decline to Pleasant Lake's ecology will be discussed. This discussion incorporates the aquatic plant data collected by UW-Stevens Point and Onterra, LLC, fisheries data from the WDNR, littoral habitat data from Ecological Research Partners, LLC, and mussel assessment data collected by Onterra, LLC. Also included is the Implementation Plan, which includes goals and actions specific to Pleasant Lake's current and future management that were developed by both members of the Pleasant Lake Planning Committee and Onterra ecologists.

2.0 RESULTS AND DISCUSSION

2.1 Primer on Data Analysis and Data Interpretation

Aquatic Plant Sampling Methodology and Data Analysis

Native aquatic plants are an important element in every healthy aquatic ecosystem (Photo 1), providing food and habitat to wildlife, improving water quality, and stabilizing bottom sediments. Because most aquatic plants are rooted in place and are unable to relocate in wake of environmental alterations, they are often the first community to indicate that changes may be occurring within the system. Aquatic plant communities can respond in variety of ways; there may be increases or declines in the occurrences of some species, or a complete loss. Or, certain growth forms, such as emergent and floating-leaf communities may disappear from certain areas of the waterbody. With periodic monitoring and proper analysis, these changes are relatively easy to detect and provide relevant information for making management decisions.

Photo 2.1-1. Native aquatic plants, like slender naiad and sago pondweed in Pleasant Lake (pictured), are an important component in maintaining a healthy aquatic ecosystem.

The **Littoral Zone** is the area of the lake where sunlight is able to penetrate and provide aquatic plants with sufficient light to carry out photosynthesis.

The point-intercept method as described Wisconsin Department of Natural Resources Bureau of Science Services, PUB-SS-1068 2010 (Hauxwell et al. 2010) was conducted in Pleasant Lake in 2009 by Onterra and in 2012 by UW-Stevens Point. Based upon guidance from the WDNR, a point spacing (resolution) of 34 meters was used resulting in 419 sampling points being evenly distributed across the lake (Map 1). At each point-intercept location within the *littoral zone*, information regarding the depth, substrate type (muck, sand, or rock), and the plant species sampled along with their relative abundance (Figure 2.2-1) on the sampling rake were recorded.

A pole-mounted rake was used to collect the plant samples, depth, and sediment information at point locations of 14 feet or less. A rake head tied to a rope (rope rake) was used at sites greater than 14 feet. Depth information was collected using graduated marks on the pole of the rake or using an onboard sonar unit at depths greater than 14 feet. Also, when a rope rake was used, information regarding substrate type was not collected due to the inability of the sampler to accurately feel the bottom with this sampling device. The point-intercept survey produces a great deal of information about a lake's aquatic vegetation and overall health. The 2009 and 2012 data are analyzed and compared and are presented in numerous ways; each is discussed in more detail the following section.

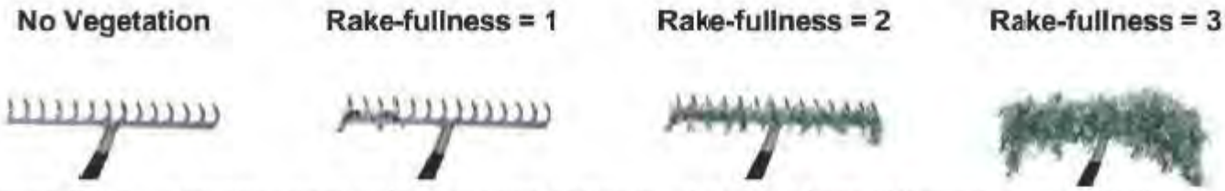

Figure 2.1-1. Aquatic plant rake-fullness ratings. Adapted from Hauxwell et al (2010).

Species List

The species list is simply a list of all of the aquatic plant species, both native and non-native, that were located during the 2009 and 2012 surveys on Pleasant Lake. The list also contains the growth-form of each plant found (e.g. submergent, emergent, etc.), its scientific name, common name, and its coefficient of conservatism. The latter is discussed in more detail below. Changes in this list over time, whether it is differences in total species present, gains and losses of individual species, or changes in growth forms that are present, can be an early indicator of changes in the ecosystem.

Frequency of Occurrence

Frequency of occurrence describes how often a certain species is found within a lake. Obviously, all of the plants cannot be counted in a lake, so samples are collected from pre-determined areas. In the case of the whole-lake point-intercept survey conducted on Pleasant Lake in 2009 and 2012, plant samples were collected from plots laid out on a grid that covered the lake. Using the data collected from these plots, an estimate of occurrence of each plant species can be determined. In this section, the occurrences of aquatic plant species are displayed as their *littoral frequency of occurrence*. Littoral frequency of occurrence is used to describe how often each species occurred in the plots that are equal to or less than the maximum depth of plant growth (littoral zone), and is displayed as a percentage.

Floristic Quality Assessment

The floristic quality of a lake is calculated using its native aquatic plant species richness and those species' average conservatism values. Species richness is simply the number of aquatic plant species that occur in the lake, and for this analysis, only native species are utilized. Average species conservatism utilizes the coefficient of conservatism values (C-value) for each of those species in its calculation. A species coefficient of conservatism value indicates that species' likelihood of being found in an undisturbed system.

The values range from 1 to 10. Species that can tolerate environmental disturbance and can survive in disturbed systems have lower coefficients, while species that are less tolerant to environmental disturbance and are restricted to high quality systems have higher values. For example, coontail (*Ceratophyllum demersum*), a submergent native aquatic plant species with a C-value of 3, has a higher tolerance to disturbed conditions, often thriving in lakes with higher nutrient levels and low water clarity, while other species like algal-leaf pondweed (*Potamogeton confervoides*) with a C-value of 10, are intolerant of environmental disturbance and require high quality environments to survive.

On their own, the species richness and average conservatism values for a lake are useful in assessing a lake's plant community; however, the best assessment of the lake's plant community health is determined when the two values are used to calculate the lake's floristic quality. The floristic quality is calculated using the species richness and average conservatism value of the aquatic plant species that were solely encountered on the rake during the point-intercept survey. The floristic quality of Pleasant Lake's aquatic plant community will be compared to other lakes within the same *ecoregion*. Ecoregions are areas related by similar climate, physiography, hydrology, vegetation and wildlife potential. Comparing ecosystems in the same ecoregion is sounder than comparing systems within manmade boundaries such as counties, towns, or states. Pleasant Lake falls within the North Central Hardwood Forests Ecoregion of Wisconsin (Figure 2.1-2).

Figure 2.1-2. Location of Pleasant Lake within the ecoregions of Wisconsin. After Nichols (1999).

Species Diversity

Species diversity is probably the most misused value in ecology because it is often confused with species richness. As defined previously, species richness is simply the number of species found within a system or community. Although these values are related, they are far from the same because species diversity also takes into account how evenly the species are distributed within the system. A lake with 25 species may not be more diverse than a lake with 10 if the first lake is highly dominated by one or two species and the second lake has a more even distribution.

An aquatic system with high species diversity is much more stable than a system with a low diversity. This is analogous to a diverse financial portfolio in that a diverse aquatic plant community can withstand environmental fluctuations much like a diverse portfolio can handle economic fluctuations. For example, a lake with a diverse plant community is much better suited to compete against exotic infestation than a lake with a lower diversity. Simpson's diversity index is used to determine this diversity in a lake ecosystem.

Simpson's diversity (1-D) is calculated as:

$$D = \sum (n/N)^2$$

where:
n = the total number of instances of a particular species
N = the total number of instances of all species and
D is a value between 0 and 1

If a lake has a diversity index value of 0.90, it means that if two plants were randomly sampled from the lake there is a 90% probability that the two individuals would be of a different species. Between 2005 and 2009, WDNR Science Services conducted point-intercept surveys on 252 lakes within the state. In the absence of comparative data from Nichols (1999), the Simpson's Diversity Index values of the lakes within the WDNR Science Services dataset will be compared to Pleasant Lake. Comparisons will be displayed using *boxplots* that show median values and upper/lower quartiles of lakes in the same ecoregion and in the state.

Box Plot or box-and-whisker diagram graphically shows data through five-number summaries: minimum, lower quartile, median, upper quartile, and maximum. Just as the median divides the data into upper and lower halves, quartiles further divide the data by calculating the median of each half of the dataset.

Community Mapping

A key component to understanding a lake's aquatic plant community is the creation of an aquatic plant community map. The map represents a snapshot of the important emergent and floating-leaf plant communities in the lake as they existed during the survey and is valuable in the development of the management plan and in comparisons with surveys completed in the future. Examples of these communities include emergent species like cattails, bulrushes, and arrowheads, and floating-leaf species like white and yellow pond lilies. Emergents and floating-leaf communities lend themselves well to mapping because there are distinct boundaries between communities. Submergent species are often mixed throughout large areas of the lake and are seldom visible from the surface; therefore, mapping of submergent communities is more difficult and often impossible. Community mapping surveys were conducted in both 2009 and 2013 on Pleasant Lake.

2.2 Aquatic Plant Survey Results

On July 9, 2012, UW-Stevens Point Center for Watershed Science and Education staff conducted the whole-lake point-intercept survey on Pleasant Lake, while Onterra ecologists conducted the community mapping survey on September 26, 2013. During these surveys, a total of 36 aquatic plant species were located (Table 2.2-1). Four of these species, hybrid water milfoil, curly-leaf pondweed, giant reed, and reed canary grass are considered to be non-native, invasive species. Because of their importance, these invasive species will be discussed in detail in the next section. Of the 36 species located in 2012 and 2013, 24 were located during the 2009 point-intercept and community mapping surveys.

During the 2012 point-intercept survey, aquatic plants were found growing to a maximum depth of 24 feet, slightly deeper than the 22 feet recorded in 2009. Pleasant Lake has relatively high water clarity (average 2012 Secchi disk transparency = 10 feet), allowing sunlight to penetrate to deeper depths and sustain aquatic plant growth. In 2012, 413 sampling locations fell within Pleasant Lake's littoral zone (≤24 feet), compared to 386 in 2009 (≤22 feet). The difference in the number of littoral sampling locations between 2009 and 2012 is due to differences in the maximum depth of aquatic plant growth between the two surveys.

Of the 413 sampling locations that fell within the littoral zone in 2012, 259 (62%) contained aquatic vegetation. Similarly, in 2009, of the 386 littoral sampling locations, 260 (67%) contained aquatic vegetation. Chi-square analysis indicates that the overall occurrence of aquatic vegetation in Pleasant Lake was not statistically different between the 2009 and 2012 surveys ($\alpha = 0.05$) (Figure 2.2-1). Figure 2.2-2 displays the distribution of aquatic plants in Pleasant Lake as determined from the 2009 and 2012 point-intercept surveys, and illustrates that there were no significant changes in the spatial distribution of aquatic plants over this time period.

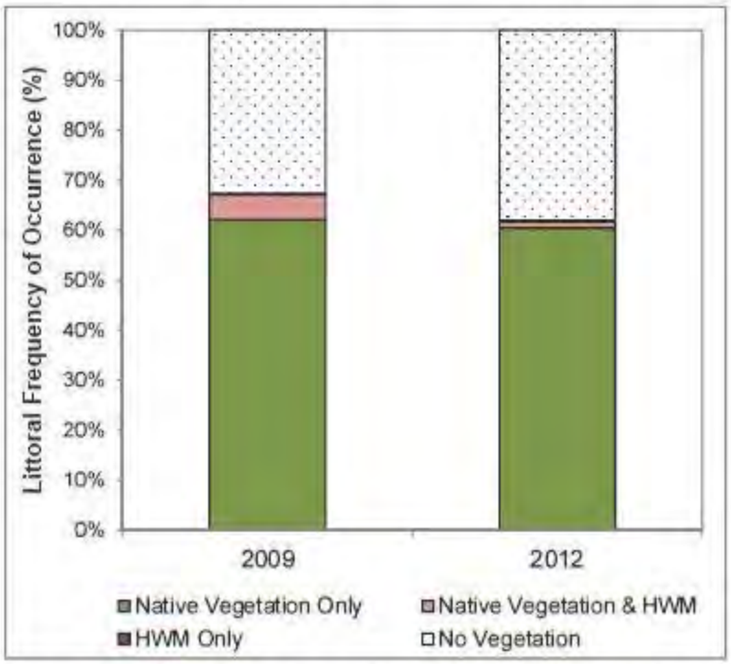

Figure 2.2-1. Pleasant Lake 2009 and 2012 littoral frequency of occurrence of native and non-native aquatic vegetation. Calculated using data from 386 and 413 littoral sampling locations from Onterra 2009 and UWSP point-intercept surveys, respectively.

Of the 36 aquatic plant species located during 2012 and 2013 surveys on Pleasant Lake, 24 were physically encountered on the rake during the whole-lake point-intercept survey; the remaining 12 species were located incidentally. Of the 24 species encountered on the rake, muskgrasses, flat-stem pondweed, and wild celery were the three-most frequently encountered (Figure 2.2-3).

Muskgrasses, the most frequently encountered aquatic plants in 2012, had a littoral frequency of occurrence of approximately 52% (Figure 2.2-3). A genus of macroalgae, muskgrasses are not true vascular plants, and are often abundant in lakes like Pleasant

Lake that are clear with higher alkalinity. While several species of muskgrasses occur in Wisconsin, the muskgrasses in Pleasant Lake were not identified to the species level. Often growing in dense beds to depths greater than most vascular plants, muskgrasses stabilize bottom sediments, provide excellent structural habitat for aquatic organisms, and are sources of food for fish, waterfowl, and other wildlife (Borman et al. 1997).

Table 2.2-1. Aquatic plant species located in Pleasant Lake in 2009, 2012, and 2013 surveys.

Growth Form	Scientific Name	Common Name	Coefficient of Conservatism (C)	2009 (Onterra)	2012/2013 (UWSP & Onterra)
Emergent	*Carex hystericina*	Porcupine sedge	3		I
	Carex lacustris	Lake sedge	6	I	
	Carex stricta	Common tussock sedge	7		I
	Eleocharis erythropoda	Bald spike-rush	3	I	I
	Eleocharis palustris	Creeping spikerush	6		X
	Juncus arcticus	Arctic rush	5		I
	Phalaris arundinacea	Reed canary grass	Exotic		I
	Phragmites australis subsp. *australis*	Giant reed	Exotic		I
	Schoenoplectus acutus	Hardstem bulrush	5	I	I
	Schoenoplectus pungens	Three-square rush	5	I	I
	Schoenoplectus tabernaemontani	Softstem bulrush	4	I	I
	Typha angustifolia	Narrow-leaved cattail	1		I
	Typha latifolia	Broad-leaved cattail	1	I	I
FL	*Nymphaea odorata*	White water lily	6	X	X
Submergent	*Ceratophyllum demersum*	Coontail	3	X	X
	Chara spp.	Muskgrasses	7	X	X
	Elodea canadensis	Common waterweed	3		X
	Heteranthera dubia	Water stargrass	6	X	X
	Myriophyllum sibiricum	Northern water milfoil	7	X	X
	Myriophyllum sibiricum X M. spicatum	Hybrid water milfoil	Exotic	X	X
	Najas flexilis	Slender naiad	6	X	X
	Najas guadalupensis	Southern naiad	7		X
	Nitella spp.	Stoneworts	7	I	X
	Potamogeton amplifolius	Large-leaf pondweed	7		X
	Potamogeton crispus	Curly-leaf pondweed	Exotic	X	X
	Potamogeton foliosus	Leafy pondweed	6	X	X
	Potamogeton friesii	Fries' pondweed	8	X	X
	Potamogeton gramineus	Variable pondweed	7	X	X
	Potamogeton hybrid	Hybrid pondweed	N/A	X	
	Potamogeton illinoensis	Illinois pondweed	6	I	X
	Potamogeton natans	Floating-leaf pondweed	5	X	X
	Potamogeton praelongus	White-stem pondweed	8	X	X
	Potamogeton richardsonii	Clasping-leaf pondweed	5		X
	Potamogeton strictifolius	Stiff pondweed	8	X	
	Potamogeton zosteriformis	Flat-stem pondweed	6	X	X
	Stuckenia pectinata	Sago pondweed	3	X	X
	Utricularia vulgaris	Common bladderwort	7		I
	Vallisneria americana	Wild celery	6	X	X
S/E	*Eleocharis acicularis*	Needle spikerush	5	I	X
FF	*Spirodela polyrhiza*	Greater duckweed	5		I

FL = Floating-leaf; S/E = Submergent & Emergent; FF = Free-floating
X = Located on rake during point-intercept survey; I = Incidentally located

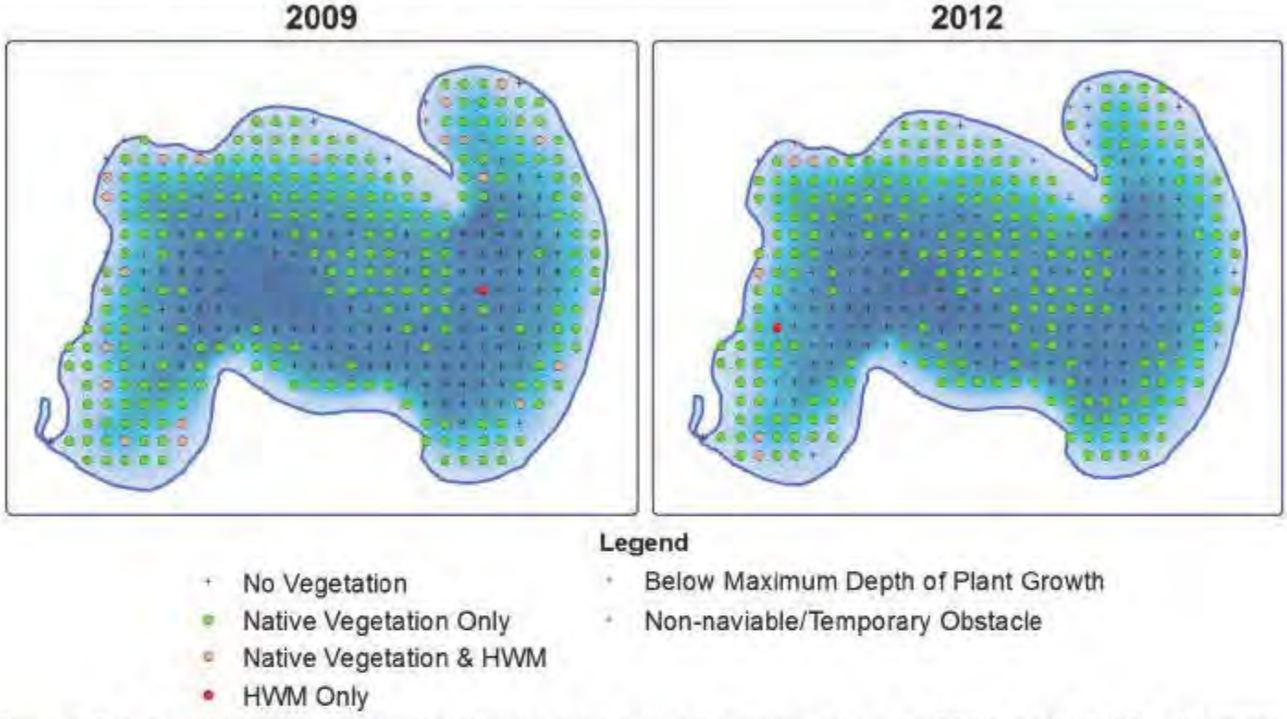

Figure 2.2-2. Pleasant Lake distribution of aquatic vegetation in 2009 and 2012. Created using data from Onterra 2009 and UWSP 2012 point-intercept surveys.

The second-most frequently encountered aquatic plant in Pleasant Lake in 2012 was flat-stem pondweed with a littoral frequency of occurrence of approximately 11% (Figure 2.2-3). Flat-stem pondweed is generally found in lakes with higher productivity, and as its name indicates, possesses a conspicuously flattened stem. Its tall stature offers good habitat while its fruit has been shown to be a good source of food for waterfowl (Borman et al. 1997).

With a littoral frequency of occurrence of approximately 9%, wild celery was the third-most frequently encountered aquatic plant in Pleasant Lake in 2012 (Figure 2.2-3). The long, tapering leaves of wild celery provide excellent structural habitat for numerous aquatic organisms while its extensive root systems stabilize bottom sediments. Additionally, the leaves, fruit, tubers, and winter buds are food sources for numerous species of waterfowl and other wildlife.

In 2012, wetland ecologist Mary Linton conducted a survey on Pleasant Lake focusing on littoral and adjacent wetland habitats. During her survey, she recorded the presence of Torrey's bulrush (*Schoenoplectus torreyi*) within the Turtle Bay wetland on the southwest side of the lake. This species is currently listed as imperiled in Wisconsin (state rank = S2) due to its rarity within the state. Pleasant Lake does contain populations of the common three-square rush (*Schoenoplectus pungens*) which is very similar morphologically to Torrey's rush. It is not known if Mary Linton sent any specimens into a herbarium for verification, and further investigation will be needed to positively identify the existence of this species within the Turtle Bay wetland.

As discussed previously, a point-intercept survey was conducted in 2009 as part of an aquatic plant community assessment. Since the sampling methodology and sampling locations were the same as the survey conducted in 2012, the data that were collected during these surveys can be compared to determine if any changes in the occurrences of aquatic plant species occurred over this three-year period. Figure 2.2-4 displays the 2009 and 2012 littoral frequencies of occurrence

of aquatic plant species in Pleasant Lake that had an occurrence of at least 5% in one of the two surveys.

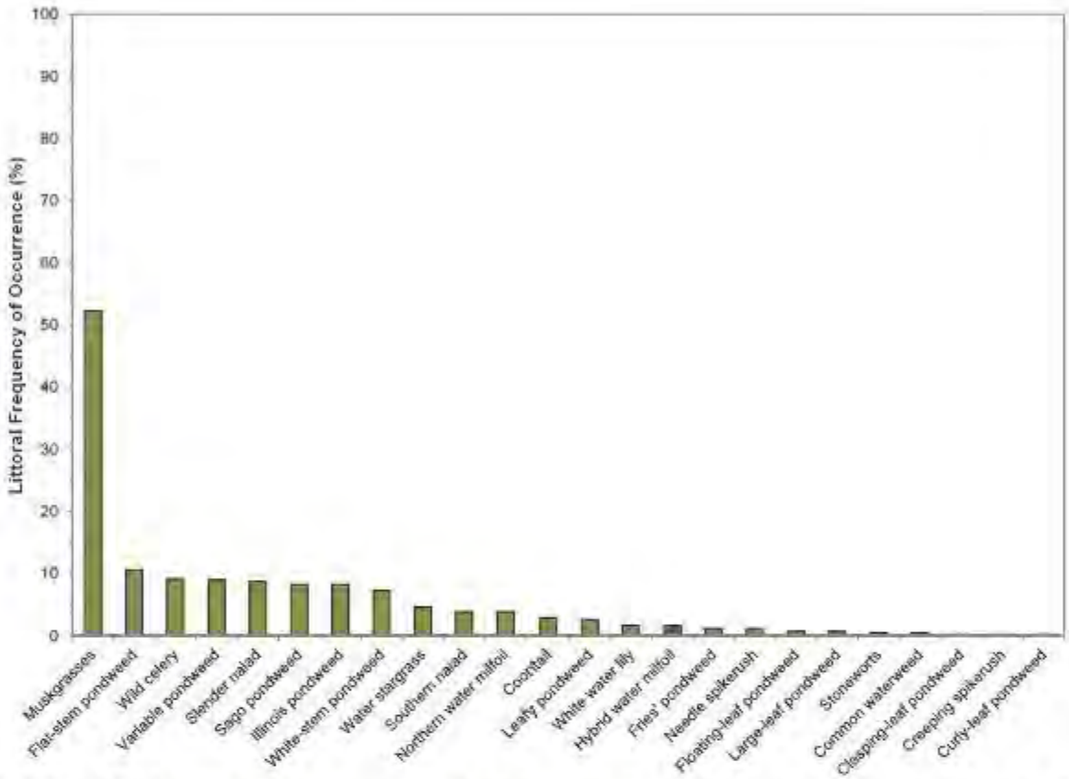

Figure 2.2-3. 2012 littoral frequency of occurrence of aquatic plant species in Pleasant Lake. Created using data from UWSP 2012 point-intercept survey. Non-native species indicated with red.

The plants in Figure 2.2-4 are divided between dicotyledons (dicots) and non-dicotyledons (non-dicots). These two divisions of plants differ in their morphological characteristics as well as their physiology. The herbicides that have been used in Pleasant Lake in an effort to control HWM have historically been believed to not affect non-dicot aquatic plants. However, emerging evidence by researchers with the US Army Corps of Engineers and WDNR may indicate that some non-dicots species can become impacted by these herbicides under certain circumstances (herbicide dose, exposure time, etc.). Unpublished data indicate that of the native plants present in Pleasant Lake, northern water milfoil and slender naiad tend to decline following herbicide management actions. It is important to note that the treatments that have been conducted on Pleasant Lake never reached levels that have been shown to have lake-wide impacts to native or non-native plant species, and any non-target impacts would like be contained to the areas of the lake where the herbicide was directly applied.

Two native plants exhibited statistically valid reductions in their littoral occurrence from 2009-2012 (Chi-square $\alpha = 0.05$), and include muskgrasses and the combined occurrences of narrow-leaf pondweeds (Figure 2.2-4). Because of their morphological similarity and often challenging identification, the occurrences of stiff pondweed, Fries' pondweed, and leafy pondweed were combined for this analysis. Three native species, slender naiad, sago pondweed, and Illinois pondweed all exhibited statistically valid increases in their littoral occurrence from 2009-2012, while the occurrences of the remaining five native species, including the dicot northern water

milfoil, were not statistically different (Figure 2.2-4). The occurrence of hybrid water milfoil was reduced from approximately 5% in 2009 to approximately 2% in 2012, representing a statistically valid reduction in occurrence of 67%.

Aquatic plant communities are dynamic, and the abundance of certain species can fluctuate from year to year depending on climatic conditions, water levels, herbivory, competition, and disease among other factors, and slight fluctuations are to be expected. The declines in the occurrences of muskgrasses and narrow-leaf pondweed species, while statistically valid, are minor, and no major reductions or complete losses of species were observed over this time period.

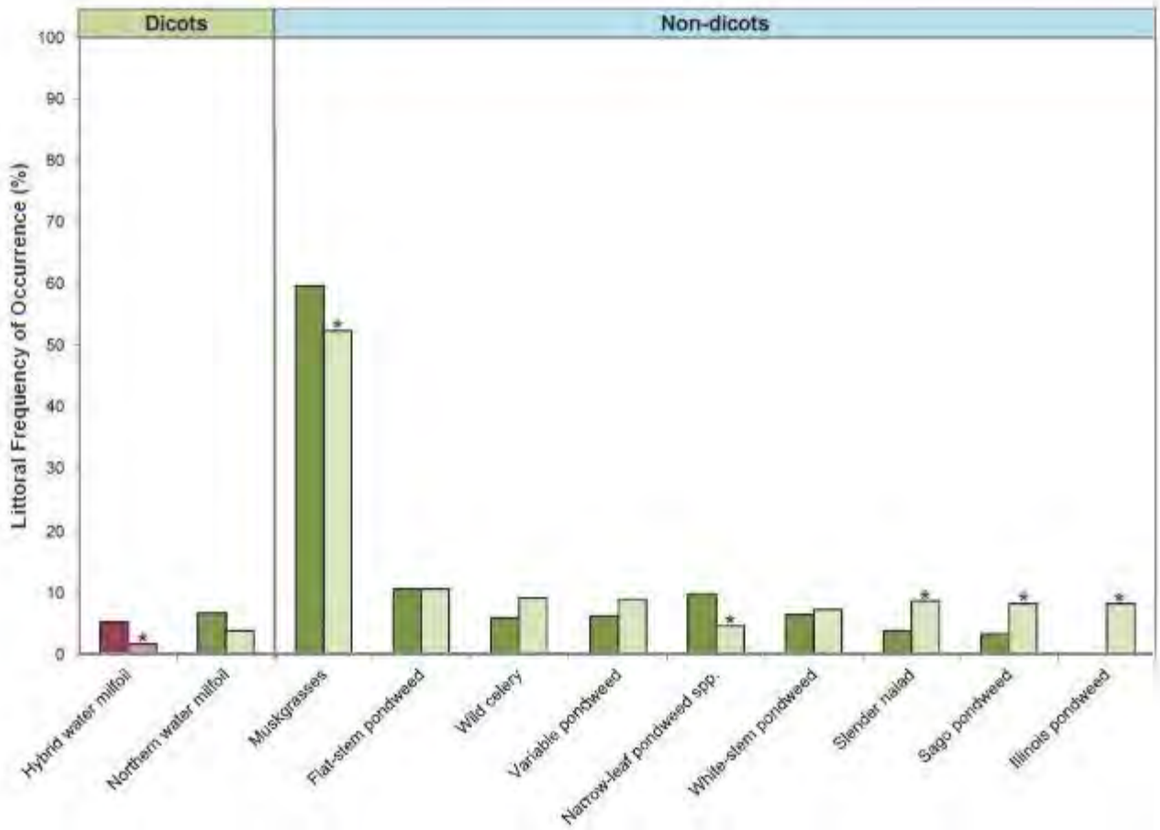

Figure 2.2-4. Statistical comparison of select aquatic plant species littoral frequency of occurrence from 2009 and 2012 in Pleasant Lake. Species with an occurrence of at least 5% in either survey represented. Created using data from Onterra 2009 (N = 386) and UWSP 2012 (N = 413) point-intercept surveys.

As discussed in the Primer Section (2.1), the calculations used for the Floristic Quality Index (FQI) for a lake's aquatic plant community are based on the aquatic plant species that were encountered on the rake during the point-intercept survey and does not include incidental species. For example, while a total of 30 native aquatic plant species were located in Pleasant Lake during the 2012 and 2013 surveys, 22 were encountered on the rake during the 2012 point-intercept survey. These 22 native species and their conservatism values were used to calculate the FQI of Pleasant Lake's aquatic plant community in 2012 (equation shown below).

$$\text{FQI} = \text{Average Coefficient of Conservatism} * \sqrt{\text{Number of Native Species}}$$

Figure 2.2-5 compares the FQI components of Pleasant Lake from the 2009 and 2012 point-intercept surveys to median values of lakes within the North Central Hardwoods and Southeastern Till Plain (NCSE) Ecoregions as well as the entire State of Wisconsin. Both the 2009 and 2012 species richness values fall above the NCSE Ecoregion and state medians, while the 2012 richness exceeds the upper quartile value for lakes within the ecoregion and the state (Figure 2.2-5).

The average conservatism values for native aquatic plant species in Pleasant Lake were similar between the 2009 and 2012 surveys, with values of 5.8 and 5.9, respectively (Figure 2.2-5). These values fall above the median value for lakes in the NCSE Ecoregion but just below the median value for lakes throughout Wisconsin. Using the lake's species richness and average conservatism values to calculate the FQI values indicates that the floristic quality of Pleasant Lake's aquatic plant community is of higher quality than the majority of lakes within the NSCE Ecoregion and the state; the 2009 and 2012 FQI values exceed ecoregional and state-wide median values. These data also indicate that the quality of Pleasant Lake's aquatic plant community has not diminished over this time period.

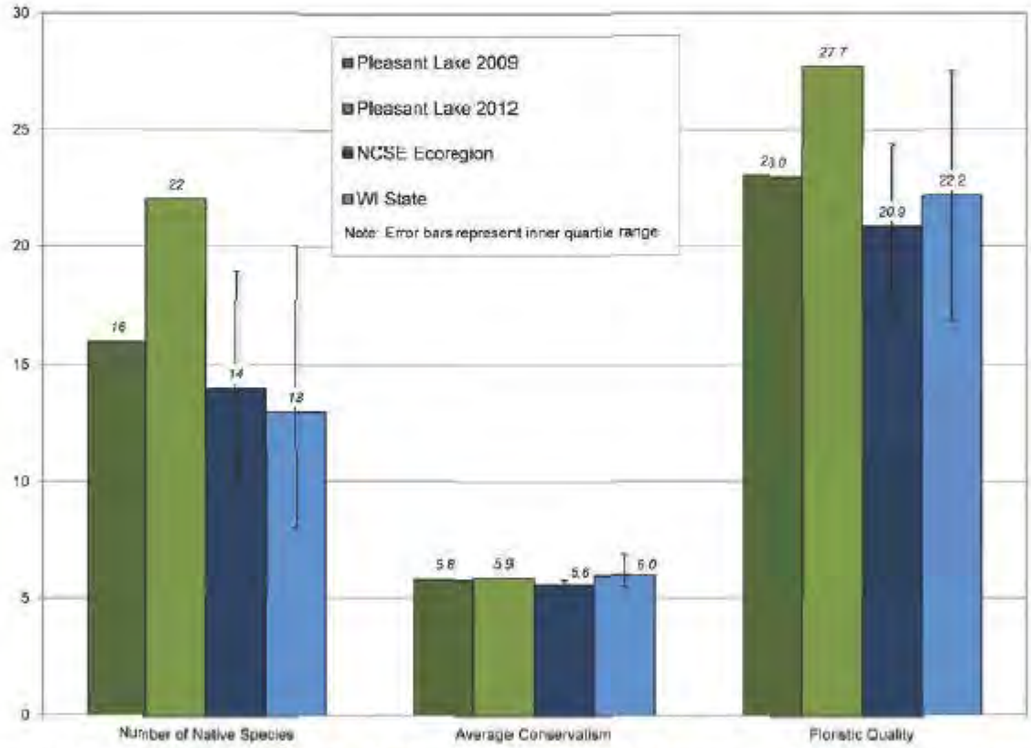

Figure 2.2-5. Pleasant Lake Floristic Quality Analysis. Created using data from Onterra 2006 and 2012 point-intercept surveys. Analysis follows Nichols (1999) where NCSE = North Central Hardwoods and Southeastern Till Plain Ecoregion.

As explained earlier, it is believed that lakes with diverse aquatic plant communities have higher resilience to environmental disturbances and greater resistance to invasion by non-native plants. In addition, a plant community with a mosaic of species with differing morphological attributes provides zooplankton, macroinvertebrates, fish, and other wildlife with diverse structural habitat and various sources of food. Because Pleasant Lake contains a relatively high number of native aquatic plant species, one may assume the aquatic plant community has high species diversity.

However, species diversity is also influenced by how evenly the plant species are distributed within the community.

While a method for characterizing diversity values of fair, poor, etc. does not exist, lakes within the same ecoregion may be compared to provide an idea of how Pleasant Lake's diversity value ranks. Using data obtained from WDNR Science Services, quartiles were calculated for 71 lakes within the North Central Hardwood Forests (NCHF) Ecoregion (Figure 2.2-6). Using the data collected from the 2009 and 2012 point-intercept surveys, Pleasant Lake's aquatic plant community was shown to have low species diversity with a Simpson's diversity values of 0.75 and 0.82, respectively. These values fall below the median diversity values for lakes in the NCHF Ecoregion and lakes throughout Wisconsin (Figure 2.2-6).

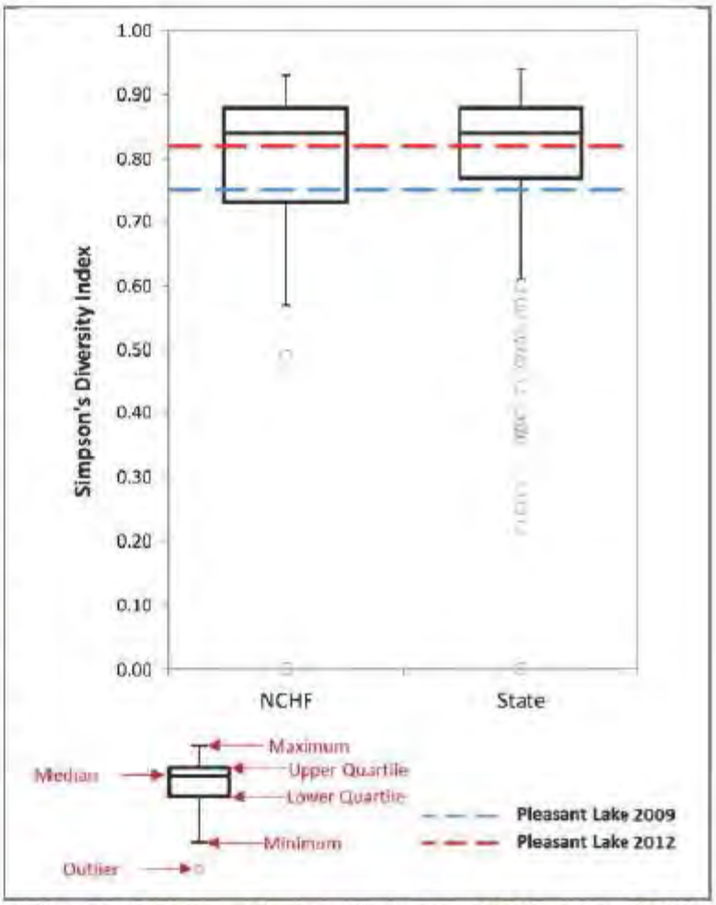

Figure 2.2-6. Pleasant Lake 2009 and 2012 Simpson's Diversity Index. Created using data from Onterra 2009 and UWSP 2012 point-intercept surveys.

As explained earlier, the littoral frequency of occurrence analysis allows for an understanding of how often each of the plants is located during the point-intercept survey. Because each sampling location may contain numerous plant species, relative frequency of occurrence is one tool to evaluate how often each plant species is found in relation to all other species found (composition of population). For instance, while muskgrasses were found at approximately 52% of the littoral sampling locations in Pleasant Lake in 2012, its relative frequency of occurrence was 37%. Explained another way, if 100 plants were randomly sampled from Pleasant Lake, 37 of them would be muskgrasses. Figure 2.2-7 displays the relative occurrence of aquatic plant species from Pleasant Lake in 2012. The lake's low species diversity is illustrated by the fact that greater than 50% of the plant community is comprised of just three species.

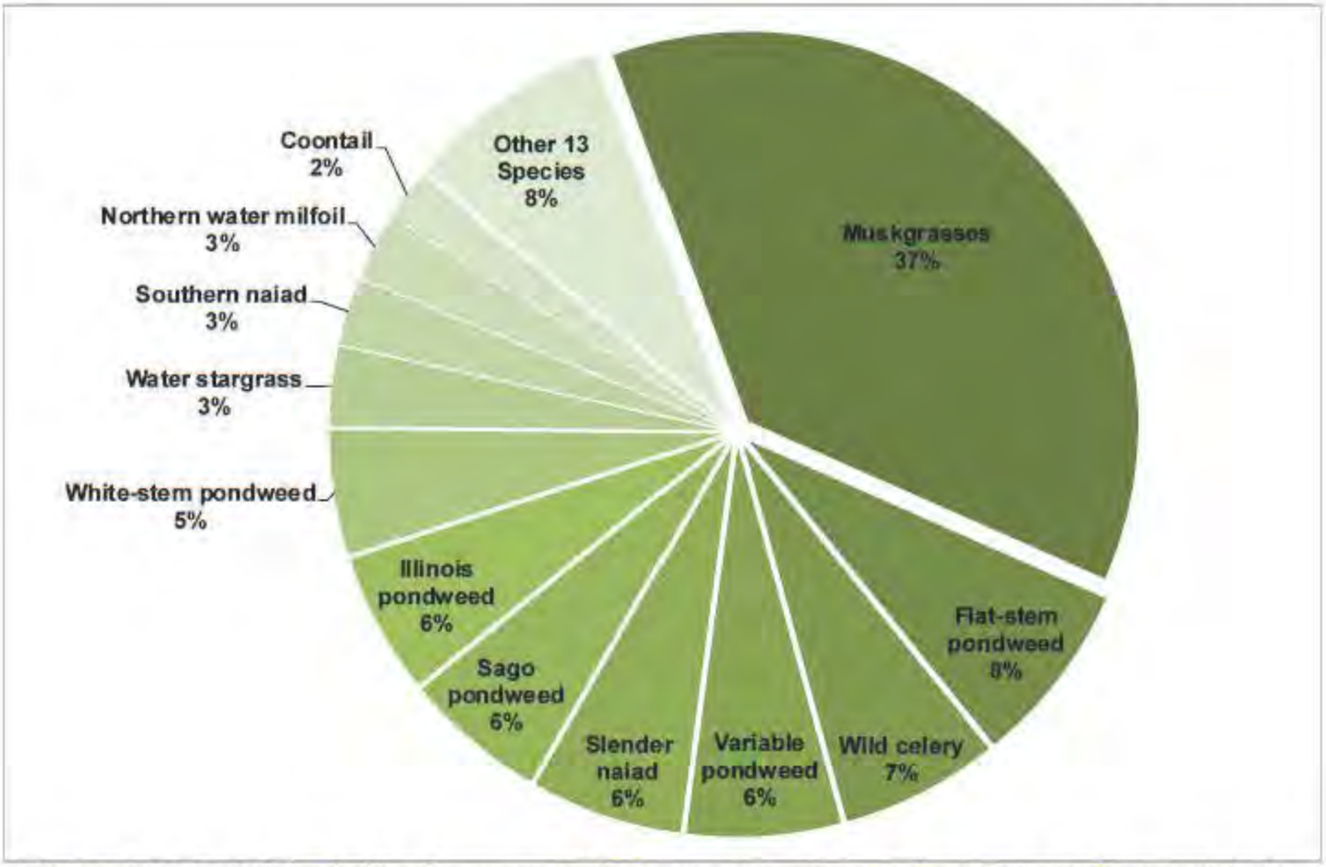

Figure 2.2-7. 2012 relative frequency of occurrence of aquatic plants in Pleasant Lake. Created using data from 2012 UWSP point-intercept survey.

The point-intercept survey is an excellent method for assessing a lake's submergent aquatic plant community; however, it tends to underestimate the occurrence of emergent and floating-leaf aquatic plants that tend to grow in shallower, near-shore areas. Because of the importance of these communities, the community mapping survey is designed to map and identify the species that comprise these communities.

The 2013 community mapping survey conducted by Onterra on Pleasant Lake indicates that approximately 4.1 acres of the lake contain floating-leaf and emergent aquatic plant communities (Table 2.2-2, Figure 2.2-8, Map 2). Twelve emergent and floating-leaf aquatic plant species were located in the lake in 2013 (Table 2.2-1). These plant communities provide valuable fish and wildlife habitat important to the ecosystem of the lake. Compared to 2009, some of these communities saw retractions, while others saw expansions. While it may appear that areas delineated as *mixed emergent and floating-leaf* in 2009 were not relocated in 2013, these areas were relocated but were able to be delineated separately into distinct *emergent* and *floating-leaf* communities in 2013. Overall, there was approximately 0.2 acres less of floating-leaf and emergent plant communities in 2013 compared to 2009 (Map 2). As illustrated, large areas along Pleasant Lake's shoreline do not contain emergent and/or floating-leaf plant communities, and their absence may be an indicator of increased shoreline development. Studies have shown that these communities are often negatively affected by recreational use and shoreland development. Radomski and Goeman (2001) found a 66% reduction in vegetation coverage on developed shorelands when compared to the undeveloped shorelands in Minnesota lakes. Furthermore, they also found a significant reduction in abundance and size of northern pike

(*Esox lucius*), bluegill (*Lepomis macrochirus*), and pumpkinseed (*Lepomis gibbosus*) associated with these developed shorelands.

Figure 2.2-8. Pleasant Lake 2013 emergent and floating-leaf aquatic plant communities. Created using data from 2013 community mapping survey.

Table 2.2-2. Acres of emergent and floating-leaf aquatic plant communities in Pleasant Lake in 2009 and 2013. Created using data from Onterra 2009 and 2013 community mapping surveys.

Plant Community	2009 Acres	2013 Acres
Emergent	0.1	0.8
Floating-leaf	1.3	3.3
Mixed Emergent & Floating-leaf	2.9	0.0
Total	**4.3**	**4.1**

These communities provide valuable structural habitat for invertebrates, fish, and other wildlife, and also stabilize bottom sediments and shoreline areas by dampening wave action from wind and watercraft. These communities become even more important during periods of low water levels, as course woody habitat is left above the receding water line. Because the community map represents a 'snapshot' of the important emergent and floating-leaf plant communities, a replication of this survey in the future will provide a valuable understanding of the dynamics of these communities within Pleasant Lake.

Water levels play a key role in determining the establishment and expansion of emergent and floating-leaf plant communities (Coops et al. 2004). Natural water fluctuations promote healthy

emergent and floating-leaf aquatic plant communities. As water levels decline, these communities are able to expand and establish lakeward. Once established, these communities are often able to persist as water levels increase.

During the community mapping survey, Onterra ecologists were also looking to quantify the abundance and size of course woody habitat within Pleasant Lake. However, no course woody habitat of over two inches in diameter could be located around the lakes shoreline.

Non-native Plants in Pleasant Lake

Hybrid water milfoil

Eurasian water milfoil (*Myriophyllum spicatum*) was first documented in Pleasant Lake in 2007, and via DNA analysis was later determined to be hybrid water milfoil (*M. sibiricum X spicatum;* HWM), a cross between Eurasian water milfoil and the indigenous northern water milfoil (Photo 2.2-1). Following its discovery, approximately two acres were treated in 2008. In 2009, Onterra was contracted to map HWM within the lake and develop a treatment strategy. In 2010, the PLMD successfully applied for a WDNR AIS Early Detection and Response (EDR) Grant to aid in funding the cost of HWM treatments and associated monitoring from 2010-2012.

Photo 2.2-1. Hybrid water milfoil (*M. spicatum X sibiricum*) in Pleasant Lake.

Herbicides that target submersed plant species are directly applied to the water, either as a liquid or an encapsulated granular formulation. Factors such as water depth, water flow, treatment area size, and plant density work to dilute herbicide concentration within aquatic systems. Understanding concentration-exposure times are important considerations for aquatic herbicides. Successful control of the target plant is achieved when it is exposed to a lethal concentration of the herbicide for a specific duration of time. Much information has been gathered in recent years, largely as a result of a joint research project between the WDNR and US Army Corps of Engineers (USACE). Based on their preliminary findings, lake managers have adopted two main treatment strategies; 1) whole-lake treatments, and 2) spot treatments.

Whole-lake or whole-basin treatments are those where the herbicide is applied to specific sites, but when the herbicide reaches equilibrium within the entire volume of water (of the lake, lake basin, or within the epilimnion of the lake or lake basin); it is at a concentration that is sufficient to cause mortality to the target plant within that entire lake or basin. The application rate of whole-lake treatments is dictated by the volume of water in which the herbicide will reach equilibrium with. Because exposure time is so much greater, target herbicide levels for whole-lake treatments are significantly less than for spot treatments.

Spot treatments are a type of control strategy where the herbicide is applied to a specific area (treatment site) such that when it dilutes from that area, its concentrations are insufficient to cause significant effects outside of that area. Spot treatments typically rely on a short exposure

time (often hours) to cause mortality and therefore are applied at a much higher herbicide concentration than whole-lake treatments. This is the strategy that has been utilized on Pleasant Lake from 2010-2012.

In 2010, granular 2,4-D (Navigate®) was the primary treatment strategy used to control HWM in Wisconsin, and was the largest treatment conducted on Pleasant Lake over this time period. The 2010 treatment was deemed successful, as HWM within the treatment areas was greatly reduced following the treatment (Map 3). Up until late-2010, granular 2,4-D treatments were conducted based upon surface acreage of the lake, and not based upon the depth of the water within that area. During the winter of 2010-2011, it became more common for application rates of granular 2,4-D to be formulated based upon the volume of water in which the herbicide application would occur.

This means that sufficient 2,4-D was applied within the *Application Area* such that if it mixed evenly with the *Treatment Volume*, it would equal the desired concentration (typically 2.0-4.0 ppm). This standard method for determining spot treatment use rates is not without flaw, as no physical barrier keeps the herbicide within the *Treatment Volume* and herbicide dissipates horizontally out of the area before reaching equilibrium (Figure 2.2-9). While lake managers may propose that a particular volumetric dose be used, such as 4.0 ppm ae, it is understood that actually achieving 4.0 ppm ae within the water column is not likely due to dissipation. And particularly with granular herbicides it is theorized that some of the 2,4-D granules sink into or bind with the sediment, not allowing a portion of the product to be included within herbicide measurements within the water column. Granular herbicides are also thought to release the herbicide more slowly in certain situations (e.g. lower pH); however more research is needed to quantify these statements.

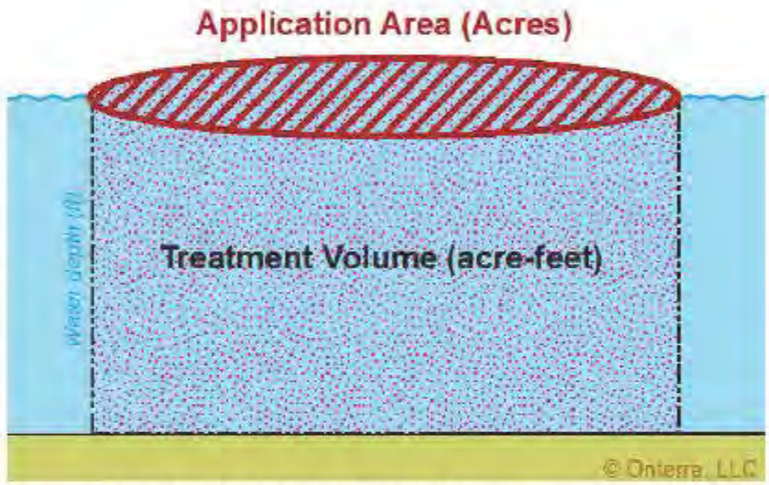

Figure 2.2-9. Herbicide Spot Treatment diagram.

With this new information, a different strategy was adopted in 2011 where HWM treatment areas in Pleasant Lake would be targeted with granular 2,4-D but with a volume-based concentration of 2.25 ppm acid equivalent (ae). At that time the most commonly used granular 2,4-D product (Navigate ®) had an EPA-approved label that only allowed the product to applied at a rate of up to 200 lbs/acre. The depth of the proposed 2011 treatment areas on Pleasant Lake would not allow Navigate ® to be used at a rate high enough to reach the desired concentration (2.25 ppm ae) within the treatment volume.

Another granular 2,4-D product (Sculpin G ®) was approved for use up to 4.0 ppm ae and soon became a more commonly used herbicide in Wisconsin lakes. This product was also comprised of a different chemical variation of 2,4-D. The active ingredient of Navigate ® is an ester formulation of 2,4-D, whereas Sculpin G ® uses the amine version of 2,4-D. While both herbicide formulations quickly dissociate into the acid form of 2,4-D when exposed to water, the

ester formulation has been shown to be more toxic to aquatic invertebrates and fish than the amine version. Updated EPA registration currently allows Navigate ® to be applied up to 4.0 ppm ae, although it carries a 24-hour swimming restriction whereas Sculpin G ® does not have any use restrictions. In 2011, approximately 3.9 acres of HWM were treated with Sculpin G ® to achieve a concentration of 2.25 ppm ae, and these treatments were very successful.

Because of the success seen in 2011, it was also recommended that the 2012 treatment utilize Sculpin G. However, data gathered on small treatment areas like those in Pleasant Lake indicate that herbicide dissipates very rapidly from the application areas. To combat this dissipation and attempt to maintain a high enough herbicide concentration to cause HWM mortality, it was recommended that the 2012 treatment areas be treated to attain a slightly higher concentration of 2.50 ppm ae. Unfortunately, despite the higher application rate, the 2012 treatment was not effective at controlling HWM within these areas.

In 2012, with the early spring and higher-than-normal temperatures, lakes throughout Wisconsin saw increases in the EWM/HWM populations; Pleasant Lake included (Map 3). With the increase in HWM observed, approximately 16.6 acres of HWM were proposed for treatment in 2013. However, given the size of this proposed treatment on Pleasant Lake and the amount of herbicide proposed to be applied, it was calculated that the herbicide dissipation would likely reach a concentration that could impact aquatic plants at the lake-wide level. Thus, this treatment would no longer be considered a spot treatment but a whole-lake treatment. While whole-lake 2,4-D treatment strategies are being utilized on many Wisconsin lakes to control EWM and HWM on a lake-wide level, it was not believed that the amount of HWM present in Pleasant Lake warranted this strategy. In addition, the bathymetric data available at that time for Pleasant Lake was based on water levels from a 1964 survey, making accurate lake-wide concentration calculations difficult. For these reasons, the MLMD agreed to forgo a treatment in 2013 until an accurate bathymetric survey of the lake could be completed.

Figure 2.2-10 shows the acreages of colonized HWM within Pleasant Lake mapped by Onterra from 2009 to 2013. In 2009, the majority of the HWM in Pleasant Lake was comprised of *dominant* and *highly dominant* colonies. These colonies were largely reduced following the 2010 treatment, and acreage increased again in 2012 but was mainly comprised of *scattered* HWM. Despite no treatment occurring in 2013, HWM acreage declined to approximately 2.2 acres. These data in combination with the whole-lake point-intercept data indicate that the treatments that have occurred from 2010-2012 have been effective at maintaining a small and low-density population of HWM within Pleasant Lake. Hybrid water milfoil has also been located within the Turtle Bay wetland on the southwest side of the lake. The HWM should be continued to be monitored within this area

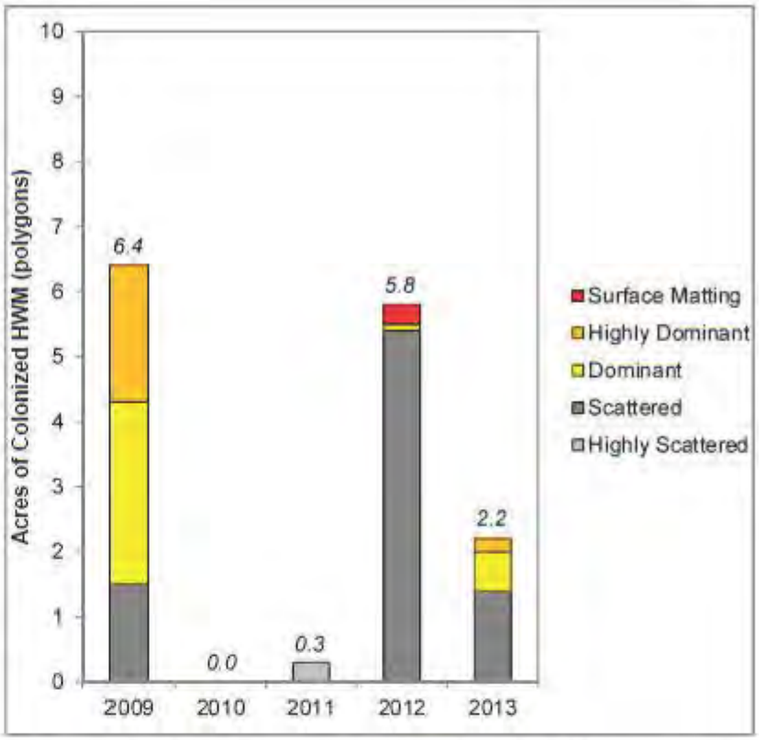

Figure 2.2-10. Acres of colonized HWM in Pleasant Lake from 2009-2013.

Curly-leaf pondweed

Curly-leaf pondweed (*Potamogeton crispus*; CLP) is a European exotic first discovered in Wisconsin in the early 1900's that has an unconventional lifecycle giving it a competitive advantage over our native plants. CLP begins growing almost immediately after ice-out and by mid-June is at peak biomass. While it is growing, each plant produces many turions (asexual reproductive shoots) along its stem. By mid-July most of the plants have senesced, or died-back, leaving the turions in the sediment. The turions lie dormant until fall when they germinate to produce winter foliage, which thrives under the winter snow and ice. It remains in this state until spring foliage is produced in early May, giving the plant a significant jump on native vegetation. Like EWM, CLP can become so abundant that it hampers recreational activities within the lake. Furthermore, its mid-summer die back can cause algal blooms spurred from the nutrients released during the plant's decomposition.

It is not known when CLP was first introduced to Pleasant Lake, but it was present in very low abundance during the 2009 surveys. Because of its odd life-cycle, an Early-Season Aquatic Invasive Species (ESAIS) Survey was conducted on Pleasant Lake on June 12, 2013 when CLP was at or near its peak growth. During this meander-based survey, no colonized areas of CLP were located, just plants denoted as *single or few plants*, *clumps of plants*, and one *small plant colony* (Map 4). Most of the CLP was located within the northeastern portion of the lake. At this time, it is not believed that the level of CLP within Pleasant Lake warrants chemical control, and may be best managed via hand removal techniques.

Giant Reed

Giant reed (*Phragmites australis* subsp. *australis*) is a tall, perennial grass that was introduced to the United States from Europe. While a native strain (*P. australis* subsp. *americanus*) of this species exists in Wisconsin, the plants located on the exposed shores of Pleasant Lake are the non-native, invasive strain. Giant reed forms towering, dense colonies that overtake native vegetation and replace it with a monoculture that provides inadequate sources of food and habitat for wildlife.

Photo 2.2-2. Giant reed along the shoreline of Turtle Bay.

Giant reed was found growing in two locations on Pleasant Lake's shoreline in 2013: one near the Turtle Bay wetland and the other on the southeastern shore (Photo 2.2-2, Map 2). Because this species has the capacity to displace the valuable wetland plants along the exposed shorelines of Turtle Bay and elsewhere, it is recommended that these plants be removed by cutting and bagging the seed heads and applying herbicide to the cut ends. This management strategy is most effective when completed in late summer or early fall when the plant is actively storing sugars and carbohydrates in its root system in preparation for over-wintering. The giant reed infestation is in its very early stages, and eradication is likely a realistic outcome if control actions are taken quickly.

Reed canary grass

Reed canary grass was found growing in areas around the Turtle Bay wetland (Map 2). Reed canary grass (*Phalaris arundinacea*) is a large, coarse perennial grass that can reach three to six feet in height. Often difficult to distinguish from native grasses, this species forms dense, highly productive stands that vigorously outcompete native species. Unlike native grasses, few wildlife species utilize the grass as a food source, and the stems grow too densely to provide cover for small mammals and waterfowl. It grows best in moist soils such as wetlands, marshes, stream banks and lake shorelands.

Reed canary grass is difficult to eradicate; at the time of this writing there is no efficient control method. Small, discrete patches have been covered by black plastic to reduce growth for an entire season. However, the species must be monitored because rhizomes may spread out beyond the plastic.

2.3 Water Levels and Littoral Habitat

Lake water levels can fluctuate naturally over varied timescales due to changes in precipitation and/or changes in human land use. Water levels in seepage lakes, like Pleasant Lake, decline when the groundwater aquifer is not being replenished at the rate that water is declining. This decline can be due to natural or anthropogenic causes, or a combination of both. Groundwater levels can naturally decline due to periods of lower precipitation, while anthropogenic factors like pumping and land practices that reduce groundwater recharge such as the construction of impervious surfaces can reduce groundwater levels. While Pleasant Lake has likely seen many water level fluctuations due to natural factors since its creation, recent studies conducted by Dr. George Kraft on the Central Sands hydrology indicate that high capacity well pumping has had a significant impact of the lowering water level of Pleasant Lake (Kraft and Mechenich 2010).

While periodic natural water level fluctuations in lakes are beneficial as they generally create more diverse plant and animal communities, sustained water level decline due to human activities may not be ecologically beneficial. As discussed earlier, Onterra conducted an acoustic survey of Pleasant Lake in 2013 to obtain updated bathymetric data. Using these data, effects to Pleasant Lake's littoral area and the habitat it provides can be modeled across varying degrees of water level decline below the baseline water level. It must be noted that the baseline water level used in these analyses was from 1992, a period with some of the highest water levels recorded on Pleasant Lake.

Littoral area, or the littoral zone, of a lake is defined as the area of the lake where sunlight is able to penetrate to the lake bottom and support aquatic plant growth. In many macrophyte (aquatic plant)-dominated lakes, the littoral zone may contribute the majority of the lake's productivity (Wetzel 2001) and is where structural habitat provided by aquatic plants will be found. The depth to which the littoral zone extends is going to depend on the clarity of the water, which determines how deep sunlight can penetrate. Second, the amount of littoral area within a lake will depend on how much area of the lake falls within depth range that can support aquatic plants.

In 2012, the maximum depth of aquatic plant growth indicated Pleasant Lake's littoral zone extended to a depth of 24 feet. Assuming the depth range of the littoral zone does not change with fluctuating water levels, the bathymetric data collected in 2013 indicate that when Pleasant Lake is at or near the baseline water level, approximately 77 acres of the lake are comprised of littoral area (≤ 24 feet) (Figure 2.3-1, Figure 2.3-2, Map 5). Due to Pleasant Lake's morphology, as water levels decline from the baseline water level, littoral area increases as more area at deeper depths is gained than is lost to exposure above the waterline. However, this increase in littoral area with declining water levels reaches a maximum of approximately 129 acres at around five feet below the baseline water level (near present-day levels) (Figure 2.3-1, Figure 2.3-2, Map 5). At this point, the entire lake is nearly comprised of littoral area. As water levels decline past five feet below the baseline water level, littoral area now declines as no new deeper areas are gained and areas near shore become exposed (Figure 2.3-1, Figure 2.3-2, Map 5).

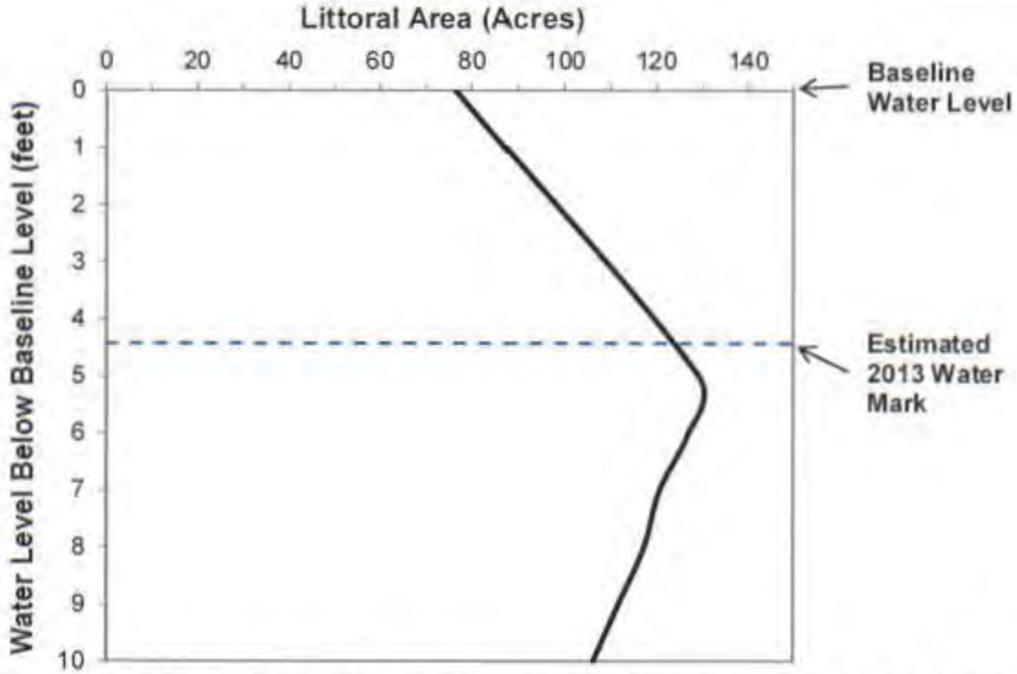

Figure 2.3-1. Relationship between littoral area and water levels in Pleasant Lake.

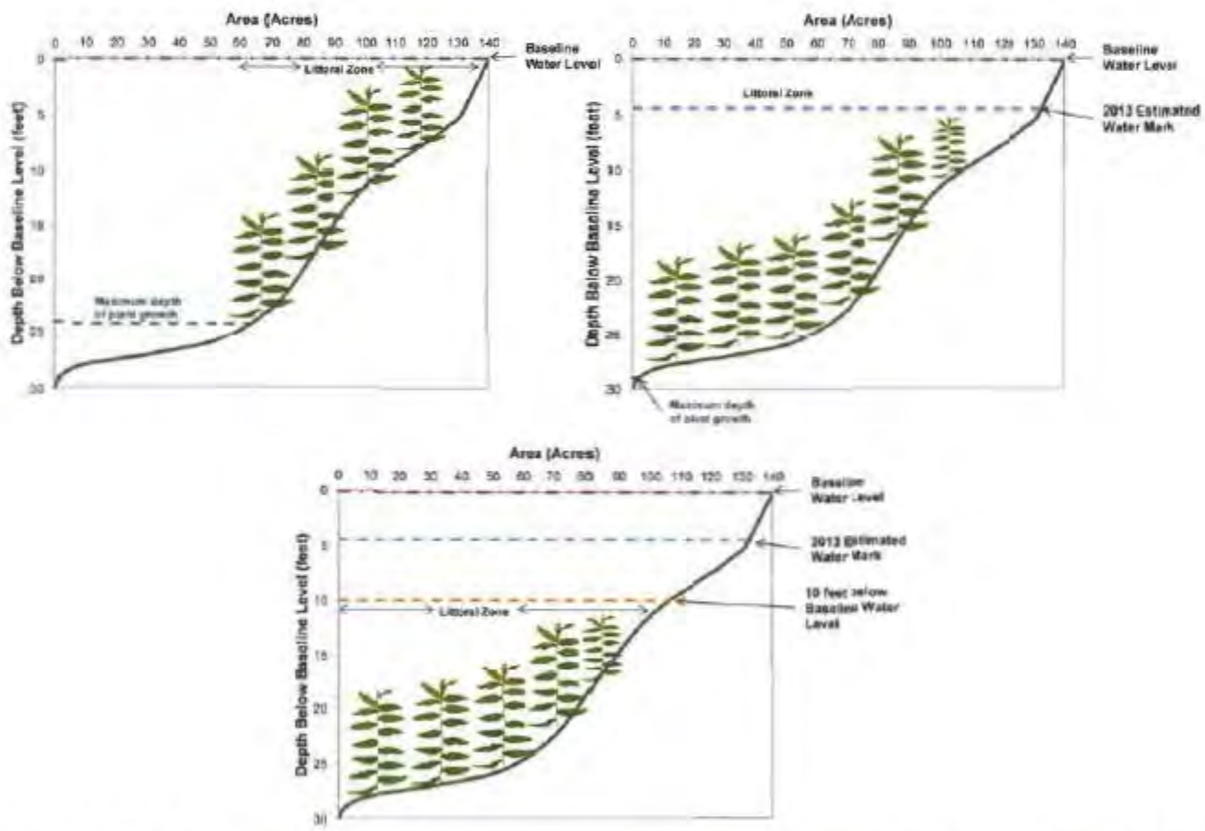

Figure 2.3-2. Pleasant Lake hypsographs displaying changes in littoral area at the baseline water level (top left), 2013 water levels (top right), and 10 feet below the baseline water level (bottom center).

As discussed, the current littoral zone of Pleasant Lake is near its maximum size. Increases or decreases in water levels from the current water level position will reduce the size of the lake's littoral area. However, the reduction in littoral area due to continued decline in water levels will likely have a greater impact ecologically than loss of littoral area due to increasing water levels. Data regarding the composition of Pleasant Lake's substrate were collected during the 2013 acoustic survey. These data indicate that the majority of the substrate within shallower areas of Pleasant Lake, mostly between 1-4 feet, is comprised of harder substrates (sand and/or rock) (Figure 2.3-3).

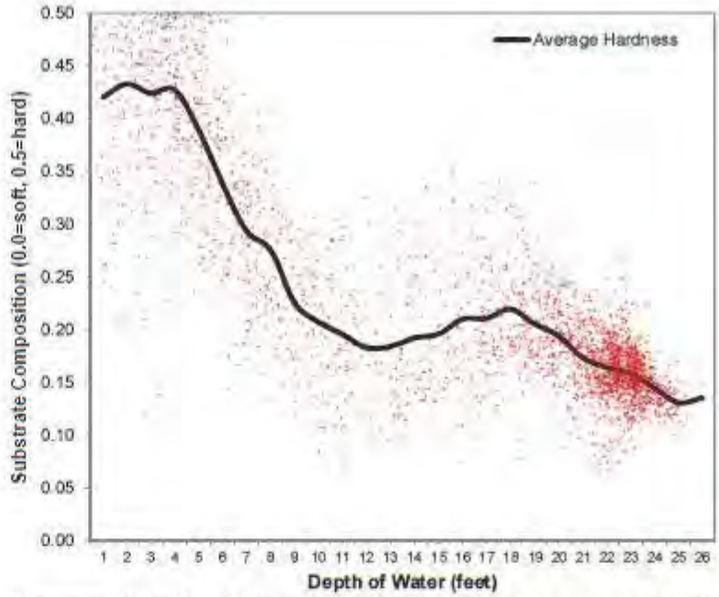

Figure 2.3-3. Pleasant Lake average substrate hardness across water depths. Created using data from 2013 acoustic survey.

The reduction of habitat comprised of harder substrate due to further water level decline in Pleasant Lake may affect certain floral and faunal populations. Of the aquatic plant species present in Pleasant Lake, slender naiad, variable pondweed, wild celery, and needle spikerush have an affinity for firm sediment (Borman et al. 1997). Figure 2.3-4 illustrates that the highest occurrence of these species occurred within areas of harder substrates in 2012. If water levels continue to decline and areas of hard substrate become reduced, the soft sediments may prove unsuitable for these species and their populations may decline. In contrast, populations of plants in Pleasant Lake which prefer soft sediments like flat-stem pondweed (Figure 2.3-4) would likely be able to migrate with receding water levels as new areas of softer sediment become habitable. However, as lake levels drop, soft material from the shallow reaches of the lake may be moved to deeper water through wind and wave action which would expose harder material. In addition, the exposure of these softer substrates to increased levels of oxygen may result in higher decomposition rates of this material, also exposing sandy substrates beneath.

During the 2013 acoustic survey, aquatic plant bio-volume data were also collected. Bio-volume is a measure of the percentage of the water column occupied by aquatic plants. Map 6 displays aquatic plant bio-volume in Pleasant Lake from 2013, and shows that areas of highest aquatic plant bio-volume occur in narrow bands around the lake. Figure 2.3-5 displays the average aquatic plant bio-volume and average substrate hardness across water depth. Two measures of average bio-volume are displayed: BVw is a measure of aquatic plant bio-volume within all areas of the lake regardless if plants were present or not, and BVp is the average bio-volume only in areas where plants were present.

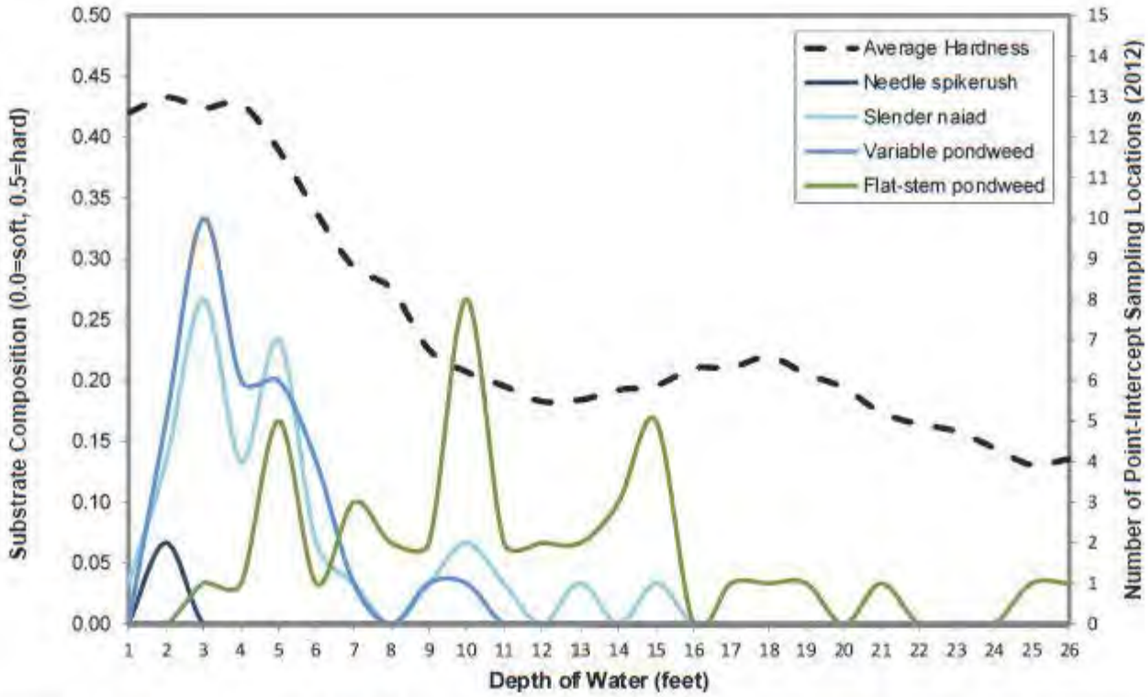

Figure 2.3-4. Pleasant Lake average substrate hardness and frequency of occurrence of select aquatic plant species across water depths. Created using data from 2013 acoustic survey.

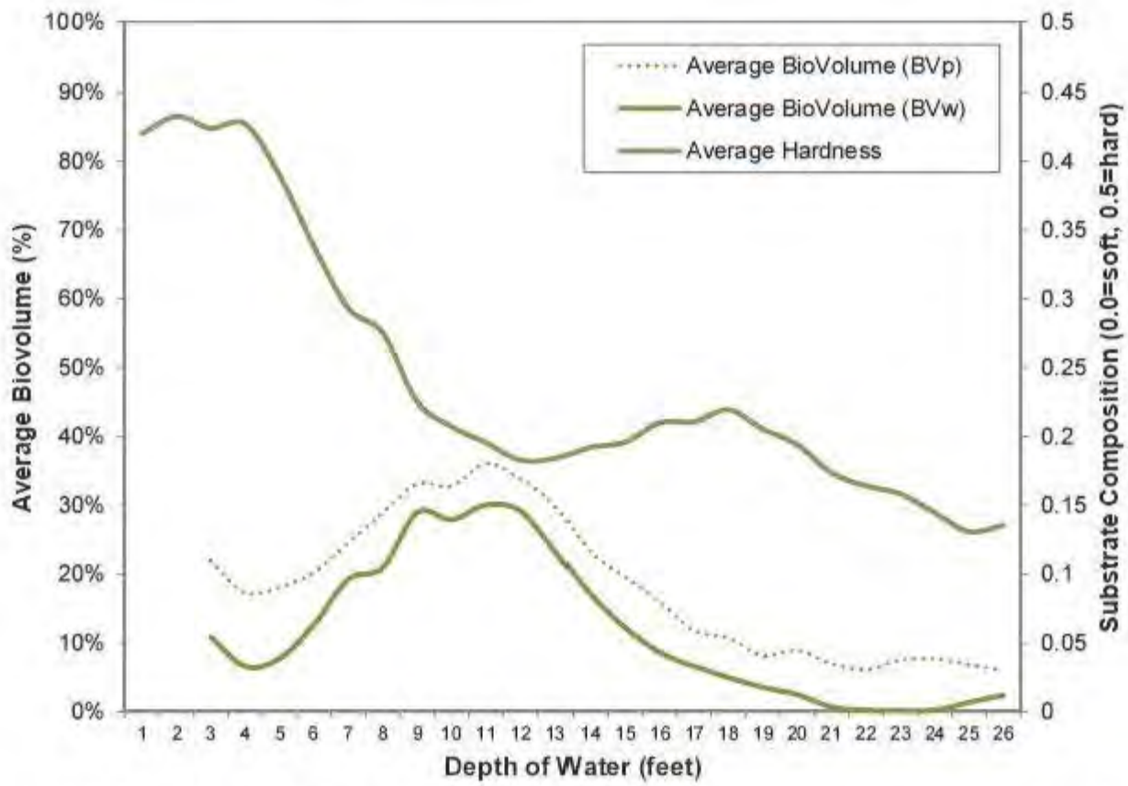

Figure 2.3-5. Pleasant Lake average aquatic plant volume across water depth. Created using data from 2013 acoustic survey.

As illustrated, the highest average aquatic plant bio-volume in Pleasant Lake occurs between depths of approximately 5-15 feet over areas of softer sediment. While muskgrasses are the most abundant aquatic plant in Pleasant Lake, the higher aquatic plant bio-volume is created from the taller vascular aquatic plants, such as flat-stem pondweed, white-stem pondweed, and northern water milfoil. Restricted from shallower areas of Pleasant Lake due to the harder substrates and from deeper areas due to inadequate light, these plants thrive in Pleasant Lake's intermediate depths where substrate and light are suitable. As water levels decline from their current level and deeper areas begin to receive adequate light, it is likely that these taller plants will be able to establish lakeward as substrate hardness appears suitable. However, as water levels increase, these bands of higher aquatic plant bio-volume may become narrower as they lose light on the lakeward edge and are restricted by harder substrates on the shoreward edge.

Like many of the native aquatic plants, both HWM and CLP show an affinity for softer sediments. Currently, the majority of the HWM population within Pleasant Lake occurs within areas of highest aquatic plant bio-volume over soft sediments (Map 3). Like many invasive species, both HWM and CLP are considered pioneer species, or species that tend to establish areas first following disturbance. As water levels decline in Pleasant Lake, deeper areas that currently do not receive adequate light will be suitable for both CLP and HWM. Their pioneering nature may give these species a competitive foothold over native aquatic plants trying to establish themselves in these newly habitable areas.

In addition to altering the aquatic plant community within Pleasant Lake proper, the aquatic plant community within the Turtle Bay wetland, located on the southwest side of the lake (Photo 2.3-1), would also be impacted from continued water level decline. This wetland is fed via groundwater and maintains a direct connection with Pleasant Lake proper. This wetland would likely see dramatic changes in plant community composition with continued water level declines of one to two feet. This perennial open marsh wetland contains a diverse plant community, supporting submergent, floating-leaf, free-floating, and emergent aquatic plants. The Turtle Bay wetland supports the only known population of common bladderwort (*Utricularia vulgaris*) within Pleasant Lake (Photo 2.3-1). This carnivorous plant is truly aquatic and would not survive desiccation following prolonged water level decline. Appendix A contains an assessment of the Turtle Bay wetland by Mary Linton, certified wetlands ecologist, and she states that "permanent loss of groundwater would significantly and negatively impact the plant community."

Mary Linton also surveyed the Turtle Bay wetland for reptiles and amphibians in 2012, and found this area hold a diverse frog community. She recorded the presence of spring peepers (*Pseudacris crucifer*), American toads (*Anaxyrus americanus*), leopard frogs (*Lithobates pipiens*), Cope's gray treefrog (*Hyla chrysoscelis*), gray treefrog (*Hyla versicolor*), and American bullfrogs (*Lithobates catesbeianus*). While not recorded, she also believes that the Turtle Bay wetland is suitable breeding habitat for boreal chorus frogs (*Pseudacris maculata*). Of the frog species she recorded, both the leopard frog and bullfrog are listed as species of special concern in Wisconsin. The Turtle Bay wetland provides ideal habitat for leopard frogs as they not only require cold spring-fed waters for breeding, but nearby warmer water for development (Appendix A). Further water level decline would likely erode this exceptional habitat for the amphibian species that are found there.

Photo 2.3-1. Turtle Bay wetland (left) and population of common bladderwort (*Utricularia vulgaris*) (right). Photos taken in 2013.

On August 29, 2013, Onterra ecologists conducted snorkel-based surveys in three locations around Pleasant Lake to determine the species of freshwater mussels (*Unionidae*) that were present. Freshwater mussels are most diverse in northeastern North America, with nearly 300 species (Cummings and Mayer 1992). Unfortunately, nearly half of the 51 species that occur in Wisconsin are listed as endangered, threatened, or species of special concern (WDNR 2011). Freshwater mussels are long-lived, and improve water quality by filtering out sediments, algae, and pollutants. Most species are found in rivers and streams, but a number can be found in lakes and ponds (Cummings and Mayer 1992).

Three areas in Pleasant Lake were surveyed for freshwater mussels (Map 7). These areas were comprised of larger expanses of sandy substrate, and have been areas where mussels have been observed during plant surveys in the past. During the 2013 survey on Pleasant Lake, only six live individuals comprised of one species, the giant floater mussel (*Pyganodon grandis*), were located (Photo 2.3-2). Appendix B contains photos of all the individuals located during the 2013 survey. All of the live mussels were located in sand, at depths of three to five feet. Five individuals were located in one area on the sandy peninsula in the northeastern portion of the lake, while one individual was located in sand off the southern shore (Map 7). Two non-live mussel shells were also located in areas surveyed along the southern shore (Map 7). Counting growth rings on the external surface of the live shells, the ages of the live individual mussels ranged from five to 15 years.

The giant floater mussel is common in Wisconsin, and can be found in a variety of habitats including lakes, rivers, and streams (Cummings and Mayer 1992), and is not currently listed as a species of special conservation need in Wisconsin (WDNR 2011). However, further water level decline leading to the loss of hard substrates may impact the giant floater population in Pleasant Lake. As mentioned, all six giant floater individuals located in Pleasant Lake were found in substrate comprised of sand at depths of 3-5 feet. Other field studies have shown that substrates comprised of sand or gravel are the preferred habitats for freshwater mussels (Green 1971; Harman 1972; Stern 1983; Downing et al. 2000). As water levels continue to decline from their present levels, these areas of firmer substrate will be exposed, and may reduce available habitat for the giant floater mussels.

Photo 2.3-2. Live giant floater mussels (*Pyganodon grandis*) located in Pleasant Lake during the 2013 mussel survey.

2.4 Fisheries Data Integration

Fishery management is an important aspect in the comprehensive management of a lake ecosystem; therefore, a brief summary of available data is included here as reference. The following section is not intended to be a comprehensive plan for the lake's fishery, as those aspects are currently being conducted by the biologists overseeing Pleasant Lake. The goal of this section is to provide an overview of some of the data that exists, particularly in regards to specific issues (e.g. fish stocking, angling regulations, etc) that were brought forth by the PLD stakeholders within the stakeholder survey and other planning activities. Although current fish data were not collected, the following information was compiled based upon data available from the WDNR (WDNR 2014 and personal communication).

Pleasant Lake Fishery

Fishing Activity

Table 2.4-1 shows the popular game fish that are present in the system, while Table 2.4-2 shows some of the non-gamefish present. When examining the fishery of a lake, it is important to remember what "drives" that fishery, or what is responsible for determining its mass and composition. The gamefish in Pleasant Lake are supported by an underlying food chain. At the bottom of this food chain are the elements that fuel algae and plant growth – nutrients such as phosphorus and nitrogen, and sunlight. The next tier in the food chain belongs to zooplankton, which are tiny crustaceans that feed upon algae and plants, and insects. Smaller fish called planktivores feed upon zooplankton and insects, and in turn become food for larger fish species. The species at the top of the food chain are called piscivores, and are the larger gamefish that are often sought after by anglers, such as bass and walleye.

A concept called energy flow describes how the biomass of piscivores is determined within a lake. Because algae and plant matter are generally small in energy content, it takes an incredible amount of this food type to support a sufficient biomass of zooplankton and insects. In turn, it takes a large biomass of zooplankton and insects to support planktivorous fish species. And finally, there must be a large planktivorous fish community to support a modest piscovorous fish community. Studies have shown that in natural ecosystems, it is largely the amount of primary

productivity (algae and plant matter) that drives the rest of the producers and consumers in the aquatic food chain. This relationship is illustrated in Figure 2.4-1.

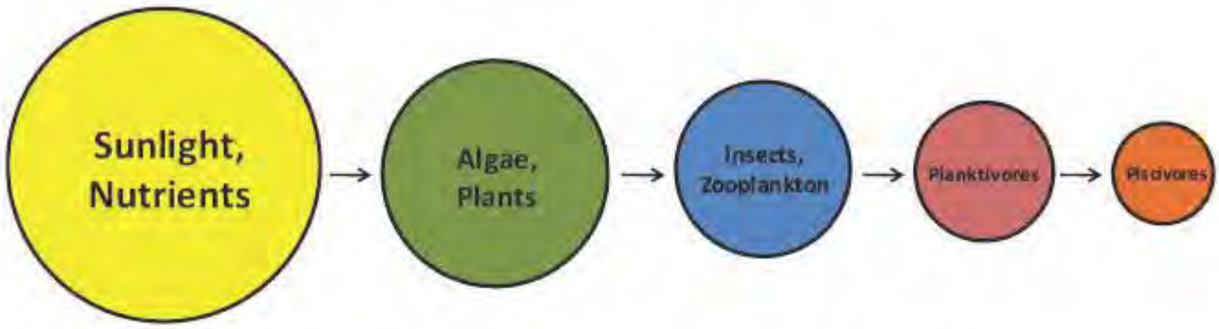

Figure 2.4-1. Aquatic food chain. Adapted from Carpenter et. al 1985.

Pleasant Lake is a meso-eutrophic system, meaning it has a moderate amount of nutrients and thus a moderate amount of primary productivity. Simply put, this means Pleasant Lake should be able to support an appropriately sized population of predatory fish (piscovores).

Table 2.4-1. Gamefish present in the Pleasant Lake with corresponding biological information (Becker, 1983). Species confirmed through a WDNR 2012 survey (Appendix D).

Common Name	Scientific Name	Max Age (yrs)	Spawning Period	Spawning Habitat Requirements	Food Source
Black Crappie	*Pomoxis nigromaculatus*	7	May - June	Near *Chara* or other vegetation, over sand or fine gravel	Fish, cladocera, insect larvae, other invertebrates
Bluegill	*Lepomis macrochirus*	11	Late May - Early August	Shallow water with sand or gravel bottom	Fish, crayfish, aquatic insects and other invertebrates
Largemouth Bass	*Micropterus salmoides*	13	Late April - Early July	Shallow, quiet bays with emergent vegetation	Fish, amphipods, algae, crayfish and other invertebrates
Northern Pike	*Esox lucius*	25	Late March - Early April	Shallow, flooded marshes with emergent vegetation with fine leaves	Fish including other pike, crayfish, small mammals, water fowl, frogs
Pumpkinseed	*Lepomis gibbosus*	12	Early May - August	Shallow warm bays 0.3 - 0.8 m, with sand or gravel bottom	Crustaceans, rotifers, mollusks, flatworms, insect larvae (terrestrial and aquatic)
Rock Bass	*Ambloplites rupestris*	13	Late May - Early June	Bottom of course sand or gravel, 1 cm - 1 m deep	Crustaceans, insect larvae, and other invertebrates
Warmouth	*Lepomis gulosus*	13	Mid May - Early July	Shallow water 0.6 - 0.8 m, with rubble slightly covered with silt	Crayfish, small fish, odonata, and other invertebrates
Walleye	*Sander vitreus*	18	Mid April - Early May	Rocky, wavewashed shallows, inlet streams on gravel bottoms	Fish, fly and other insect larvae, crayfish
Yellow Perch	*Perca flavescens*	13	April - Early May	Sheltered areas, emergent and submergent veg	Small fish, aquatic invertebrates

Table 2.4-2. Non-gamefish present in the Pleasant Lake Species confirmed through a WDNR 2012 survey (Appendix D).

Common Name	Scientific Name
Banded killifish**	*Fundulus diaphanus*
Brown bullhead	*Ameiurus nebulosus*
White sucker	*Catostomus commersonii*
Yellow bullhead	*Ameiurus natalis*

***State Special Concern species*

Table 2.4-3. WDNR fishing regulations for Pleasant Lake, 2013-2014.

Species	Season	Regulation
Panfish	Open All Year	No minimum length limit and the daily bag limit is 25.
Largemouth and smallmouth bass	May 4, 2013 to March 2, 2014	The minimum length limit is 14" and the daily bag limit is 5.
Northern pike	May 4, 2013 to March 2, 2014	The minimum length limit is 26" and the daily bag limit is 2.
Walleye, sauger, and hybrids	May 4, 2013 to March 2, 2014	The minimum length limit is 15" and the daily bag limit is 5.
Bullheads	Open All Year	No minimum length limit and the daily bag limit is unlimited.
Rock, yellow, and white bass	Open All Year	No minimum length limit and the daily bag limit is unlimited.
Catfish	Open All Year	No minimum length limit and the daily bag limit is 25.

Fisheries Habitat and Management

Substrate and habitat are critical to fish species that do not provide parental care to their eggs, in other words, the eggs are left after spawning and not tended to by the parent fish. Northern pike is one species that does not provide parental care to its eggs (Becker 1983). Northern pike broadcast their eggs over woody material or aquatic plants, which can be found above sand or muck. This organic material suspends the eggs above the substrate, so the eggs are not buried in sediment and suffocate as a result. Walleye is another species that does not provide parental care to its eggs. Walleye preferentially spawn in areas with gravel or rock in places with moving water or wave action, which oxygenates the eggs and prevents them from getting buried in sediment. Fish that provide parental care are less selective of spawning substrates. Species such as bluegill tend to prefer a harder substrate such as rock, gravel or sandy areas if available, but have been found to spawn in muck as well.

Pleasant Lake is managed for a largemouth bass and bluegill fishery primarily, with a smaller component of northern pike and other panfish species. The WDNR does not stock the lake with fish currently, though northern pike have been stocked in the past. Walleye have been stocked within the lake by the PLD, most recently in 2010. These stockings have been largely unsuccessful, as reproduction of mature walleyes has not been observed within the lake following stocking. A 2012 comprehensive survey (Appendix D) does note that largemouth bass

populations are doing well, and bluegill populations are average when compared to other lakes statewide. Growth and condition rates for these species are, however, are below average.

Currently, the WDNR is focusing upon habitat protection and restoration as a fishery goal for the lake. This includes the use of large woody habitat (tree drops and "fish sticks") that would provide direct benefit through "cover for juvenile fish and forage species, improvements in growth of both pan and gamefish species and better overall balance of the fish community" (David Bartz - WDNR, personal communication). The presence of coarse woody habitat is important for many stages of a fish's life cycle, including nesting or spawning, escaping predation as a juvenile, and hunting insects or smaller fish as an adult. Unfortunately, as development has increased on Wisconsin lake shorelines in the past century, this beneficial habitat has often been the first to be removed from the natural shoreland zone.

As discussed within the aquatic plant section, substrate composition was shown to vary by depth. Changes that may occur to the substrate as a result of water fluctuation would force fish species to adapt accordingly. However, the degree of change and difficulty of adaption is difficult to predict. In general, as lake levels drop, soft material from the shallow reaches of the lake may be moved to deeper water through wind and wave action which would expose harder material.

One Pleasant Lake fish, the banded killifish, is listed as a state species of special concern. This listing means that the fish is of concern in Wisconsin, though not to the extent that it is extensively tracked by the National Heritage Inventory database. The WDNR has monitored banded killifish on two recent occasions, in 1999 and 2012, and found that the populations have remained healthy between this time period (David Bartz – WDNR, personal communication). The banded killifish prefer clear water of bays and quiet backwaters of large lakes and medium to large streams with sparse to no vegetation over gravel, sand, silt, marl, clay, detritus or cobble (WDNR website http://dnr.wi.gov/topic/EndangeredResources/Animals.asp?mode=detail&SpecCode=AFCNB04060). WDNR fisheries biologists believe that these habitat requirements are met in certain areas of Pleasant Lake. It is not thought that the population has been significantly affected by loss of habitat in the near shore areas, as the littoral zone has continued to migrate out as water levels have dropped within Pleasant Lake and small pockets of "micro habitats" seem to have allowed this species to continue in Pleasant Lake (David Bartz – WDNR, personal communication). As such, WDNR fisheries biologists do not currently have concern on this species' presence in Pleasant Lake.

4.0 SUMMARY AND CONCLUSIONS

The design of this supplemental management planning project was intended to fulfill two main objectives:

1) Conduct an assessment of Pleasant Lake's aquatic plant community and develop realistic management goals that will enhance and protect it.
2) Conduct a littoral habitat assessment on Pleasant Lake and determine the potential ecological effects of continued water level decline.

These two objectives were fulfilled during this project and have led to an understanding of the positive and negative attributes of Pleasant Lake's aquatic plant community. In addition, potential impacts to the Pleasant Lake ecosystem have been identified if water levels within the lake continue to decline.

Through the studies conducted on Pleasant Lake, the aquatic plant community was found to be of higher quality when compared to other lakes within the North Central Hardwood Forests Ecoregion and of comparable quality when compared to other lakes around the state. The plant community contains a relatively high number of native species, and is dominated by muskgrasses. The dominance of muskgrasses yielded a species diversity index value lower than regional and median values, but the abundance of muskgrasses is to be expected in a lake like Pleasant Lake with relatively high calcium carbonate concentrations.

While the submersed invasive aquatic plants hybrid water milfoil (HWM) and curly-leaf pondweed (CLP) are present within the lake, the 2012 point-intercept survey indicated both populations are in relatively low abundance. In addition, with the HWM control actions taken in 2010-2012, its occurrence was found to have declined by a statistically valid 67% from 2009-2012. However, at present, the HWM in Pleasant Lake is the largest threat to the lake's native aquatic plant community, as annual data collected on Pleasant Lake indicate this population has the capacity to spread and grow rapidly. While CLP has likely been present within the lake for many years, it has not yet been observed forming large, monotypic colonies; CLP plants are currently widespread throughout the lake and are not likely having any significant impact on the lake ecosystem.

Additionally, the emergent invasive plants giant reed and reed canary grass along the shorelines of Pleasant Lake are of concern. Both giant reed and reed canary grass have the capacity to spread rapidly and displace valuable native flora. Of most concern, is the proximity of these plants to the Turtle Bay wetland on the southwest side of the lake, which harbors diverse floral and faunal communities.

The littoral habitat assessment revealed that one of the largest impacts Pleasant Lake's ecosystem would likely be a decline of hard substrate habitat. The acoustic survey revealed that the majority of the hard substrates (i.e. sand and rock) are located within four feet of water or less, and continued water level decline may reduce this habitat type. A number of aquatic plants as well as aquatic animals, like the giant floater mussel, have an affinity for harder substrates. A reduction of this habitat type may impact the populations of these species in Pleasant Lake. In addition, a continued reduction of the groundwater table would likely result in the loss of the plant and animal communities within the Turtle Bay wetland. Under natural conditions, fluctuating water levels in a seepage lake like Pleasant Lake are normal and are a required part of

the life cycle of a number of plants and animals. However, continued or sustained water level decline due to high capacity wells may have detrimental impacts to Pleasant Lake's ecology.

Through the process of this supplemental lake management planning effort, the PLMD has learned much about their lake's aquatic plant community, both in terms of its positive and negative attributes. Overall, the plant community is healthy, but there are certain aspects which require attention. It is now the PLMD's responsibility to maximize the positive attributes while minimizing the negative attributes as much as possible. The Implementation Plan that follows this section stems from discussions between Onterra ecologists and the PLMD Planning Committee on which action items the district may implement to properly maintain and care for this resource.

5.0 IMPLEMENTATION PLAN

The Implementation Plan presented below was created through the collaborative efforts of the Pleasant Lake Management District (PLMD) Planning Committee and ecologists/planners from Onterra. Along with the goals created as part of the Waushara County Lake Management Planning Project, these goals represent the path the PLMD will follow in order to meet their lake management goals. The goals detailed within the plan are realistic and based upon the findings of the studies completed in conjunction with this planning project and the needs of the Pleasant Lake stakeholders as portrayed by the members of the Planning Committee. The Implementation Plan is a living document in that it will be under constant review and adjustment depending on the condition of the lake, the availability of funds, level of volunteer involvement, and the needs of the stakeholders.

Management Goal 1: Control Existing and Prevent Further Introductions of Aquatic Invasive Species to Pleasant Lake

Management Action: Enact hybrid water milfoil monitoring and control strategy.

Timeframe: Begin 2014

Facilitator: Pleasant Lake Board of Directors

Description: As described within the Aquatic Plant Results Section, one of the most pressing threats to the health, recreation, and aesthetics of Pleasant Lake is the non-native, invasive species hybrid water milfoil (HWM). Following its discovery in 2007, the PLMD acted quickly and enacted herbicide spot treatments to control areas of HWM. In 2010, with the assistance of Onterra, the PLMD received a WDNR AIS Early Detection and Response Grant to aid in funding HWM monitoring and control from 2010-2012. This program was successful, as HWM acreage and occurrence within the lake was reduced over this time period.

However, surveys in 2012 indicated that HWM is rebounding/re-colonizing areas that were treated in 2010-2012. A treatment was initially proposed for 2013, but calculations of the amount of herbicide proposed indicated that concentrations were approaching levels that could potentially impact aquatic plants on a lake-wide level. Because the bathymetric data available from the lake was from 1967 and a more accurate estimate of the lake's volume could not be made, it was decided that the 2013 treatment would be suspended until updated bathymetric data could be collected.

As described in the Aquatic Plant Survey Results Section, Pleasant Lake was found to contain approximately 2.2 acres of HWM in 2013. At this time, a combination of manual hand-removal and herbicide applications are the most feasible methods of control. Historically, the spot treatment strategy has been utilized in Pleasant Lake to target specific areas of HWM. While a whole-lake treatment has not yet been

found to be warranted in Pleasant Lake, a whole-lake treatment strategy may be applicable in the future if HWM becomes more widespread throughout the lake. However, if a whole-lake treatment is found to be warranted, whole-lake point-intercept surveys will have to be conducted the summer prior to the treatment and the summer immediately following the treatment to assess the aquatic plant community at the lake-wide level.

The objective of this management action is not to eradicate HWM from Pleasant Lake, as that is impossible with the currently available tools and techniques. The objective is to maintain an HWM population that exerts little to no detectable impacts on the lake's native aquatic plant community and overall ecology, recreation, and aesthetics. Monitoring is a key aspect of any AIS control project, both to prioritize areas for control and to monitor the strategy's effectiveness. The monitoring also facilitates the "tuning" or refinement of the control strategy as the control project progresses. The ability to tune the control strategies is important because it allows for the best results to be achieved within the plan's lifespan. It must be noted that hand-removal methodology is still experimental, and success criteria for assessing the efficacy of hand-removal have never been defined. Because of this, the following series of steps to manage HWM via hand-removal and herbicide applications in Pleasant Lake should remain flexible to allow for modifications as the project progresses. The series includes:

1. A lake-wide assessment of HWM (Early-Season AIS Survey) would be completed in early June to assess areas of HWM. By completing this survey in June, these areas of HWM can be provided to Golden Sands RC&D so they can better coordinate their hand-removal efforts.
2. A lake-wide assessment of HWM completed while the plant is at or near its peak biomass (July or August).
3. Creation of an herbicide treatment strategy (if warranted) for the following spring.
4. Verification and refinement of treatment plan immediately before the treatments are implemented.
5. Completion of treatments.
6. Assessment of treatment results (summer after treatment).

Two types of monitoring would be completed to determine treatment effectiveness; 1) quantitative monitoring using WDNR protocols, and 2) qualitative monitoring using observations at individual treatment sites and on a treatment wide basis. Results of both of these monitoring strategies would be used to create the subsequent treatment strategies. The quantitative strategies include sampling plants, both HWM and native species, at predetermined locations (points) within treatment areas, while the qualitative monitoring includes the determination of HWM abundance based upon a continuum of density. The density

continuum ranges from non-detectable levels of HWM to what is considered a monoculture where HWM is essentially the only plant that exists in the area. Both monitoring types would be completed before and after the treatments (pretreatment surveys and post treatment surveys). Comparing the monitoring results from the pretreatment and post treatment surveys would determine the effectiveness of the treatment on a site-by-site basis and on a treatment wide basis. Finally, a lake-wide plant survey (point-intercept survey) would be completed after this management action is completed (3 years) to determine the effectiveness of the intense control program.

Qualitatively, a successful treatment on a particular site would include a reduction of exotic density, as demonstrated by a decrease in density rating. Quantitatively, a successful treatment would include a significant reduction in HWM frequency following the treatments, as exhibited by at least a 50% decrease in exotic frequency from the pre- and post treatment point-intercept sub-sampling. Funds from the WDNR AIS Program in will be sought to partially fund this control program from 2015-2017. Specifically, funds would be applied for under the Education, Planning and Prevention Project classification.

Action Steps:

1. Retain qualified professional assistance to develop a specific project design utilizing cyclic series of steps discussed above.
2. Apply for WDNR Education, Planning and Prevention Grant based on developed project design in 2014 cycle.
3. Initiate control plan.
4. Revisit control plan in two years.
5. Update management plan to reflect changes in control needs and those of the lake ecosystem.

Management Action: Monitor curly-leaf pondweed population in Pleasant Lake.

Timeframe: Begin 2015

Facilitator: Pleasant Lake Board of Directors

Description: As discussed in the Aquatic Plant Section, Pleasant Lake also contains the non-native, invasive plant curly-leaf pondweed (CLP). While it is not known when CLP was first introduced to Pleasant Lake, it has likely been present in the lake for some time. Surveys conducted in 2013 found a very small CLP population, with no large colonized areas being observed. At this time, CLP control strategies utilizing herbicides are not warranted, and hand-removal of these plants is the most feasible control option.

However, the CLP population in Pleasant Lake should be monitored so that control strategies can be enacted quickly if necessary. As discussed in the previous management action, a WDNR Education Planning and Prevention Grant will be sought to aid in funding

professional monitoring of HWM from 2015-2017. This will include an Early-Season AIS Survey in June of each year. Because CLP senesces (dies back) by early summer, occurrences of CLP in Pleasant Lake would also be be mapped during the June Early-Season AIS Survey. While the CLP will be monitored professionally from 2015-2017, it should be the goal of the PLMD to eventually monitor the CLP population annually utilizing trained volunteers. These volunteers could then relay their findings to resource managers and control actions could be initiated if necessary.

Action Steps:

1. See previous management action.

Management Action: Control populations of giant reed (*Phragmites australis subsp. australis*) on the shorelines of Pleasant Lake.

Timeframe: Begin 2014

Facilitator: PLMD Board of Directors with assistance of Golden Sands RC&D Staff

Description: During Onterra's 2013 aquatic plant surveys, the non-native, invasive wetland plant species giant reed was located in two locations along Pleasant Lake's southern shore (Map 2). These populations are believed to be in an early stage of infestation, and eradication of these plants is highly likely if control is initiated quickly. Staff from Golden Sands RC&D will be initiating control of these giant reed populations during the summer of 2014. This will include the cutting of the giant reed stems followed by the application of glyphosphate directly to the cut stems. Following this initial treatment, PLMD volunteers will be able to implement this control strategy annually as new plants are observed.

Action Steps:

1. Contact Golden Sands RC&D to see when they plan on visiting Pleasant Lake to initiate giant reed control strategy.
2. PLMD volunteers join Golden Sands RC&D staff during giant reed cutting and herbicide application to learn control methodology.
3. PL MD volunteers initiate giant reed control strategy annually as needed.

Management Action: Monitor Pleasant Lake for zebra mussels.

Timeframe: Begin 2015

Facilitator: PLMD Board of Directors

Description: The calcium concentrations in Pleasant Lake indicate that the lake is suitable and highly susceptible to zebra mussel establishment if they are introduced to the lake. In addition, nearby lakes like Silver Lake contain populations of zebra mussels. While the PLMD monitors the lake's boat landing through the Clean Boats Clean Waters Program in

an effort to prevent the introduction of zebra mussels and other invasive species, the PLMD also wishes to monitor the lake for adult zebra mussels in an effort to detect an early infestation. While there are currently no strategies to control zebra mussels once they are established, knowing if they are present in a waterbody is important so lake users can take extra precautions when removing their watercraft from Pleasant Lake.

The PLMD wishes to monitor Pleasant Lake for adult zebra mussels following the methodology outlines in the WDNR's *Dreissenid (Zebra and Quagga) Mussel Monitoring Protocol*. Specifically, the PLMD would like to purchase substrate sampler materials, where a specially-designed samples containing metal plates is suspended in the water and periodically checked for adult zebra mussels. If zebra mussels are located on the sampler, the PLMD will notify the WDNR.

Action Steps:

1. PLMD contacts Cathy Cleland (WDNR) at 715.365.8997 to order a zebra mussel substrate sampler.
2. Following protocols outlined in *Dreissenid (Zebra and Quagga) Mussel Monitoring Protocol*, the PLMD will deploy the substrate sampler and periodically check it for attached adult zebra mussels.
3. PLMD will report any occurrences of zebra mussels to the WDNR.

Management Action: Continue Clean Boats Clean Waters watercraft inspections at Pleasant Lake public access location.

Timeframe: Continuation of current effort

Facilitator: PLMD Board of Directors

Description: Currently the PLMD monitors the public boat landing using training provided by the Clean Boats Clean Waters program. Pleasant Lake is a popular destination for recreationalists, making it vulnerable to new infestations of exotic species. The intent of the boat inspections would not only be to prevent additional invasives from entering the lake through its public access point, but also to prevent the infestation of other waterways with invasives that originated in Pleasant Lake. The goal would be to cover the landing during the busiest times in order to maximize contact with lake users, spreading the word about the negative impacts of AIS on lakes and educating people about how they are the primary vector of their spread.

Action Steps:

1. See description above as this is an established program.

Management Goal 2: Assure and Enhance the Communication and Outreach of the Pleasant Lake Management District with Lake Stakeholders

Management Action: Support an Education and Communication Committee to promote stakeholder involvement, inform stakeholders on various lake issues, as well as the quality of life on Pleasant Lake.

Timeframe: Develop in 2014

Facilitator: PLMD Board of Directors to form Education and Communication Committee

Description: Education represents an effective tool to address lake issues like shoreline development, invasive species, water quality, lawn fertilizers, as well as other concerns such as community involvement and boating safety (Map 8). An Education and Communication Committee will be created to promote lake preservation and enhancement through a variety of educational efforts.

Currently, the PLMD regularly publishes and distributes a newsletter and maintains a district website that provides district-related information including current district projects and updates, meeting times, volunteer opportunities, and educational topics. Both of these mediums are an excellent source for communication and education to both district and non-district members.

The PLMD would like to increase its capacity to reach out to and educate district and non-district members regarding Pleasant Lake and its preservation. In addition to creating a newsletter, a variety of educational efforts will be initiated by the Education and Communication Committee. These may include educational materials containing information about the PLMD (projects, finances, etc.) as well as facts about Pleasant Lake and steps lake residents can take to maintain and enhance the quality of the lake, as well as quality of life for those who live and recreate on it. The Education and Communication Committee will also organize workshops and speakers surrounding lake-related topics.

Education of lake stakeholders on all matters is important. During the second planning meeting with PLMD Planning Committee members, the list below of educational topics was discussed. These topics will be included within the district's newsletter and/or website or distributed as separate educational materials. In addition, the PLMD can invite professionals who work within these topics to come and speak at the district's annual meeting or hold workshops if available.

Example Educational Topics

- Shoreline restoration and protection
- Boating regulations and safety
- Importance of maintaining course woody habitat
- Effect lawn fertilizers/herbicides have on the lake
- Pier regulations and responsible placement to minimize habitat disturbance
- Importance of maintaining a healthy native aquatic plant community and minimizing impacts to it
- Aquatic invasive species (AIS) prevention and updates for AIS in Pleasant Lake
- Water quality monitoring updates from Pleasant Lake

Action Steps:

1. Recruit volunteers to from Education and Communication Committee.
2. Investigate if WDNR Small-Scale Lake Planning or AIS Education, Planning, and Prevention Grants would be appropriate to cover initial setup costs.
3. The PLMD Board will identify a base level of financial support for educational activities to be undertaken by the Education and Communication Committee on an annual basis.

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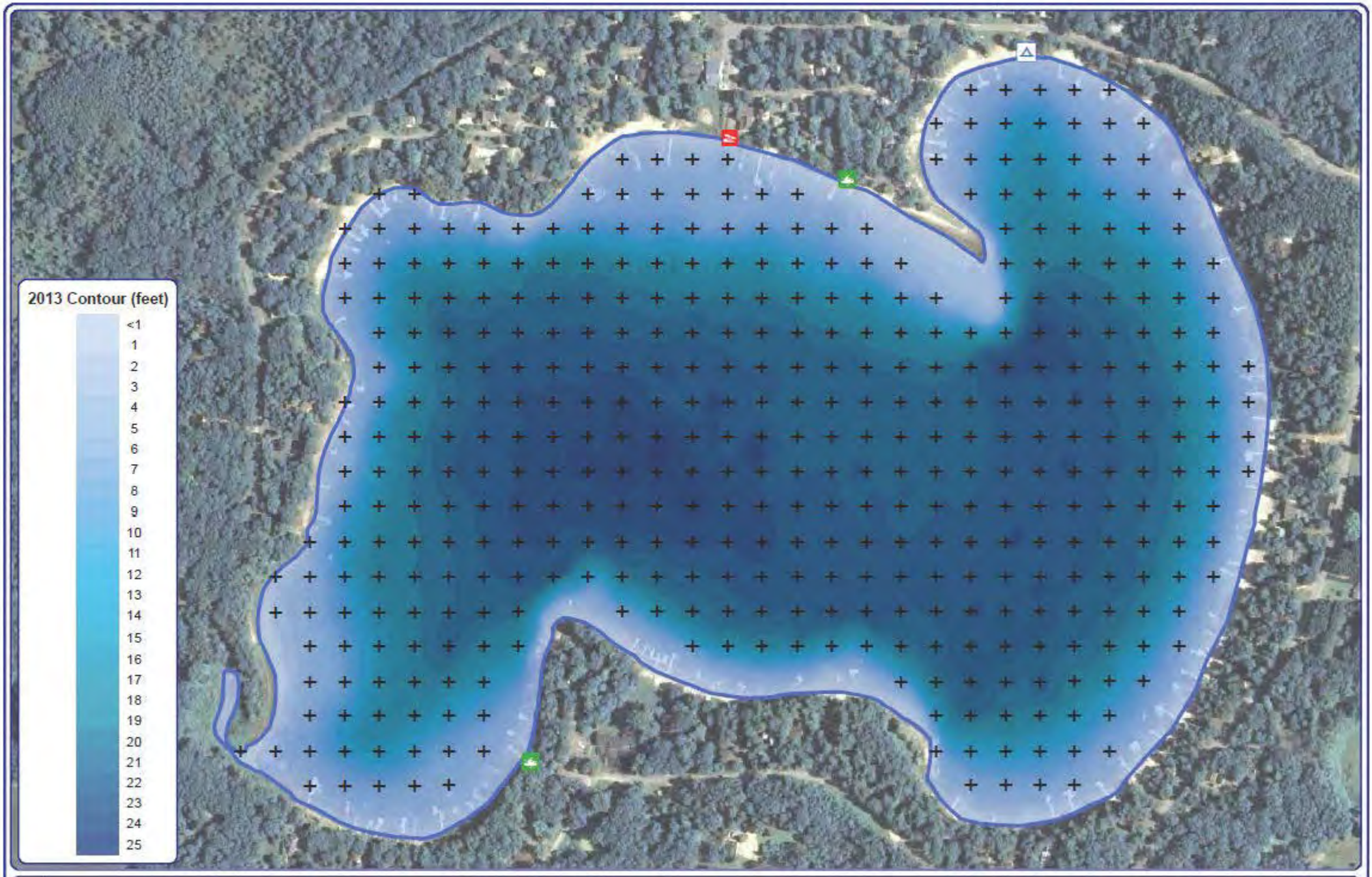


410
Feet

Onterra LLC
Lake Management Planning
815 Prosper Road
De Pere, WI 54115
920.338.8860
www.onterra-eco.com

Sources:
Data: Bathymetry: Onterra, 2013
Orthophotography: NAIP, 2010
Map Date: February 10, 2014
Filename: Map1_Pleasant_Location.mxd

Project Location in Wisconsin

Legend

Pleasant Lake ~127acres
WDNR Definition

Point-Intercept Survey Location
34-meter spacing, 419 total points

Public Access

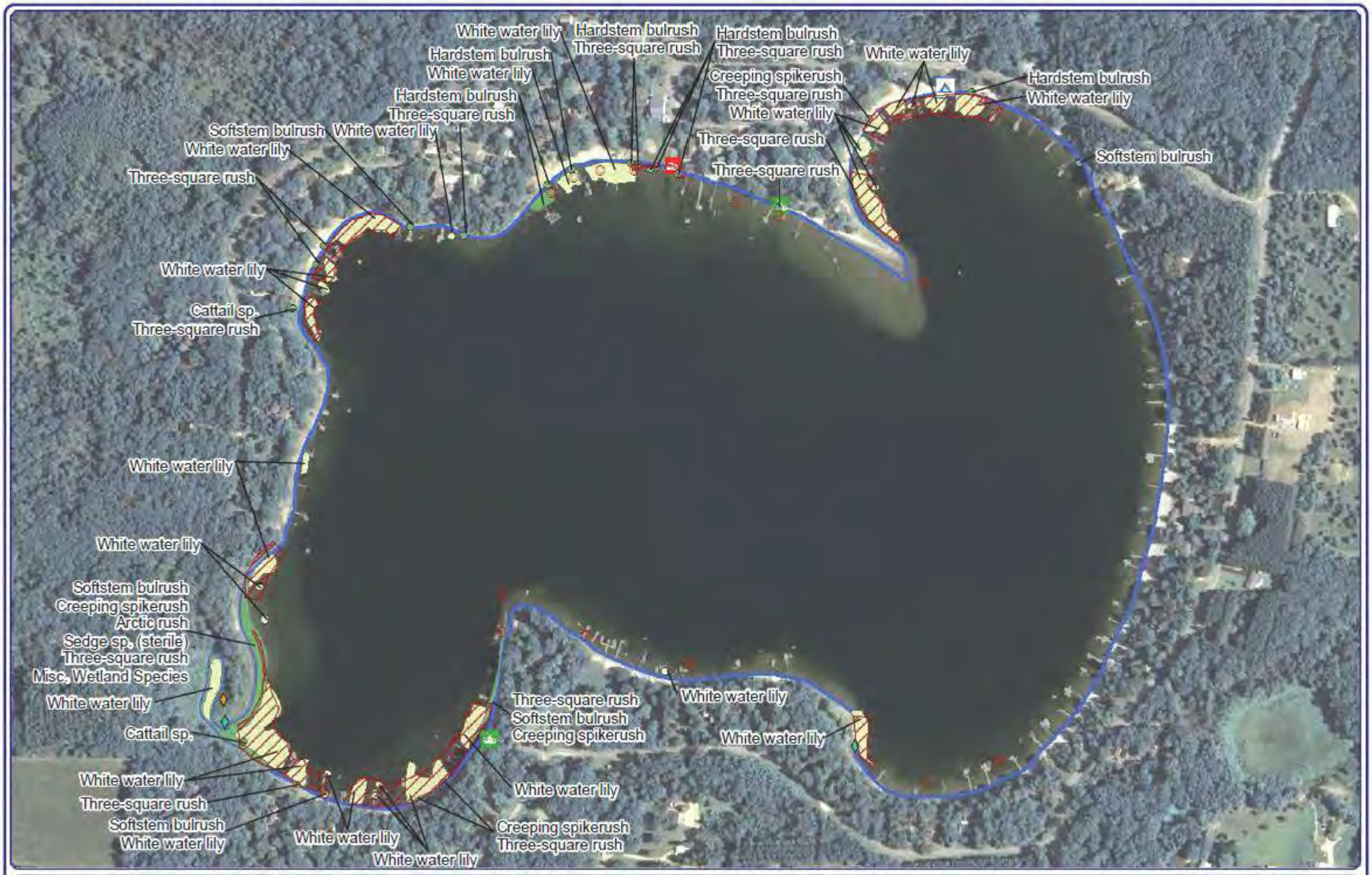
Carry-In Access

Public Beach

Map 1

Pleasant Lake
Waushara County, Wisconsin

Project Location & Lake Boundaries



450

Feet

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Sources:
Hydro: WDNR
Aquatic Plants: Onterra, 2013
Orthophotography: NAIP, 2010
Map date: February 14, 2014
Filename: Map2_Pleasant_Comm_2013.mxd

Project Location in Wisconsin

Legend

Large Plant Community
- Emergent
- Floating-leaf
- Mixed Emergent & Floating-leaf
- 2009 Emergent and/or Floating-leaf

Small Plant Community
- Emergent
- Floating-leaf
- Mixed Emergent & Floating-leaf
- 2009 Emergent and/or Floating-leaf

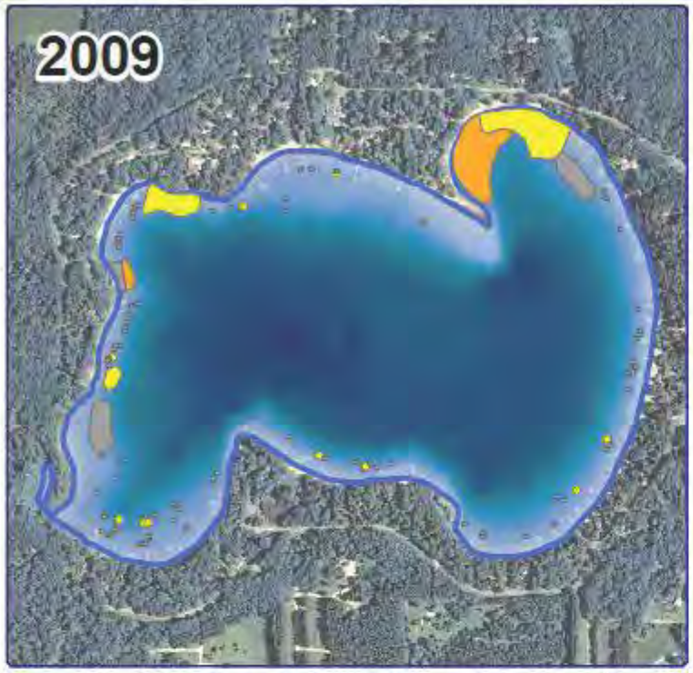
Exotic Plant Community
- Giant Reed
- Reed Canary Grass

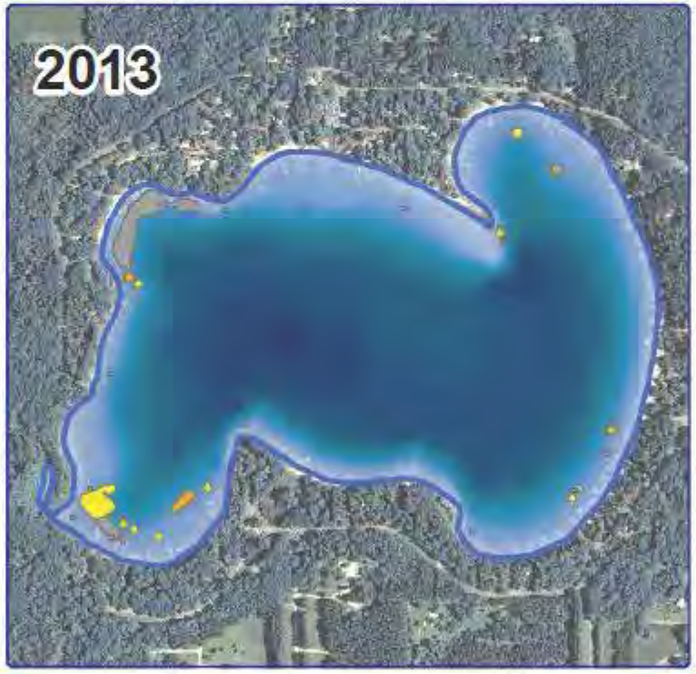
Map 2

Pleasant Lake

Waushara County, Wisconsin

Emergent & Floating-leaf Aquatic Plant Communities





1,100

Feet

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Sources:
Data: Bathymetry: Onterra, 2013
Orthophotography: NAIP, 2010
Map Date: February 10, 2014
Filename: Map1_Pleasant_Location.mxd

Project Location in Wisconsin

Legend

Hybrid Water Milfoil

- Highly Scattered
- Scattered
- Dominant
- Highly Dominant
- Surface Matting
- Single or Few Plants
- Clumps of Plants
- Small Plant Colony

Map 3

Pleasant Lake

Waushara County, Wisconsin

2009-2013

HWM Locations

410

Feet

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Sources:
Data: Bathymetry: Onterra, 2013
Orthophotography: NAIP, 2010
Map Date: February 10, 2014
Filename: Map4_Pleasant_CLPPB_June2013.mxd

Project Location in Wisconsin

Legend

Curly-leaf pondweed

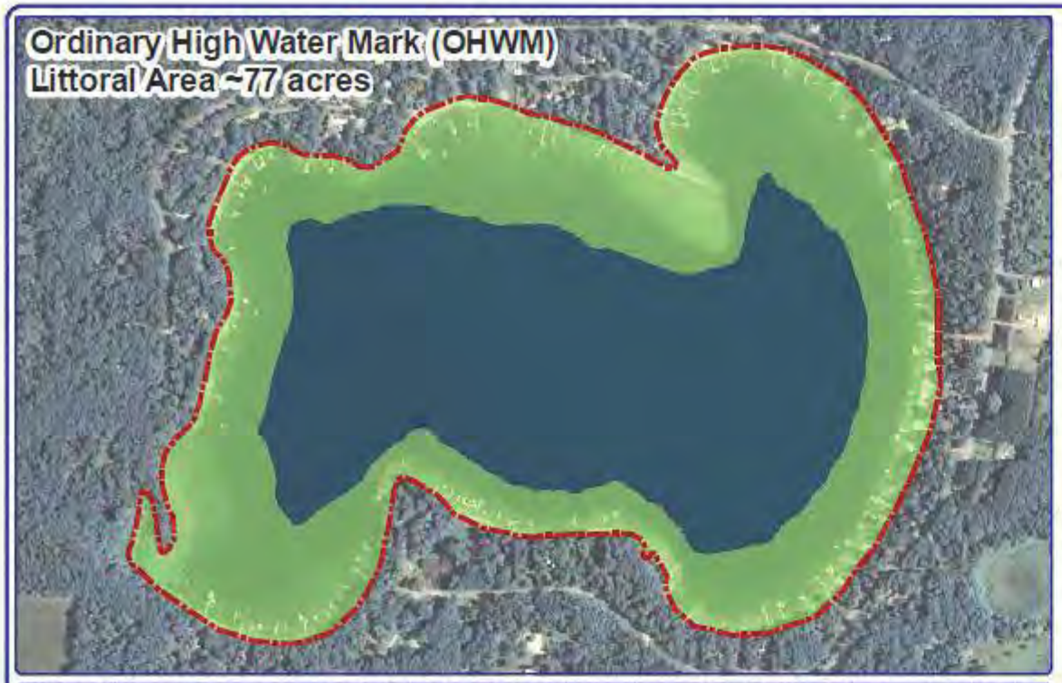
- Highly Scattered
- Scattered
- Dominant
- Highly Dominant
- Surface Matting
- Single or Few Plants
- Clumps of Plants
- Small Plant Colony

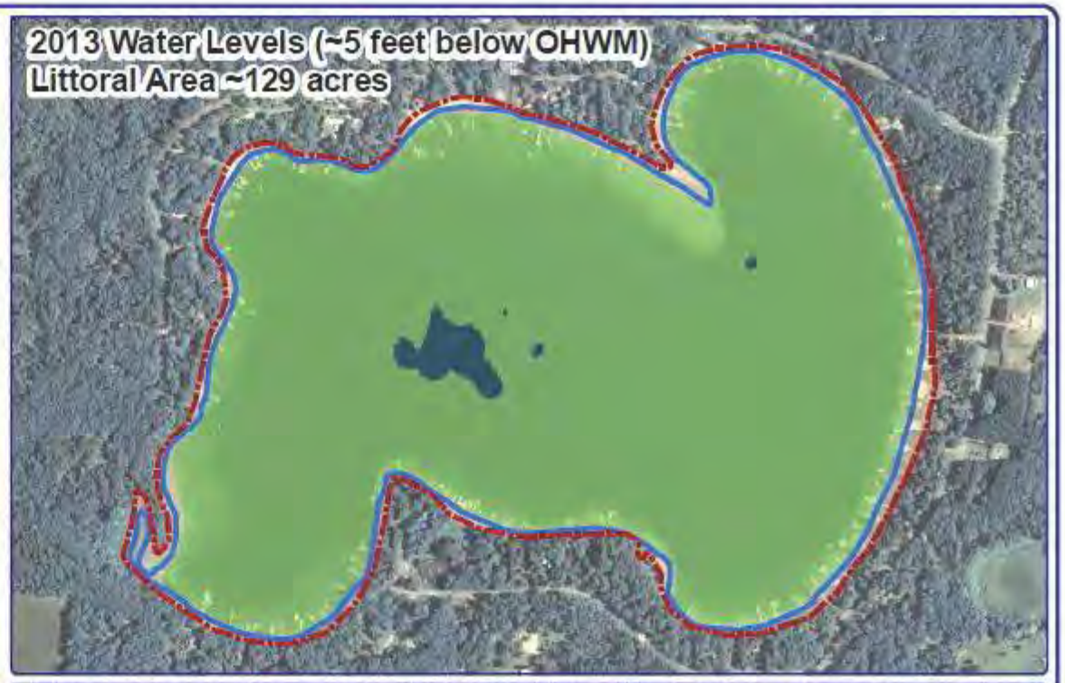
Map 4

Pleasant Lake

Waushara County, Wisconsin

2013 CLP Locations





780
Feet

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Sources:
Data: Bathymetry: Onterra, 2013
Orthophotography: NAIP, 2010
Map Date: February 10, 2014
Filename: Map5_Pleasant_LittoralArea_Scenario.mxd

Project Location in Wisconsin

Legend

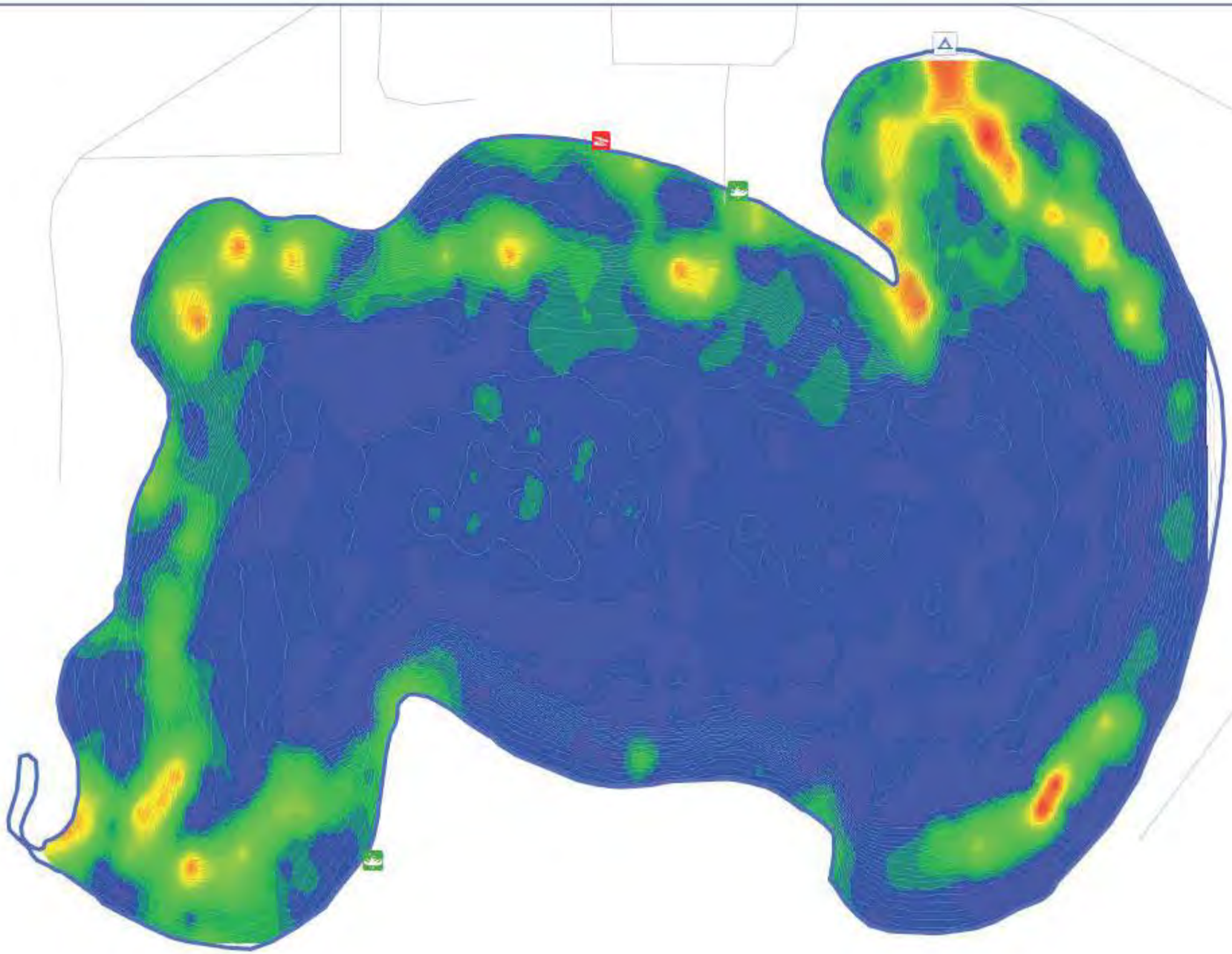
- Pleasant Lake Estimated Ordinary High Water Mark (OHWM)
- Pleasant Lake Estimated 2013 Water Mark
- Littoral Area ≤ 24 feet
- Non-Littoral Area >24 feet
- Exposed Lakebed

Map 5

Pleasant Lake

Waushara County, Wisconsin

Littoral Area in Relation to Water Levels



410

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www.onterra-eco.com

Sources:
Roads and Hydro: WDNR
Aquatic Plants: Onterra, June 2013
Map Date: June 24, 2013
Filename: Map6_Pleasant_Biovolume_2013.mxd

Project Location in Wisconsin

Legend

0% 50% 100%

Aquatic Plant Bio-volume (%)

No Data

Map 6

Pleasant Lake

Waushara County, Wisconsin

2013 Aquatic Plant Biovolume

430

Feet

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920.338.8860
www.onterra-eco.com

Sources:
Data: Bathymetry: Onterra, 2013
Orthophotography: NAIP, 2010
Map Date: February 10, 2014
Filename: Map7_Pleasant_MusselLocations.mxd

Project Location in Wisconsin

Legend

- Mussel Snorkel Survey Transect Area
- Live *Pyganodon grandis*
- Non-Live *Pyganodon grandis*
- Public Access
- Carry-In Access
- Public Beach

Map 7

Pleasant Lake

Waushara County, Wisconsin

2013 Freshwater Mussel Survey Results

410
Feet

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920.338.8860
www.onterra-eco.com

Sources:
Data: Bathymetry: Onterra, 2013
Orthophotography: NAIP, 2010
Map Date: February 10, 2014
Filename: Map8_Pleasant_Watercraft_RegAreas.mxd

Project Location in Wisconsin

Legend

All Watercraft Slow-No-Wake Area (100 feet)

Personal Watercraft Slow-No-Wake Area (200 feet)

Public Access

Carry-In Access

Public Beach

Map 8

Pleasant Lake
Waushara County, Wisconsin

Watercraft Regulation Areas

A

APPENDIX A

Survey of Littoral Zone and Associated Wetlands of Pleasant Lake

10 July 2012

To: Carl Sinderbrand
Axley Brynelson, LLP
2 East Mifflin St., Suite 200
Madison, Wisconsin, 53701-1767

From: Mary Linton, PhD
Certified Ecologist (Ecological Society of America)

Re: Survey of Littoral Zone and Associated Wetlands of Pleasant Lake

I conducted visual and auditory surveys of the shoreline and littoral zone of Turtle Bay and three wetlands near to or associated with Pleasant Lake on May 2 and 23/24, and June 13/14, 2012. In this paper I provide the data collected during that time and my interpretation of what the data predicts regarding possible biotic effects of further permanent drawdown of water levels in Pleasant Lake. My investigations focus on the anuran (frog and toad) community, and evidence of groundwater inputs to Pleasant Lake and associated wetlands. I also estimate the effect of drawdown on shallow, near-shore areas as well as the very rich Turtle Bay littoral zone (habitat for banded killifish, a Wisconsin Species of Special Concern) and boggy sedge meadow directly connected to Turtle Bay via a small channel.

A. Wetlands

Only one of the three wetlands I surveyed had an established name: Turtle Bay Wetland. Turtle Bay Wetland (N43° 58.950' W89° 33.528') is found adjacent to Turtle Bay in the southwest corner of Pleasant Lake. Turtle Bay Wetland is connected to Pleasant Lake via a shallow channel that appears to have been excavated. Wetland 2 (N43° 58.892' W89° 33.260') is east of Turtle Bay, approximately 400 feet from lake edge, has no surface water connection to the lake, and is located on Fairwood Camp property. Wetland 3 (N43° 59.341' W89° 32.859') also has no surface water connection to the lake and is approximately 500 feet north of the northeast lobe of the lake. All wetlands have similar elevations to Pleasant Lake.

1.Turtle Bay Wetland
Turtle Bay Wetland, whose entire basin is fully exposed to the sun, has the most diverse plant community of the three wetlands studied even though the site has been disturbed. The current wetland vegetation contains almost all of the plant species found in the rich shoreline wetland community found in adjacent Turtle Bay (see Table 2).

According to lake residents dredging occurred in Turtle Bay Wetland approximately 15 years ago. The wetland was deepened near Pleasant Lake and a shallow channel to the lake was added. Wetland plants continue to the edge of the woodlands west and south of the opening, a distance of at least 30 feet. Obligate (OBL) wetlands plants found distant

from the current smaller wetland pool include *Carex stricta* (Tussock Sedge), *Carex lacustris* (Lake Sedge), *Eupatorium maculatum* (Joe-Pye-Weed), *Salix exigua* (Sand Bar Willow) and *Schoenoplectus tabournaemontani* (Softstem Bullrush). *Phalaris arundinacea* (Reed Canary Grass, FACW+), and *Impatiens capensis* (Jewelweed, FacW) were also abundant distant from the pool.

This distribution of plants in the upland suggests that the basin of this wetland was much larger within in recent decades. The presence of groundwater near the surface, including springs and seeps (see Fig. 1), may help the survival of the obligate wetland plants, as well as the others that prefer wetter places. It is likely that the dredging and loss of water level due to current groundwater removal by high-capacity wells contributed to the shrinking of this exceptional wetland. Further permanent loss of groundwater would significantly and negatively impact the plant community now growing in the old wetland basin.

Turtle Bay Wetland also contained the most numerous populations of frogs and toads (See Table 1). Due to unusually warm spring temperatures, Wisconsin's earliest frog species to emerge from hibernation started breeding before our survey began. It is likely that Boreal Chorus Frogs (*Pseudacris maculata*) breed in large numbers in early March. The wetland would also provide good breeding habitat for the Pickerel Frog (*Lithobates palustris*, Wisconsin Species of Special Concern) because it prefers cold, spring-fed waters for breeding. The cold waters must be near warmer waters for juveniles to development. The shallow channel or the littoral zone of Pleasant Lake would supply juvenile habitat.

In Turtle Bay Wetland frogs and toads were so abundant that they called not only from the water in the wetland, but also from the larger wetland basin and the surrounding woodlands. In addition, Leopard Frogs (declining in Wisconsin) and Bullfrogs (Wisconsin Species of Special Concern) were associated with the outlet to Pleasant Lake and the shoreline nearest Turtle Bay Wetland. Due to the abundance and diversity of frogs and toads in Turtle Bay, it should be protected as the prime anuran breeding area in the Pleasant Lake area.

Finally, Snapping Turtles (*Chelydra serpentina*) and Western Painted Turtles (*Chrysemys picta belli*) were observed at Turtle Bay Wetland.

2. Wetland 2

Wetland 2 is a shallow wetland almost completely covered by tree canopy. Woodland wetlands can be breeding ponds for *Ambystoma* salamanders. These amphibians would have bred in February and March this year so would not have been observed. No juveniles were captured. Only Spring Peepers bred in Wetland 2 with the same abundance as Turtle Bay Wetland. Other frogs and toads, including the Leopard Frog and Cope's Gray Treefrog (both species declining in Wisconsin) were present in smaller numbers (see Table 1). Even though numbers of breeding anurans was not as large as Turtle Bay, this pond still served as a good breeding site and contained breeders from declining species. Western Painted Turtles were observed basking on logs in sun patches.

Evidence of groundwater input could be seen in numerous spots in this wetland (see Fig. 1) In May the surface of the wetland was almost completely covered with Purple-fringed Riccia (*Ricciocarpus natans*), an uncommon aquatic liverwort. By June duckweed shared the surface with the Purple-Fringed Riccia.

3. Wetland 3

Wetland 3 had clearly been altered in the past and was surrounded almost entirely by Reed Canary Grass. As with Turtle Bay Wetland and Wetland 2, evidence of groundwater input was seen in Wetland 3. Large numbers Spring Peepers, Cope's Gray Treefrogs, and American Toads chorused at Wetland 3. Green Frogs and Gray Treefrogs were less abundant. Even with it's low plant diversity. Wetland 3 should be protected from further permanent drawdown because it is also a fine site for amphibian breeding.

As at the other wetlands, evidence of groundwater input was present at Wetland 3.

B. Turtle Bay Littoral Zone

The littoral zone in the shallow water on the east shore of Turtle Bay is a significant resource for animal populations of Pleasant Lake. All amphibians heard calling in Pleasant Lake were calling from this area. A Bullfrog (Species of Special Concern), several leopard frogs (declining in Wisconsin) and numerous American Toads were heard calling from the macrophyte beds of this littoral zone. The macrophyte beds provided structure and protection for calling male amphibians, and egg-laying habitat for female amphibians.

On June 13/14, 2012, I surveyed the macrophytes of the shallows and noted the animal species using the habitat provided. Table 2 contains the plant and algae species found in the macrophyte bed with an estimate of their coverage/abundance. The plant species diversity is high for this macrophyte bed with no single species dominating. All but Reed Canary Grass are native species. Stonewort (*Chara)* is a submerged alga that grows under the emergent vegetation in the bed and in more open areas where macrophytes that prefer shallower water thin out and submerged plants, such as the pondweeds, and plants with floating leaves, such as White Water Lily, grow.

Stonewort is a calciphile and it's abundance here is due to ground water input. Springs and seeps were easily located in the macrophyte bed by noting quick changes in water temperature from the typical warm waters of the lake to very cold spring water. Mineral deposits left by spring were observed in the macrophyte bed (see Fig. 1). Groundwater input was also indicated by the abundance of snails that need calcium for their shells.

The shallows of Turtle Bay supply nesting areas for sunfish and bass. They also provide food and protection for the young sunfish and bass. I observed a school of Banded Killifish (*Fundulus daiphanus*, Wisconsin Species of Special Concern) feeding in the macrophyte bed. Killifish use the beds for protection from larger predatory fish - its

striped coloration serves as camouflage in plant beds. They also contain killifish prey such as the abundant small crustaceans also found in weed beds.

The macrophyte bed was being used by many species of dragonflies and damselflies (Odonata). In a short period I was able to identify 20 species, most fairly common. Of special interest were numerous Red Saddlebags (*Tramea onusta*) that are uncommon in Wisconsin. The macrophyte bed also contained many common Hemiptera (water striders, backswimmers, water boatmen and water scorpions), Coleoptera (predacious diving beetles, water scavenger beetles, and whirlygig beetles), and minnow Mayflies. The juvenile and adult insects are prey for the fish of Pleasant Lake.

Shallow water is essential for the health of the Turtle Bay macrophyte bed, as well as a smaller bed associated with the point of sand that extends into Pheasant Lake, forming the northeast lobe of the lake that contains the county park and dock. Turtle Bay has the largest shallow bench in the lake and provides the most complex habitat for lake animals. I mapped the bottom contours at these shallows by measuring the depth of water in inches every 2 feet along transects established at each location. Figure 2 contains the depth contour of the Turtle Bay shallows and the shallows from the sand point into the main body of Pleasant Lake.

Permanent drawdown of up to 5 inches would lead to a loss of 6 feet of shallow water but little loss of habitat. A drawdown of 3 to 5 inches would lead to a serious loss of 7 to 10 feet of the shallows at Turtle Bay, effectively stranding the littoral zone community. It would take years to re-establish the bed's plant and animal community ten feet distant from it's current location and would significantly decrease the viability of the Banded Killifish population in the lake.

It would also change the interaction of Turtle Bay wetland with Pleasant Lake. I studied the flow in the channel between the Lake and wetland on three dates and on 2 dates water flowed from the Lake into the wetland, while on one date it flowed from the wetland into the lake. The flow into the wetland from the lake would cease with a stranding of the channel.

Summary

The wetlands and littoral zones currently provide habitat for a rich variety of aquatic plants and animals. Another permanent drawdown would negatively impact habitat in the littoral zone of Pleasant Lake and could seriously impact the water levels and plant and animals diversity of the three wetlands closely associated with the lake.

Table 1. Anuran Call Survey of Pleasant Lake and Associated Wetlands. Method used was the Wisconsin Frog and Toad Survey, the national standard. On April 14, 2012, Dr. Francine Rowe recorded anuran calls that were then analyzed by Dr. Mary Linton. Mary Linton conducted the May 2, May 23 ad June 13, 2012 surveys. Plea. Lake = Pleasant Lake. SP = Spring Peepers, LF = Leopard Frogs, AT = American Toads, CGTF = Cope's Gray Treefrog, EGTF = Gray Treefrog, GF = Green Frog, BF = Bullfrog

Date	Site Name	Water Temps ° C	Anuran Species						
			SP	LF	AT	CGTF	GTF	GF	BF
4/14/12	Wetland 3	--	3*		1				
	Wetland 2	--	2						
	Turtle Bay	--	3		2				
	Plea. Lake	--	--	--	--	--	--	--	--
5/2/12	Wetland 3	24.5	3		3	3			
	Wetland 2	26	3			2			
	Turtle Bay	27	3	1	2	3			
	Plea. Lake	--							
5/23/12	Wetland 3	18	2			3	1		
	Wetland 2	18.5					2	1	
	Turtle Bay	21				3		2	
	Plea. Lake	--				3			1
6/13/12	Wetland 3	21						1	
	Wetland 2	21			1				
	Turtle Bay	18.5						3	
	Plea. Lake	22.5			1			2	

*1 = individuals can be counted, there is space between calls
2 = calls of individuals can be distinguished but there is some overlapping of calls
3 = full chorus. Calls are constant, continuous and overlapping

Table 2. Turtle Bay Macrophytes. Species abundance in the bed scored as abundant (A), common (C), uncommon (U), and rare (R).

Species	Common Name	Abundance
Carex comosa	Bristly Sedge	C
Chara sp.	Stonewort Algae	A
Decodon verticillatus	Water Willow	U
Eleocharis acicularis	Least Spikerush	R
Eleocharis obtuse	Blunt Spikerush	U
Nymphaea odorata	White Water-lily	C
Phalaris arundanaceae	Reed Canary Grass	A
Polygonum amplifolius	Aquatic Smartweed	R
Potemogeton amplifolius	Big-leafed Pondweed	R
Potamogeton natans	Floating Pondweed	R
Potamogeton pectinatus	Sago-pondweed	R
Rhizoclonium sp.	Hair Algae	C
Salex sp.	Willow	C
Schoenoplectus tabernaemontani	Softstem Bulrush	A
Scirpus torreyi	Torrey Threesquare Bulrush	U
Typha latifolia and hybrids	Common cattail	U
Utricularia sp	Bladderwort	R

Figure 1. Evidence of significant groundwater seepage into Turtle Bay (above) and Fairwood Camp Wetland (below).

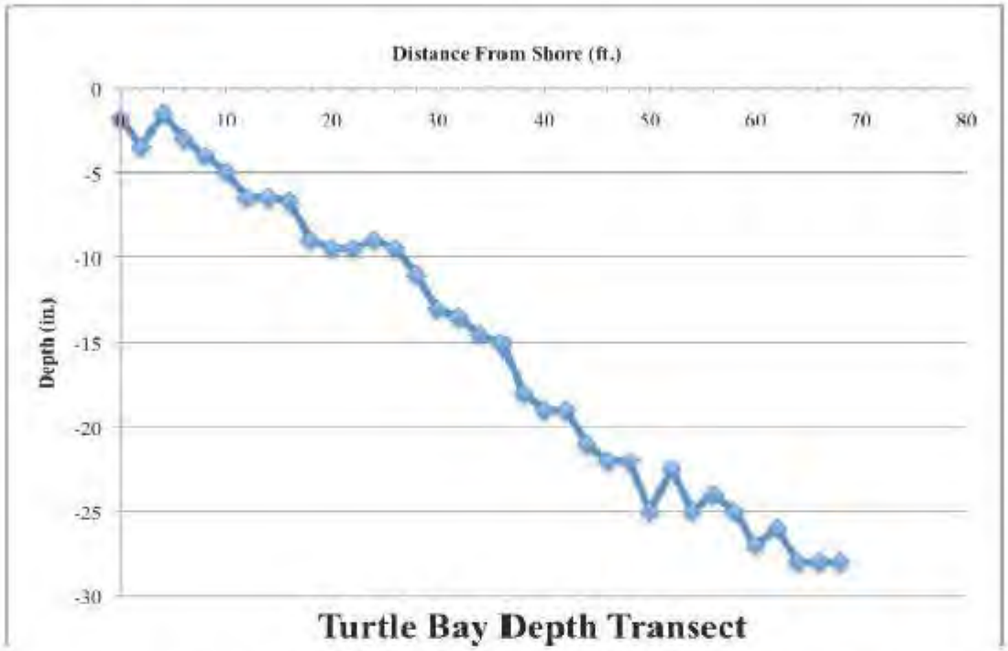

Figure 2. Turtle Bay Depth Transect. Transect began on shore at N43° 58.965', W83° 33.499', and extended due E into Pleasant Lake.

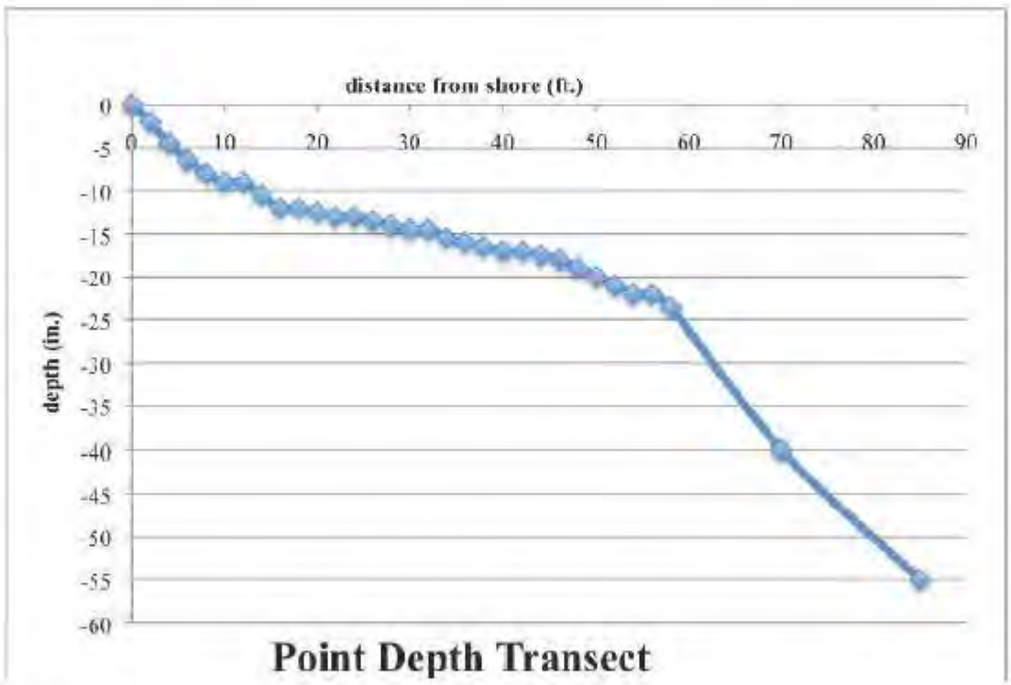

Figure 3. Depth transect of shallow zone extending into the main body of the lake from the sand point south of the county park. Transect began on shore at N43° 59.207', W89° 32.988' and extended due south into Pleasant Lake.

B

APPENDIX B

Pleasant Lake Freshwater Mussel Survey Specimen Photographs

Specimen 1: Live **Location:** 43.983526, -89.55419

Specimen 2: Live **Location:** 43.986991, -89.549588

Specimen 3: Live **Location:** 43.987013, -89.549608

Specimen 4: Live **Location:** 43.986909, -89.549501

Specimen 5: Live **Location:** 43.986817, -89.549402

Specimen 6: Live **Location:** 43.986457, -89.549381

Public comment sought on draft environmental impact statement for Richfield Dairy, Adams County

By South Central Region September 16, 2014

Contact(s): Russ Anderson, environmental analysis and review supervisor, 608-275-3467 Bob Manwell, DNR communications, 608-275-3317

Hearing set for Oct. 14 at 7 p.m. at Adams County Community Center

NOTE: Comments will be accepted through the close of business on Nov. 10, 2014

MADISON, Wis. -- The public will have an opportunity to review and comment on a draft Environmental Impact Statement on a proposed concentrated animal feeding operation in Adams County.

Milk Source Holdings, Inc. is proposing construction and operation of the Richfield Dairy, a large concentrated animal feeding operation in Adams County. The proposed dairy facility would house 4,300 cows and 250 steers. The company plans to convert 115 acres of existing cropland to farm buildings and production areas. Richfield Dairy has an approved nutrient management plan with a total of approximately 16,300 acres available for spreading of manure. The project cost is estimated at $35 million.

The wastewater and high capacity well permits were approved, with modifications, by an administrative law judge on September 3, 2014. The draft EIS addresses concerns raised in a December 2013 court decision specifically directing the department to consider the environmental effects of the two proposed Richfield Dairy high capacity wells, in conjunction with other high capacity wells in the region.

The department has decided to follow the Environmental Impact Statement process as the most thorough approach to achieve compliance with the Wisconsin Environmental Policy Act and to satisfy the court order. There will be a 45-day comment period on the draft EIS as well as a public hearing. The Final EIS will address all oral and written comments received during the comment period.

Public written comments on the draft EIS are welcome and can be submitted to Russ Anderson, 3911 Fish Hatchery Rd., Fitchburg, WI 53719, by Nov. 10, 2014. There will also be a public hearing on the draft EIS held at Adams County Community Center, 569 North Cedar Street, Adams, at 7 p.m. on Oct. 14, 2014 where the public can also provide oral comment.

Copies of the draft EIS and related documents are available by searching the DNR website dnr.wi.gov for keywords "environmental impact analysis" and clicking on the link for "current EIA documents." [http://dnr.wi.gov/topic/EIA/Current.html] Copies of the analysis can also be obtained

from Karen Kalvelage, 3550 Mormon Coulee Rd., La Crosse, WI 54601 or by phone at 608-785-9115, or by email at Karen.Kalvelage@wisconsin.gov.

-30-

Last Revised: Tuesday, September 16, 2014

Current Alerts

No Air Alerts Good air quality for Wisconsin on Friday, September 18, 2015 at 2:33 pm CT.

- Check my county's Air Quality Notices
- Check fire danger

News Resources

News releases

- Join DNR staff for Deer Management Assistance Program chat Sept. 22
- Learn to Trap event offered at Horicon Marsh in February - register now and reserve your spot

Weekly News

- Fall color change reflects healthy forest diversity as different species start to turn
- Sturgeon Fest to celebrate a decade of progress

Outdoor Report

- Hunters had some very good weather for the opening of the archery deer...
- Numerous hunting sea...

Features

- Restoration efforts started in 1920s continue to influence Horicon Marsh management today
- At turn of the 20th century, dredge and drain efforts changed Horicon landscape
- Breeding Birds and Summer Mothers

Calendars

- Get Outdoors! Events
- Public Hearings
- Public Meetings
- Public input opportunities
- Season and permit deadlines
- Workshops, clinics, seminars
- Wis. Cons. Congress meetings

Richfield Dairy Environmental Impact Statement Comment Response Document
Wisconsin Department of Natural Resources

Part 1. Introduction

The Department would like to thank everyone who took the time to respond to the Draft EIS. We have considered all comments and provide the following response addressing those comments. With the submission of this letter the WEPA process is considered complete and the Final EIS is, therefore, signed.

The purpose of the EIS is to ensure that the Department and interested public have the information necessary to consider the potential impacts of the proposed project on the human environment. The purpose of the EIS is not to make regulatory decisions or to comment on other aspects of the proposed Dairy or CAFOs in general. In addition, the purpose of an EIS is not to discuss hypothetical enforcement, remedies, or rule changes, as some comments have requested. Some of the inconsistencies noted by commenters have been corrected in the Final EIS. However, the EIS attempts to summarize thousands of pages of hearing testimony and exhibits, including some differing opinions among experts and conflicting evidence. In order to complete the record in this matter, the FEIS includes all of the hearing testimony (pre-filed testimony and the hearing transcript) and the hearing exhibits, so that all information is available for the public. Supporting documents for the final EIS appear on the Department's web-site, at: http://dnr.wi.gov/topic/agbusiness/cafo/richfielddairy.html. In addition, there are DVDs that contain the following documents from the contested case hearing for this proposal: pre-filed testimony from all witnesses, all hearing exhibits and the hearing transcript. Accommodations can be made to view these documents by contacting Russ Anderson, Fitchburg Service Center, 3911 Fish Hatchery Road, Fitchburg, WI 53711 at 608-275-3467. Some commenters submitted additional data and information with their comments. To the extent the material submitted was not duplicative of information already in the Department's final EIS record, it has been added as appendices to the final EIS. The Department reviewed the additional information and the EIS has been updated where necessary.

It should also be noted that the DEIS was largely completed before Judge Boldt's decision was issued, so the draft document evaluated the potential environmental impacts of the high capacity wells using the pumping rate approved by DNR before Judge Boldt's decision reduced the approved amount by 27%. The final EIS was updated to evaluate potential impacts at the pumping rate approved by Judge Boldt. Ground water quality was addressed during the hearing. Concerns about what is happening in other locations of the state concerning ground water quality have limited relevance to the EIS analysis for this proposed project. DNR is in the process of determining what the AU limit will be. The new AU number will be included in the modified WPDES Permit, as ordered in Judge Boldt's decision.

Part 2. General Responses to Public Comments on the Richfield Dairy EIS

General

1. **Comment:** The DEIS ignores the wealth of data that has been collected and analyzed regarding Pleasant Lake, Chaffee Creek, and other surface water bodies in the region including evidence presented during the contested case hearing. [FOCS p. 4; PLMD p. 1-3]

Response: DNR was present at the hearing and hearing testimony and exhibits were considered in the drafting of the DEIS. The EIS was updated to include all of this information.
Specific corrections made:

- Calcareous fen drawdown discrepancies in testimony and ALJ findings [FOCS p. 7(2), 17]
- Limitations of models as presented by Kraft, Wade, Gaffield [PLMD p. 4-5] Note: Judge Boldt's decision discussed the relative merits of the groundwater models presented by Dr. Kraft and Dr. Andrews; DNR considered both models and their limitations

2. **Comment:** The information in the DEIS is largely taken from the 2011 Environmental Assessment. Where is the new information that represents what has happened in the last 3 years? [FOCS p. 4; Clarke email; Utesch email]
   Response: All modeling, field studies, expert opinions, and other information was discussed in great detail at the contested case hearing. DNR was present throughout the hearing and considered information presented in the creation of the EIS. It is impossible to properly and fully summarize the information at the hearing so the pre-filed testimony, entire hearing transcript and exhibits are added as appendices to this EIS.
3. **Comment:** The EIS refers to conditions in the approval that will avoid significant adverse environmental impacts but does not identify the harm or the conditions that will be imposed to prevent the harm. The public is not given the opportunity to review or comment on the sufficiency of the conditions. [PLMD p. 5]
   Response: The conditions in the approvals and permit were discussed at length in the contested case hearing. Please see comment response #2.
4. **Comment:** The DEIS is missing data and analyses regarding: [PLMD p. 7]
   - Changing water chemistry – Ca++, nitrates, and phosphates
   - Impacts to fisheries
   - Impacts to aquatic plant communities
   - Changes in the littoral zone as water is lost [*see also* PLMD p. 8 for specific evidence]
   - Invasion of unwanted plant species – aquatic and terrestrial

   Response: These impacts were discussed at length at the contested case hearing and the testimony, transcript, and exhibits have been attached to this EIS so that they are readily available to the public. Please see comment response #2.
5. Some comments, including many oral comments at the informational hearing in Adams County, expressed general thoughts in favor of or against Richfield Dairy and CAFOs in general.
   Response: Thank you for the comments. The purpose of the EIS is to evaluate all of the potential environmental impacts of the proposed project, not the advantages or disadvantages of the proposed Dairy or CAFOs in general.
6. A few comments note "inconsistencies" within the DEIS document.
   Response: Many of the inconsistencies have been corrected. However, the DEIS attempts to summarize thousands of pages of hearing testimony and exhibits, including some differing opinions among experts and conflicting evidence.
7. Some comments requested very specific additional information about other CAFOs. These included questions about soil qualities, cattle numbers, volumes of manure, proximity to lakes and streams, and analyses and review information. [PLMD p. 14]
   Response: The EIS does not need to provide information to that degree of specificity about the CAFOs that it uses as examples. The purpose of an EIS is to provide information about environmental impacts in a way that is accessible for the public. Adding such detail would

detract from informing the public about the proposed project and would make access for the general public more difficult.

8. Many comments addressed enforcement and regulatory concerns. For example:
    - Who monitors NMP compliance, nitrate load to the groundwater, the presence of *E. coli* in neighboring wells and surface water bodies? What is the mechanism, if any, to ensure compliance? What is in place for a DNR rapid response to a spill or over-application of manure? What is the historical effectiveness of these types of response? [PLMD p. 9]
    - Questions about the wisdom of designing facilities around a 25-year storm event over 24 hours [PLMD p. 12]
    - Questions about the adequacy of the regulatory standards for separation from groundwater [PLMD p. 13]
    - What are the definitions of "reasonable" and "adequate level" [PLMD p. 13] and "minimize"? [PLMD p. 16]
    - Why are CAFOs allowed to spread waste? [Lindroth comment]
    - If the Dairy is shut down due to pollution, will the downstream people be indemnified? [Lindroth comment]
    - Who will manage and enforce manure management to prevent streams, creeks, lakes, and wells from being polluted? [Seefeldt comment]
    - What remedies are available if a private well is contaminated or runs dry? [McEniry comment]
    - Will Milk Source be able to install additional high capacity wells under a different name or lease them from other facilities? [Swanson comment]

    Response: The purpose of an EIS is to identify all potential environmental impacts for the proposed projects. It is not appropriate to discuss hypothetical enforcement, remedies, or rule changes in the EIS.

<u>Cumulative Impacts</u>

9. **Comment:** The DEIS finds no anticipated significant adverse environmental impacts at 72.5 MGY but this does not align with the ALJ's decision that the volume must be capped at 52.5 MGY. The EIS must assess the pumping level that was actually approved by the agency. [FOCS p. 3-4; PLMD p. 5, Clarke email]
    Response: The DEIS was largely completed before Judge Boldt's decision was issued, so it evaluated the potential environmental impacts at the rate approved by DNR before Judge Boldt's decision reduced the approved amount by 27%. Although the draft EIS may overstate the potential environmental impacts in some respects, the final EIS does provide all available information about potential impacts on the human environment. During the course of the environmental analysis process, the Department considered the potential environmental impacts based on groundwater models which predicted impacts at pumping rates of both 72.5 MGY and 52.5 MGY. The final EIS has been updated to provide additional information about potential impacts at a 52.5 MGY pumping rate. In addition, all materials associated with the contested case hearing – which includes discussion of impacts at 52.5 MGY – are attached to this EIS.
10. **Comment:** The DEIS does not adequately or accurately assess cumulative impacts to Chaffee Creek spring. According to Dr. Andrews' model, cumulative impacts with the Richfield Dairy

wells will exceed the 20% threshold in NR 820.31(4)(d) and Wis. Stats. s. 281.34(5)(d) even before future cumulative impacts are considered. [FOCS p. 7]
Response: Evidence presented at the contested case hearing demonstrated that the Chaffee Creek spring and spring pond have already been affected by cumulative withdrawals in the area and the withdrawals from Richfield Dairy wells would add to that impact. This evidence was considered as a part of the EIS. Administrative Law Judge Boldt heard all the testimony and decided that 52.5 MGY was an acceptable pumping rate for the Richfield Dairy.

Hydrologic Cumulative Impacts

11. **Comment:** Cumulative impacts must include yet to be realized impacts from existing wells as well as future wells (currently requested and under review and reasonably foreseeable requests). [PLMD p. 6]
Response: Potential cumulative impacts from future high capacity wells were considered in the EIS Section VI.A.3, pp. 109; and in Section V.B.3 for municipal, non-community, and residential wells. It is difficult to accurately project what future impacts may be due to many unknown factors such as locations of well, rates of withdrawals, amount of irrigated land in the area, wells taken out of service, etc. The department considered future cumulative impacts to the extent possible in the EIS and will evaluate potential cumulative impacts on a case-by-case basis for future high capacity well approval applications.

Ecological Cumulative Impacts

12. **Comment:** Impacts are typically presented as drawdown percentages to water, and it is often hard to know how biological resources (for example, trout and aquatic species, wetland plants, and other resources) will be affected, what the likelihood of those impacts is, and what the loss or reduction of these resources means for the environment and users of these resources (e.g., recreational impacts). [FOCS p. 8]
Response: The EIS considers these questions in Section V.A.4.a. The department evaluated potential impacts to biological resources on a case-by-case basis. The department uses screening mechanisms, such as percentage stream depletions from a medial August flow [see, e.g., the Michigan Water Withdrawal Assessment Tool (WWAT) – which was developed to review and track impact of high capacity wells on stream in Michigan], to characterize the impacts of water withdrawals on stream resources. Using similar stream classifications in Wisconsin, this approach allows the department to predict how assemblages of fish that are typical of each stream classification would change as a result of decreased base flows. This provides information from which the department can make a determination regarding whether baseflow reductions are likely to have a significant impact on fish resources in streams.
13. **Comment:** Given admissions that ”future increases in irrigation pumping and the resulting decrease in water level and groundwater inflow could result in significant changes to wetland ecology” and “using the Michigan model [all headwaters near RD] would be considered significant,” how can DNR conclude that Richfield Dairy will not contribute to significant adverse cumulative impacts? [PLMD p. 7]
Response: The EIS does not draw that conclusion. The EIS considers cumulative impacts to streams and wetlands as likely to be significant. The EIS considers whether cumulative impacts to Pleasant Lake are significant, and notes that Judge Boldt concluded that existing cumulative

impacts to streams, wetlands, including the Chaffee Creek calcareous fen wetland, and Pleasant Lake are significant.

Economic Cumulative Impacts

14. **Comment:** The DEIS needs to consider specific economic impacts to the surrounding community including impacts on tourism, property values, tax base, and the public at large. The analysis needs to be specific because economic impacts will vary greatly geographically. [Many more related sub-questions and comments, see the comment language.] [PLMD p. 8, 11, 12, 16, 17; Seefeldt comment (page 35 of compilation document)]
    Response: Because regional economies are complex and interconnected, the effects of individual business changes on a region are generally difficult to detect after the fact and similarly difficult to project in advance. Doing so requires expensive data collection and modeling. A detailed analysis requires resources that are beyond the capabilities of the Department, and the results do not have a bearing on permit decisions. Also, a socioeconomic analysis is often something where the results are subjective, where something that is viewed as a negative by one person may be viewed as a positive by another. We concentrated our limited resources for what was the focus of the hearing. Furthermore, the Department provided information on a previous response to comments on a study that was done in the early 2000's in Pennsylvania describing what was discovered through that analysis. That analysis gives a descriptive write-up of what can be expected from the development of a CAFO. That information has been added to the FEIS.
15. **Comment:** The DEIS fails to assess the cumulative impacts on surface waters and groundwater of the manure spreading of Richfield Dairy in combination with manure spreading activities of other large CAFOs in the area, as well as other farms. [FOCS p.6]
    Response: [An NMP for WPDES permit issuance addresses impacts on surface waters for those fields included in the permittee's plan. If a field in the permittee's plan is also used by another user (another CAFO, non-CAFO farm, industrial waste, municipal waste, septage, etc.) the permittee is responsible to account for those nutrients and waste source(s) and the impacts they would have on surface waters.

Alternatives Analysis

16. **Comment:** The alternatives analysis is inadequate because it is not a rigorous exploration and consideration of all reasonable alternatives and did not analyze the mitigation measures and conditions imposed by the ALJ in his decisions (HCW and WPDES). [FOCS p. 8]
    Response: In addition to the DEIS, alternatives were discussed in the two previous EAs and at the contested case hearing.

Land Application and Water Quality

17. A number of comments were received concerning land application of manure and process wastewater and associated groundwater quality. Some of the general comments included comments about:
    - Impacts to aquatic flora and fauna due to runoff and nutrient transport from land spreading [FOCS p. 5]
    - Analyses to determine nitrogen uptake by crops [FOCS p. 5]

- The occurrence of groundwater pollution at other CAFOs in the Central Sands [FOCS p. 5, 6; PLMD p. 4, 5, 10]
- Water quality monitoring at the Richfield Dairy site [PLMD p. 5, 14]
- Requests for additional specific information about volumes of manures to be spread on given areas over what time periods [PLMD p. 4] and pollution levels in existing private wells [PLMD p. 12]
- Characterization of groundwater quality in the area as "fair to good" [PLMD p. 5, 10]
- Regulatory concerns about proof of adequate land base, grower agreements, and maps [PLMD p. 4, 8, 14].

Response: Most of these comments relate to issues that were discussed at length at the hearing and additional details can be found in the hearing record. Other issues raise regulatory concerns and are not appropriately addressed in the EIS. In addition, the ALJ did not require groundwater monitoring at land application fields, since he found that the NMP and use of BMPs was sufficient.

18. **Comment:** The DEIS indicates that manure application will occur in October and November but the ALJ's decision relating to the WPDES permit found that no fall land applications are currently allowed under the NMP. If fall applications are contemplated, the DEIS should identify likely permit conditions and consider those proposed by FOCS as suggested by the ALJ. [FOCS p.6; PLMD p. 15] [specifically identified pages IV-70 and IV-75].
    Response: The farm's approved Nutrient Management Plan (NMP) is designed to address the impacts to surface water and groundwater from those fields included in the plan. All fields in the NMP are required to meet soil and phosphorus loss requirements as well as managed to account for all nutrients applied to each individual field (manure, commercial fertilizers, biosolids, industrial waste, etc.). Additionally, more restrictive practices are required when an area or field is identified as having a higher risk to groundwater or surface water pollution. See P. 54 for the start of specific information on this topic.
19. **Comment:** There is no discussion of impacts to groundwater quality, even though the DEIS acknowledges that there will be impacts based on its balancing of impacts and that DNR is requiring leak detection and monitoring to identify when these expected discharges have already caused impacts. [PLMD p. 13]
    Response: These impacts were discussed at length at the contested case hearing—see hearing testimony and exhibits.
20. DNR received a number of comments about groundwater quality that discussed Kewaunee County, including:
    - The groundwater pollution problems there [PLMD p. 4]
    - The Kinnard Farms ALJ decision [PLMD p. 3]
    - Geologic similarities [PLMD p. 5-6]
    - The failure of the WPDES and NMP processes to protect groundwater quality [PLMD p. 12]

    Response: Kewaunee County has different hydrogeology from the Central Sands, and has limited relevance to the EIS analysis for this proposed project. The comments also raise regulatory concerns, which are not appropriately addressed in the EIS.
21. **Comment:** The NMP has been modified since the original approval in 2011. This is not reflected in the DEIS. [FOCS p. 4]
    Response: The March 2014 NMP modification is reflected in the DEIS on page IV-72.

Rare and Endangered Species

22. **Comment:** A number of endangered or threatened species can be found in Adams and Waushara counties – including the Karner Blue Butterfly, Whooping Crane, Kirtland's warbler, and Bald Eagle – that were not sufficiently discussed in the DEIS. [PLMD p. 7, 10-11]
    Response: The DEIS discussed the Kirtland's warbler. This issue was addressed in the previous EAs as well (please refer to P. 7 of the original EA).

Animal Unit Cap

23. **Comment:** The ALJ determined that Richfield Dairy's WPDES permit must be modified to include a cap on animal units commensurate with the 52.5 MGY pumping limit. This is not reflected in the DEIS. [FOCS p. 4]
    Response: DNR is in the process of determining what the AU limit will be. The AU number will be included in a modified WPDES Permit, as ordered in Judge Boldt's decision.

Modeling

24. **Comment:** The SSPA model was not created for Richfield Dairy and did not withstand scrutiny at the contested case hearing. Why does DNR rely on it? [PLMD p. 4]
    Response: The SSPA model along with Dr. Kraft's regional groundwater model, were discussed in great detail at the hearing. DNR considered both models, including their limitations.

Air Quality

25. **Comment:** There is no discussion correlating generic agricultural air quality impact with the Richfield Dairy. [PLMD p. 16]
    Response: Air issues were addressed in the original EA.

Climate Change

26. **Comment:** DNR ignores the synergistic impacts associated with climate change and human use. [PLMD p. 17]
    Response: Synergistic impacts associated with climate change and human use were outside the scope of our environmental review.

Other Comments

27. We agree with DNR's use of modeled baseflow conditions where measured baseflow conditions are not available because it is intended to reflect an unimpacted condition. [FOCS p. 7]
28. Long Lake continues to lose water despite two years of above-average precipitation. The shared aquifer cannot sustain any factory farm or expansion thereof. [Williquette comment]
29. Pleasant Lake has gone down almost 2 feet over the summer, without the Richfield Dairy wells. There will be no Pleasant Lake if this continues. [Erickson comment]
30. A pond on our property shows lowering water levels. What would happen to it after Milk Source's water is removed? [Pinter comment]
    Response: Site-specific groundwater modeling would be needed to predict within a reasonable margin of error what would happen to the pond's water level as a result of Milk Source's water withdrawals.

31. Stop hi cap wells. No more studies are needed, just need to use a little common sense. Something this life changing should be up to the people that would have to live with it. [Seefeldt comment]
32. DNR must consider cumulative impacts and change course, especially for the Frozene and Bula applications in the same area. [hearing comment]
33. The EIS says there is no authority to regulate air quality. Other industries with ammonia releases have to report and this Dairy would release way more. [hearing comment]
34. Milk Source is very active in the community in a very positive way through donations to local organizations, scholarships, etc. They also invest in science to improve sustainability across the industry. [hearing comment]
35. The water use by CAFOS only represents a small percentage of the water use in the state. [hearing comment]
36. This case has taken more time than it should. This is really about people who oppose modern farms. Other wells with higher capacities in the area have not been challenged. People need to remember that this is a replacement well and that the pumping rate will actually be lowered from what it has pumped in years past. [hearing comment]
37. The modeling done by SSPA and Dr. Andrews has been shown to be accurate so far at nearby New Chester Dairy. The monitoring requirement at Richfield ensures that reliance on the model will be verifiable. [hearing comment]
38. Another high capacity well in the area will destroy us. [hearing comment]
39. This is about the impact study and the DNR did it correctly. [hearing comment]
40. We need to find a way to allow more local control. Factory farms are heavily regulated but it only works when there is enforcement. [hearing comment]
41. CAFOs create conflict and destroy the values of rural communities. This CAFO is already being approved so this [informational hearing] is a horse and pony show. [hearing comment]
42. With so many cows in a small area, truck traffic is very concentrated. There will be a manure truck every 1-1.5 miles. [hearing comment]
43. Society has forced the creation of large dairies because it is increasingly hard for small dairies to stay afloat. [hearing comment]
44. The DEIS goes into careful and quantitative detail about impacts. This has been more scrutinized than thousands of other wells and even larger ones in the Central Sands. People fight this but do not present any other alternatives. [hearing comment]
    Response to all: Thank you for your comments.

Richfield Dairy High Capacity Well Supplemental Environmental Assessment – 72.5 MGY

Background

In May 2011 Milk Source Holdings, LLC, dba Richfield Dairy submitted a high capacity well application to the Department of Natural Resources (DNR) to construct two high capacity wells with pumping capacities of 500 gallons per minute (gpm) each. One well would serve as the primary water supply well for dairy operations, while the other would function as a back-up well. Water would be used year-round for animal watering and cleaning, and in summer for evaporative cooling of the barn. An existing irrigation well on the property would be abandoned.

The proposed Richfield Dairy facility and wells are located approximately 1.1 mile west of the north-south-trending Johnstown Moraine, which forms the surface water divide between the Mississippi River and Lake Michigan drainage basins. The facility is roughly 0.4 miles east of the Mississippi River/Lake Michigan groundwater divide, and groundwater at the site generally flows in a southeasterly direction. The aquifer consists of 150-200 feet of sand and gravel overlying about 300 feet of sandstone bedrock. Based on soil borings in the area, the static groundwater level at the site is no less than 32 feet below ground surface. The proposed wells would be drilled to a depth of around 350 feet and be cased into the sandstone.

The Department held an informational session and public hearing on the Environmental Assessment (EA) and proposed WPDES permit for the facility on July 18, 2011 at the Adams County Community Center in Adams, Wisconsin. Department staff estimated that approximately 340 individuals attended the hearing. The Department allowed a 30-day comment period on the EA. The EA and addendum, including responses to comments, are available at the following website:
http://dnr.wi.gov/topic/AgBusiness/documents/finalEnvironmentalAssessment.pdf

In November 2011, the DNR issued a high capacity well approval for two wells to Milk Source Holdings, LLC for the Richfield Dairy facility. The November 2011 approval restricted the maximum total gallons pumped from the two wells in any 365-day period to 131.2 million gallons. A group of petitioners challenged the DNR's decisions regarding the Richfield Dairy facility, seeking both contested case hearings and judicial review. The judicial cases were filed in Dane County Circuit Court and asserted, among other things, that the DNR's EA for the project was not adequate. On July 20, 2012, the Circuit Court Judge ruled that the EA prepared by the DNR was deficient because it failed to sufficiently evaluate the environmental effects of the DNR-approved 131.2 million gallons per year (MGY) pumping rate, in conflict with ss. NR 150.22 and 150.02(9), Wis. Adm. Code. Consequently, the Court remanded the matter back to the DNR "to provide a preliminary factual investigation of sufficient depth to allow a reasonably informed

preliminary judgment and the opportunity for public comment about the environmental and cumulative effects of the high capacity wells operating at 131.2 million gpy."

On July 27, 2012, DNR received a request from Richfield Dairy that pumping on the high capacity property be limited to 72.5 MGY. In view of Richfield Dairy's request for an annual pumpage limit of 72.5 MGY, the supplemental EA addresses the environmental and cumulative effects of operating the wells on the property at the pumping rate of 72.5 MGY, rather than 131.2 MGY. The Circuit Court Judge also noted, in a Decision and Order on Motion for Relief from Judgment or in the Alternative to Amend and Clarify, dated October 2, 2012, that the EA should evaluate the impact of the high capacity wells at whatever pumping limit is anticipated to be approved.

Based on pumpage reported for the years 1978-1980, 1982-1989, and 2007-2011, 72.5 MGY is roughly twice the amount of water that was previously pumped for irrigation purposes. In conjunction with its request to limit pumping to 72.5 MGY, Richfield Dairy provided DNR with numerical groundwater modeling results and an evaluation of the effects of pumping on lakes and streams in the vicinity of the proposed wells (S.S. Papadopulos & Associates, 2012, attached – referenced as "SSPA"). Numerical groundwater modeling is currently the best tool available for evaluating the long-term effects of groundwater withdrawals in a large, complex system.

The *MODFLOW* model provided by SSPA is based on the calibrated regional groundwater model of the Central Sands developed by Mechenich and others (2009), with site-specific refinements. Model grid spacing ranged from 125 square feet (ft^2) in the vicinity of the Dairy to 1000 ft^2 near the boundaries of the model. The site-specific model was constructed with model layers for the upper sand and gravel aquifer and for the lower sandstone aquifer. Hydraulic conductivity in the upper aquifer was zoned to reflect different geology east and west of the terminal moraine and modified to produce the best representation of actual conditions using *PEST* parameter estimation software. Pleasant Lake and Lake Burnita were modeled using the *MODFLOW* lake package. Pumping from existing irrigation wells was explicitly modeled, with an irrigation water loss equivalent to the 2 inches of "missing water" identified in work by Kraft and others, 2012. The proposed Dairy wells were assumed to have 100% water loss.

The site-specific model was run under background conditions (no pumping), current conditions (pumping from all existing irrigation wells), and existing irrigation pumping plus 72.5 MGY withdrawal from the Dairy. The first two scenarios were run at steady state (infinite time). The simulation of the effects of pumping at Richfield Dairy was run in a transient mode, which allows observation of the effects of pumping over time. During the Richfield Dairy pumping scenario, no water withdrawal was simulated from the existing irrigation well on the property, because this well would be abandoned prior to operation of the Dairy wells. Model results were reported at 5 and 25 years of operation. After 25 years, the modeled system had equilibrated until groundwater

drawdown was no longer increasing significantly with time (see graph of Pleasant Lake drawdowns over time, p. 17 of SSPA).

The DNR's Water Use Section conducted a review of the potential impacts of the Dairy's high capacity wells on waters of the state. The DNR analysis focused on the long-term (25-year) impacts of pumping.

Analysis of Environmental Impacts

Private Wells: There is an existing residential well roughly 400-500 feet from the Dairy's proposed north well (Well #71787). Initial screening indicated that drawdown would not exceed five feet after extended pumping at the proposed rate of 72.5 MGY. In almost all cases where private wells have been constructed in accordance with the state's well code, water table drawdown of less than five feet will not cause significant impacts to private wells. Results of the site specific model indicate that after 25 years of sustained pumping at 72.5 MGY, water table drawdown at the existing well would be roughly 18 inches (1.5 feet). The expected level of drawdown does not constitute a significant impact.

Public Wells: The nearest public utility well is the Village of Coloma Well #1. The village well is 4.8 miles northeast of the proposed Richfield Dairy wells. After 25 years of pumping at 72.5 MGY, water table drawdown at Well #1 is modeled to be 1-2 inches; which would not impair the water supply of the Village of Coloma Well #1. (Estimated drawdown of 10 feet or more in a public utility well after 30 days of continuous pumping from a proposed high capacity well would indicate reduced availability of groundwater to a public utility well, under s. NR 812.09(4) (a), Wis. Adm. Code.)

Wetlands: The nearest mapped wetland is approximately 1.5 miles northwest of the proposed wells. The expected drawdown from the proposed wells at this wetland would be less than one inch after 25 years of pumping at the maximum proposed pumping rate (72.5 MGY), and this is not expected to cause significant environmental impacts.

Springs: A large spring is located 3.5 miles east of the proposed well site, at the headwaters of Chaffee Creek. The Wisconsin Springs Inventory identifies the spring's flow as approximately 2 cubic feet per second (cfs), measured in August, 1963. In July of 2003, flow at a monitoring station roughly 3800 feet downstream of the headwater spring was 1.2 cfs. The proposed wells at Richfield Dairy are located outside of the expected contributing area for the Chaffee Creek headwater spring (springs generally have a contributing area of one square mile per cfs of flow). Modeling results confirm that flow reduction is expected to be around 0.05 cfs (Chaffee Creek gaging station 1 mile downstream of the headwater spring), or less than 5% of the spring's flow. The proposed wells are very unlikely to cause a significant decrease in flow from the spring and are not expected to have a significant environmental impact on the spring.

Streams: The following streams are located within five miles of the proposed wells: Unnamed headwaters of Little Roche a Cri Creek (~2.5-2.9 miles north and west), Little Roche a Cri Creek (4.6 miles west), Fordham Creek (4.5 miles southwest), Chaffee Creek (3.5 miles east), and Tagatz Creek (3.5 miles southeast). All of the named streams are Class I or II trout streams; Little Roche a Cri and Fordham Creeks are Exceptional Resource Waters, and Chaffee and Tagatz Creeks are Outstanding Resource Waters.

The SSPA model evaluated the impacts of the proposed wells on stream flows at gaging stations within the model domain on Little Roche a Cri Creek, Fordham Creek, Chaffee Creek, Tagatz Creek, Campbell Creek, Neenah Creek, Lawrence Creek, Carter Creek, the Mecan River, Schmudlack Creek, and the South Branch of Wedde Creek. The maximum modeled flow reduction was 0.10 cfs (43 gallons per minute) in Little Roche a Cri Creek at 10th Ave. This flow reduction constitutes about 0.3% of the measured baseflow (34 cfs) at this location. In terms of percent reduction, the maximum modeled change in streamflow was 3.4% (0.05 cfs removed from 1.47 cfs baseflow) in Chaffee Creek at County Highway CH. Modeled flow reductions were less than 1% at all other gaging locations (see Table 1). At flow reductions of less than 4%, even sensitive stream types do not typically experience observable changes in fish populations (Hamilton and Seelbach, 2011). The expected flow reductions due to the proposed Dairy wells are unlikely to cause a significant environmental impact to the streams.

Lakes: Pleasant Lake is a deep seepage lake located at the border of Waushara and Marquette Counties, about 2.5 miles southeast of the proposed dairy. The lake has a surface area of approximately 129-135 acres, a maximum depth of 23.7 feet, and an average depth of 15 feet. Pleasant Lake is a groundwater seepage lake with no surface water inlet or outlet. Groundwater enters the lake from the west and north and exits to the east and south, feeding the headwaters of Chaffee and Tagatz Creeks. Water levels in Pleasant Lake are generally an expression of the elevation of the water table. For the period of 1964-2012, measured lake levels have varied by 5.5 feet. This amount of fluctuation over a period of several decades is typical of a groundwater seepage lake in Wisconsin. On a *seasonal* basis, water level fluctuations in seepage lakes typically vary by an average of 1.4 feet (Novitski & Devaul; House). The lake level record for Pleasant Lake includes four years with multiple water level measurements, including several measurements for 2012 submitted by the Dairy. These show annual variability ranging from 0.49 to 0.86 feet (5.9 to 10.3 inches). The measurements were not collected to represent maximum and minimum lake levels, but suggest that the seasonal water level fluctuation in Pleasant Lake could be between 6 inches and 1 foot. Evaluation of the bathymetry of Pleasant Lake and historical air photos indicates that for historically-observed lake levels, a one-foot change in lake elevation results in a change of 2 - 5.3 acres in the surface area of the lake.

Because Pleasant Lake's water budget is dominated by groundwater, it is relatively well-buffered (pH > 8, alkalinity >100 mg/L) and experiences good water clarity for the most part (average summer water clarity of 10 feet in 2011). Aquatic vegetation is most

abundant in the 3 - 5 foot depth zone, and consists primarily of submerged species (data provided by UW Stevens Point). Emergent vegetation and submerged species in the nearshore zone (less than 3 feet) are likely limited due to historical water level fluctuations and shoreland development and associated human activities.

The site-specific SSPA groundwater model indicates that 25 years of pumping at the maximum proposed withdrawal amount of 72.5 MGY would result in 1.6 ± 0.26 inches of drawdown to Pleasant Lake. This change is small relative to the historically recorded 5.5-foot variation in water level. For the lowest recorded historic water level (978.27 feet above mean sea level), the modeled drawdown would constitute a percent change in lake surface area and volume of less than 2%. For higher historic lake levels, the modeled drawdown would constitute a lower percentage change in lake surface area and volume.

Reductions in groundwater inputs to a seepage lake have the potential to impact water quality, chemistry, temperature, and aquatic life, including aquatic vegetation and fisheries. The Department evaluated data regarding lake morphometry, water budget, water chemistry, aquatic and nearshore vegetation, and historic lake levels to determine whether the projected ~1.6 inches of additional drawdown and 1.5% reduction in groundwater inflow to Pleasant Lake could result in significant impacts. The projected water level drawdown is small relative to historically-measured fluctuations, and it also represents a small percentage change in lake area and volume. Therefore, changes in lake clarity, temperature or dissolved oxygen concentrations due to changes in lake depth are unlikely. Because Pleasant Lake's water budget is dominated by groundwater and well-buffered, the expected change in groundwater input is small enough that no measurable changes to lake chemistry or clarity are expected.

Shoreline ecology has been significantly altered by existing human development, and Pleasant Lake currently supports little emergent vegetation of the type that would be most susceptible to small changes in lake level. It is not expected that the lake's plant communities will experience significant changes due to pumping from the proposed wells. Because habitat (chemistry/temperature/vegetation) will not be significantly altered, it is not expected that there will be any impacts to the fishery. It is very unlikely that projected drawdown due to operation of the dairy's wells would result in measurable changes or significant impacts to aquatic plant life, wildlife, or water temperature relative to the effects of existing shoreland use and water level fluctuations.

Overall, the impacts of the proposed wells on Pleasant Lake are likely to be insignificant, especially compared to the natural variability in lake level, the impact of existing shoreland development and lake use, and the cumulative impacts of existing pumping in the vicinity of Pleasant Lake. Cumulative impacts are discussed in the following section.

The SSPA report also modeled lake level drawdowns in Lake Burnita, a 10.5 - 13.5-acre seepage lake 3.7 miles southeast of the proposed dairy. The maximum depth of Lake Burnita is reported to be 8 feet, and a 1963 water body description reports that the lake experiences winterkill and fluctuating water levels. There is no historical water level record available for Lake Burnita. Water level drawdown in the lake due to operation of the proposed dairy wells was estimated to be less than 1.3 inches. A reasonable estimate of mean lake depth is between four and five feet, based on regression analysis of depth data from other lakes in Wisconsin. At this lake volume of between 42 and 67.5 acre-feet, the modeled drawdown would constitute a volume reduction of 2.2 - 2.7%. As with Pleasant Lake, the impacts associated with the proposed wells on water levels and the ecology of Lake Burnita are likely to be insignificant, especially compared to the natural variation and existing pumping impacts.

Cumulative Impacts

The area of the state where the Richfield Dairy wells are proposed is a center of irrigated agriculture. There are currently about 90 wells with the capacity to pump over 70 gpm, often with capacities of 800-1200 gpm, within 4 miles of the proposed wells.

Groundwater modeling and observations of various water bodies indicates that a reduction in water quantity has occurred due to the high volume of irrigation and other water withdrawals in the Central Sands region of the state; this region includes the proposed Richfield Dairy well locations. Modeling by Kraft and Mechenich (2010) shows an average water table drawdown of 1.5 feet at Pleasant Lake and streamflow reductions of 1.5 - 15% in headwater areas of nearby trout streams. This is attributed to water “missing” due to irrigation. The SSPA site-specific model also calculated impacts due to the cumulative impact of irrigation pumping. Irrigation pumping from area high capacity wells was calculated to have depressed the water level in Pleasant Lake by 0.7 feet and reduced flow in nearby trout streams by 3-6% (0.5 - 1.8 cfs). Some streams within the model domain were calculated to have flow reduced by higher percentages (up to 41%) due to existing irrigation pumping.

In the last ten years, the Department has approved seven new wells with pumping capacities greater than 70 gpm within five miles of the proposed Richfield Dairy. Six of these were agricultural irrigation wells with pump capacities of 400-1200 gpm, and one was a greenhouse well with a pumping capacity of 125 gpm. It is expected that similar increases in groundwater withdrawal could continue in the future.

The addition of the Richfield Dairy wells, or any additional water withdrawal in the area, will increase existing stresses on the availability of groundwater to supply surface water bodies. The effects of this type of cumulative reduction in groundwater availability include decreased flow and increased temperature in headwater streams, and lowered lake levels in nearby lakes (such as Pleasant Lake). DNR has evaluated these cumulative effects for purposes of the EA, in order to inform its decision-making regarding the

proposal. Resources used for this evaluation included groundwater modeling results and evaluations of the impacts of irrigation pumping for the entire Central Sands region by Kraft and Mechenich (2010) and Kraft et al. (2012), information presented by Kenneth Wade, modeling of cumulative impacts in the area around the proposed wells by SSPA, Department records regarding nearby high capacity wells and groundwater withdrawal capacity, and records of historic changes to water bodies.

However, when DNR determines whether or not to approve an application for a high capacity well, DNR is limited to considering whether the proposed well or wells on the high capacity property may cause significant adverse environmental impacts. In this case, as described above, the Department's assessment of the available information is that the proposed wells are not likely to cause significant adverse environmental impacts.

Since operating the wells with an annual pumping limit of 72.5 million gallons per year is not anticipated to result in significant adverse environmental effects, the Department has made a preliminary determination that an environmental impact statement is not required for the revised high capacity well approval.

Alternatives Analysis

Applicant Alternatives

In addition to the alternatives listed in the 2011 Environmental Assessment, the following alternative was considered by the applicant:

Relocate wells. The applicant considered moving the wells to a different location in order to minimize the potential impact to waters of the state. This alternative was not chosen because of the uncertainty of finding a feasible site where overall impacts would be lessened relative to the current site.

DNR Alternatives

The Department's alternatives for review of the high capacity well application are:

- Deny the application for high capacity well(s) based on probable significant adverse environmental impacts to waters of the state that cannot be avoided by placing conditions on the construction or use of the well(s).
- Approve the application for high capacity well(s) without conditions.
- Approve the application for high capacity well(s) with conditions designed to avoid significant adverse environmental impacts to waters of the state.

The selected alternative is to approve the high capacity well application with conditions to avoid significant adverse environmental impacts. The Department will require

ongoing water level monitoring and reporting of results from monitoring wells on site. Annual pumping will be limited to 72.5 MGY (as requested by the Dairy).

The following are proposed draft conditions to be included as part of Richfield Dairy's amended high capacity well approval:

> The approved pump capacity is 500 gallons per minute for each well. The approved maximum groundwater withdrawal rate for the property is 72,500,000 gallons in any 365-day period, as requested by the applicant. The purpose of this pumping limit is to avoid or minimize the potential for adverse environmental impacts to waters of the state, including Pleasant Lake, Lake Burnita, Chaffee Creek, Tagatz Creek, the headwaters of Little Roche a Cri Creek, and nearby potable well(s).
>
> After reviewing the available information, including the modeling submitted by the applicant, the Department has determined that operation of the proposed wells in accordance with this approval is not likely to result in significant adverse environmental impacts to waters of the state. Monitoring of groundwater levels near the proposed high capacity wells is required to confirm the model results.
>
> As part of its WPDES permit, the applicant is required to install monitoring wells in the production area. As part of the high capacity well approval, the applicant must also install a minimum of one additional piezometer nested with a monitoring well downgradient of the high capacity wells. The applicant shall collect monthly water level information from the monitoring wells and piezometer and shall submit collected information to the Department's Water Use Section on an annual basis.
>
> Any increased withdrawal over the approved amount would require a new high capacity well application, subject to DNR approval.

References

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S.S. Papadopulos & Associates, Inc., 2012. Evaluation of Groundwater Pumping for Richfield Dairy, LLC. July 27 Report.

Table 1.
S.S. Papadopulos Model Results -- Streamflow Impacts

		No Pumping (Base Case)	**Calculated Impact from Existing Irrigation Wells**			**Projected Impact from Richfield Dairy Wells**			
Name	Measured Baseflow (cfs)	Calculated Baseflow (cfs)	Reduction (gpm)	Reduction (cfs)	% Baseflow Removed	Reduction (gpm)	Reduction (cfs)	Baseflow Removed (%)	% Reduced Baseflow* Removed
Little Roche-A-Cri @ 10th Ave	34	35.1	812	1.81	5.3%	43	**0.10**	0.3%	**0.3%**
Campbell @ CTH A	2.4	2.3	121	0.27	11.2%	0.4	**0.00**	0.0%	**0.0%**
Neenah @ CTH G	0.8	1	63	0.14	17.5%	0.3	**0.00**	0.1%	**0.1%**
Neenah @ CTH A	42	31.4	216	0.48	1.1%	0.7	**0.00**	0.0%	**0.0%**
Chaffee @ CTH JJ	14	14.3	212	0.47	3.4%	27	**0.06**	0.4%	**0.4%**
Chaffee @ CTH CH	1.8	1.7	147	0.33	18.2%	22	**0.05**	2.9%	**3.6%**
Lawrence @ Eagle	20	17.5	237	0.53	2.6%	5	**0.01**	0.1%	**0.1%**
Lawrence nr Westfield	16	14.7	216	0.48	3.0%	4	**0.01**	0.1%	**0.1%**
Carter @ CTH G	2.5	3.3	458	1.02	40.8%	5	**0.01**	0.3%	**0.5%**
Mecan @ CTH GG	13	12.3	111	0.25	1.9%	3	**0.01**	0.1%	**0.1%**
Schmudlack @ Cottonville	1.2	2	101	0.22	18.7%	2	**0.00**	0.2%	**0.3%**
Tagatz nr Westfield	7.6	6	213	0.47	6.2%	27	**0.06**	1.0%	**1.1%**
S Br Wedde @ CTH JJ	7	2.2	51	0.11	1.6%	3	**0.01**	0.3%	**0.3%**
Fordham Cr @ 8th Dr	~13.5					13	**0.03**	<1%	**NA**
Little Roche-a-Cri @ Cypress Ave						28.5	**0.06**	<1%	**NA**

**Michigan Model (Hamilton and Seelbach, 2011): Cold Stream - Observable Effects @ 14% flow reduction, Significant Effects @ 20% flow reduction
*Reduced Baseflow = Measured Baseflow - Reduction from Existing High Caps

Review complete of lower pumpage rate for proposed Richfield Dairy; Public comment accepted on high capacity well analysis through Dec. 28

By Central Office November 27, 2012

Contact(s): Eric Ebersberger (608) 266-1722; Rachel Greve (608) 267-7652

ADAMS COUNTY - Richfield Dairy in Adams County has requested reducing its maximum approved pumping rate for two proposed high capacity wells from 131.2 to 72.5 million gallons per year, and the state's supplemental environmental review concludes that the proposed wells, at the lower pumpage rate, are not expected to result in significant adverse environmental impacts.

As a result, the Department of Natural Resources has made a preliminary determination that an Environmental Impact Statement is not required for the revised high capacity well approval nor for the entire project proposed. For the next 30 days, DNR will accept comments on its conclusions, according to Eric Ebersberger, who leads DNR's water use section.

People can submit written or electronic comments through Dec. 28 to Rachel Greve at DNR's Central Office Drinking Water & Groundwater Bureau, 101 S Webster Street, Fifth Floor, Madison, WI 53707-7921 or by email to rachel.greve@wisconsin.gov.

Milk Source Holdings, Inc. has proposed constructing and operating a dairy facility in Adams County to house 4,300 milking / dry cows and 250 steers and would include two high capacity water wells. The proposed Richfield Dairy facility would be located in the southeast corner of the intersection of 1st Drive and Cypress Avenue.

The dairy had originally received DNR approval for an annual pumpage rate of 131.2 million gallons per year. It later submitted a revised high capacity well approval application for 72.5 million gallons a year. In response to the revised application and to comply with an order from the Dane County Circuit Court regarding the earlier environmental review, required DNR to conduct prepared the supplemental environmental analysis of the revised pumpage rate.

DNR's supplemental environmental analysis concludes that operating the wells with an annual pumping limit of 72.5 million gallons per year is not anticipated to result in significant adverse environmental impacts, nor to have significant effects upon the quality of the human environment, DNR's supplemental environmental analysis concluded.

Information on file for this action, including the addendum to the environmental analysis, can be found online at this address: http://dnr.wi.gov/topic/AgBusiness/wiLargestFarms.html.

The information also may be inspected and copied at the DNR's Central Office Drinking Water & Groundwater Bureau, 101 S Webster Street, Fifth Floor, Madison, WI or at the DNR's Service Center

at 5301 Rib Mountain Drive, Wausau, Wisconsin, 54401, Monday through Friday (except holidays), between 9 a.m. and 3:30 p.m.

Last Revised: Tuesday, November 27, 2012

Richfield Dairy Supplemental Environmental Assessment Comment Response Document

Introduction

The Wisconsin Department of Natural Resources (DNR or Department) prepared an Environmental Assessment (EA) for the proposed Richfield Dairy facility in November 2011. The EA was challenged in Dane County Circuit Court. DNR prepared a Supplemental Environmental Assessment (SEA) for the proposed Richfield Dairy high capacity wells, based on a decision from the Dane County Circuit Court remanding the EA back to DNR because the EA did not adequately evaluate the effects of the high capacity wells at their approved pumping rate.

As directed by the Court, DNR has now conducted additional factual investigation to allow a reasonably informed preliminary judgment about the environmental effects of the high capacity wells operating at 72.5 million gallons per year (MGY), which is the rate requested by the Richfield Dairy in a revised high capacity well approval application. DNR has evaluated newly submitted information, including a numerical groundwater model submitted by the Dairy (S.S. Papadopulos & Associates, 2012, referenced as "SSPA"), and has evaluated all available information in order to make its preliminary judgment about the environmental effects of the high capacity wells operating at 72.5 MGY.

The DNR received 183 comments concerning the Richfield Dairy SEA. The DNR carefully reviewed all comments and provides responses to these comments below. The vast majority of the comments voiced concerns over the volume of water use for the proposed high capacity wells for the Dairy. We ask that commenters review the responses in total to identify those responses that pertain to their concern or comment. For detailed letters received from organizations or individuals, the DNR responded referencing the numbered paragraphs in the letters.

A listing of the comments with specific responses is as follows:

A. Pleasant Lake Management District
B. George Kraft
C. Francie Rowe
D. Friends of Central Sands
E. Ray White
F. Ken Wade
G. Michael Best & Friedrich
H. Hanaman/Garnett combined comments
I. Thomas Kune
J. Sierra Club

For comments that were general in nature or similar topics from several people, we have provided a general heading with responses as follows:

Part I. General Responses to Public Comments on the Richfield Dairy SEA

1. **Private Wells:** Potential impacts to private wells were considered as part of DNR's analysis of potential impacts to waters of the state. Several different methods were used to analyze drawdown (analytical and numerical models). For the closest existing private wells (about 400-800 feet from the proposed high capacity wells), the predicted drawdown amounts are several feet less than a level that would be expected to impede the function of almost all legally constructed wells. Drawdown amounts decrease with distance away from the high capacity well(s).

   Several comments questioned what the remedy would be if private water supplies were impacted by pumping at the Dairy. DNR concluded that the proposed high capacity wells, at the pumping limit of 72.5 MGY, are not predicted to adversely impact nearby private water supply wells. However, if water use by one landowner causes unreasonable harm by lowering the groundwater table, such that a neighboring landowner's use of the groundwater is affected, the adversely impacted landowner could attempt to resolve the conflict by bringing a civil suit. {See *State v. Michels Pipeline Construction, Inc*., 63 Wis.2d 278 (1974)}. The high capacity well approval includes a condition stating that issuance of the approval does not relieve the well owner from any liability for claims brought by nearby landowners related to potential harm to their water supplies.

2. **Surface Waters:** Almost all comments expressed concern about the impact of the Richfield Dairy high capacity wells on surface waters such as Pleasant Lake, Little Roche a Cri Creek, Chaffee Creek, Tagatz Creek, and others. DNR evaluated the potential impact of the proposed wells on nearby private and public wells, wetlands, springs, streams, and lakes. The impact analysis compared modeled reductions to current baseflow conditions of streams and minimum recorded lake levels to evaluate the effects of the proposed pumping (% change in stream flows, change in lake volume, surface area, vegetation, etc.). The conclusion of that evaluation was that pumping the proposed wells at the maximum proposed amount for an extended period of time (≥25 years), independent of existing groundwater withdrawals, is very unlikely to result in significant adverse environmental impacts to waters of the state (see the SEA for more detailed discussion).

   DNR's review did not show significant environmental impact resulting directly from the proposed wells. The proposed wells would not be approved at a level where significant impacts were predicted. The hydrogeologic properties of the sandy soils of the Central Sands were incorporated into both the Kraft et al and SSPA groundwater flow models reviewed by DNR.

   See Responses to Pleasant Lake Management District (PLMD), Dr. George Kraft, and Mr. Ray White for additional discussion of surface waters.

3. **History of Approved Withdrawal Amount:** Although the Dairy initially stated that its expected water use was 52.5 MGY, its original high capacity well application requested a combined total pumping capacity of 1000 gpm, or 525.6 MGY from its two wells. DNR limited this amount to 131.2 MGY for the original approval. Subsequently, the Dairy re-evaluated its water needs and requested approval for a maximum withdrawal of 72.5 MGY.

4. **Impact of Groundwater Pumping Pattern:** The pattern of groundwater withdrawal from the proposed Dairy would be quite different from irrigation pumping. The Dairy would pump groundwater year-round (pumping limited to an annual average of 138 gallons per minute (gpm) which equates to 72.5 MGY, and limited to 21.6 million gallons in any 30-day period), with slightly higher pumping rates in the summer for cooling and slightly lower pumping rates during the remainder of the year. Irrigated agriculture requires very high rates of seasonal pumping during the summer months (600-1200 gpm), with an opportunity for water levels to recover during the remainder of the year. At distances of several miles from the irrigation pumping, however, these seasonal peaks of drawdown would be damped to a more or less constant drawdown amount similar to the effect of the Dairy (Barlow and Leake, 2012, p. 28).

5. **Impact on Property Values and Tourism, Generalized Impacts to the Natural Environment, Odors:** Comments on these topics were addressed in the Permit Changes and Response to Comments document http://dnr.wi.gov/topic/AgBusiness/documents/RichfieldDairy/RichfieldDairyComments.pdf

6. **Impact on Water Quality:** Water quality concerns related to manure spreading and other Dairy activities were previously addressed in the November 1, 2011 Environmental Assessment and the subsequent "Permit Changes and Response to Comments" document. The Water Pollutant Discharge Elimination System (WPDES) permit is not under review at this time.

7. **Cumulative Impacts (Regarding Decision Whether to Approve the Wells):** Numerous comments on the SEA asserted that DNR should deny the proposed wells because they would exacerbate an existing significant depletion of surface water resulting from the current levels of groundwater pumping in the area. The Comments cite to *Lake Beulah Management District* v. *DNR*, 2011 WI 54, as giving DNR the authority to take this action.

   The DNR is aware of water resource depletion in the Central Sands region. (In addition to the discussion in the SEA, see, e.g., the Response to Ray White Comment #1). The SEA Response to Comments includes responses regarding cumulative impacts, in the context of compliance with ch. NR 150, Wis. Adm. Code, requirements. See e.g., the General Responses to PLMD Comments #4 to 6.

   However, the Department does not interpret its legal authority to allow for conditioning or denying individual high capacity well approval applications based on the cumulative impacts from other groundwater withdrawals in the area.

   The high capacity well statute (s. 281.34, Wis. Stats.) gives DNR authority to condition or deny high capacity wells if "the proposed well" will have significant adverse environmental impact. The statute does not give DNR authority to consider impacts from other groundwater withdrawals in the area. The *Lake Beulah* decision did not address the issue of whether DNR may condition or deny high capacity well approvals based on the cumulative impacts of existing wells located on nearby properties. *State v. Michels Pipeline*, cited above, establishes that property owners are entitled to withdraw groundwater from underneath the land and use it for a beneficial purpose, provided

that the withdrawal does not cause unreasonable harm through lowering the water table or reducing artesian pressure, the groundwater does not form an underground stream and the withdrawal does not have a direct and substantial effect upon a watercourse or lake. Therefore, when deciding whether to approve high capacity wells, DNR assesses the potential adverse environmental impacts from the high capacity property itself. In this case, that assessment indicates that such impacts will not occur.

8. **Drought Conditions:** In light of the severe drought conditions experienced in 2012 in many parts of the state and the possibility of ongoing climate change, many commenters expressed that DNR should base its review on impacts in a dry year, as opposed to average conditions. The Dairy's high capacity well approval would not allow pumping to exceed 72.5 million gallons per year or 21.6 million gallons in any 30-day period, even in dry years.

   In conducting an environmental review, the Department attempts to consider a range of possible conditions. The analysis of impacts to Pleasant Lake was conducted assuming the minimum recorded water level. Pumping at the Dairy was modeled at the maximum amount allowed throughout the entire modeling period.

   See Responses to Ray White's comments for further discussion of this topic.

9. **Is modeling by the Dairy's consultant reliable?** In addition to the DNR's internal review of the SSPA model, the comments DNR received from Pleasant Lake Management District included a review of the model by Dr. George Kraft. While Dr. Kraft expressed concerns about several aspects of the modeling of cumulative impacts, he generally agreed with the model's conclusions about direct impacts from the proposed pumping at the Dairy. Given that no serious issues were identified by DNR or raised by others with regards to this aspect of the model, DNR is comfortable using the model results for our review of the impacts of the proposed wells.

10. **Golden Sands:** DNR received several comments regarding the proposed Golden Sands Dairy. The topic of the comments is the SEA for the proposed Richfield Dairy high capacity wells in Adams County. The public will have an opportunity to comment on the Golden Sands proposal at a future time.

Part II. Responses to Individual Public Comments on the Richfield Dairy SEA

A. **Responses to Pleasant Lake Management District (PLMD) Comments on SEA**
   [DNR Note: PLMD's comments are summarized below; complete PLMD comments are attached to the Comment Response document.]

PLMD General Comment Responses

1. **Comment:** The SEA does not satisfy the minimum requirements of WEPA, and does not even suggest that DNR conducted any independent evaluation of impacts.

Response: The Dane County Circuit Court (Court) previously addressed the question of whether DNR's EA for the project was adequate. The Court found the EA to be adequate. The Court remanded the EA to DNR not because the EA failed to "satisfy the minimum requirements of WEPA" but because the EA did not adequately evaluate the effects of the high capacity wells at their approved pumping rate.

As directed by the Court, DNR has now conducted additional factual investigation to allow a reasonably informed preliminary judgment about the environmental effects of the high capacity wells operating at 72.5 MGY, which is the rate requested by the Richfield Dairy in a revised high capacity well approval application. DNR has independently evaluated newly submitted information, including a numerical groundwater model submitted by the Dairy (S.S. Papadopulos & Associates, 2012, referenced as "SSPA"). DNR has also independently evaluated all available information in order to make its preliminary judgment about the environmental effects of the high capacity wells operating at 72.5 MGY.

A Response to the more specific Comments regarding the discussion of wetlands, springs, streams and Pleasant Lake is included in the Response to Specific Comments from PLMD.

2. **Comment:** The SEA fails to define "significant environmental impact" and does not identify the criteria used to conclude that the proposed high capacity wells will not have a "significant environmental impact."

   Response: DNR prepared the SEA, as it prepared the original EA and addendum, by following the procedures, requirements and definitions under ch. NR 150, Wis. Adm. Code. Section NR 150.02(16), Wis. Adm. Code, defines "major action" as "an action of such magnitude and complexity that the action will have significant effects upon the quality of the human environment." Section NR 150.02(25), Wis. Adm. Code, defines "significant effects" as "considerable and important impacts of major state actions on the quality of the human environment." The "proposed action" contemplated by DNR for the original EA was to approve the proposed Richfield Dairy, including issuing a WPDES Permit, a plans and specification approval and a high capacity well approval. For the SEA, the "proposed action" is to approve the high capacity wells at a combined pumping rate of 72.5 MGY. DNR concluded (both for the original EA and the SEA) that the "proposed action" is not a "major action" since it is not an action of such "magnitude and complexity" that it will have "significant effects" or "considerable and important impacts" on the quality of the human environment.

   Similarly, DNR is required under ch. NR 150, Wis. Adm. Code, to evaluate the "probable environmental consequences of the proposal" and to discuss "adverse environmental effects" should the proposal be implemented (s. NR 150.22(2)(d), Wis. Adm. Code). "Proposal" is defined in s. NR 150.02(24), Wis. Adm. Code, to mean "the full range of activities of the entire project proposed." For purposes of the SEA, DNR concluded that the "probable environmental consequences of the proposal" to install the two wells pumping at 72.5 MGY would not be anticipated to result in significant adverse environmental effects.

3. **Comment:** The SEA only addresses Richfield Dairy's requested initial pumping rate.

   Response: In its Decision and Order on Motion for Relief from Judgment or in the Alternative to Amend and Clarify, dated October 2, 2012, the Circuit Court stated as follows:

   > The intent of the remand is to require the Environmental Assessment to evaluate the impact of the high capacity well permits at whatever value is the limit of the permit. If DNR approves a 72.5 million gpy limit in the high capacity well permit, that should be the value assessed in the Environmental Assessment. (Decision and Order on Motion for Relief, page 5).

   As directed by the Court, the SEA contains an evaluation of the environmental impact of the high capacity wells operating at the rate of 72.5 MGY, including evaluation of groundwater modeling of the potential impacts. The revised high capacity well approval will establish an approved maximum pumping rate for the wells. Richfield Dairy could not increase its pumping rate above the rate allowed without submitting a new high capacity well approval application. DNR would review that application, and its review would include a new assessment of groundwater withdrawal impacts, and may include evaluating groundwater modeling at the new requested pumping rate. A new high capacity well approval application would be a public record, and interested parties could request DNR to conduct an environmental review of the potential impacts of the wells at the revised pumping rate, by submitting concrete scientific evidence of potential harm.

4. **Comment:** The discussion of cumulative impacts in the SEA did not include any independent evaluation by DNR.

   Response: Even though the Court concluded that DNR conducted an adequate evaluation of the cumulative effects of the wells in the original EA, DNR conducted additional independent analysis of cumulative effects in the SEA (see pages 6-7 of the SEA).

   DNR evaluated modeling by Kraft and Mechenich (2010), Kraft et al. (2012), and the SSPA site-specific model, which calculated impacts due to the cumulative effects of irrigation pumping in the region. DNR also reviewed information presented by Kenneth Wade and its own records regarding high capacity wells approved in the vicinity of the proposed wells in the past ten years. DNR also indicated its preliminary judgment regarding the cumulative effects of additional groundwater withdrawals in the vicinity. The responses to comments include additional evaluation of cumulative effects (see, e.g., the Response to Dr. Kraft General Comment #5 and Detailed Comments #6 and 13 and the Response to Ray White Comment #1).

5. **Comment:** While DNR acknowledges that cumulative effects will occur, DNR does not evaluate them, to determine whether they are significant.

   Response: DNR concluded (as in the original EA) that the proposed action is not a "major action," meaning it is not an action of such "magnitude and complexity" that it will have "significant effects" or "considerable and important impacts" on the quality of the human

environment. Section NR 150.22(2)(a) requires DNR to consider five criteria when making this determination, and "cumulative effects" is one of the criteria. The rule does not require DNR to make a separate determination as to each criterion nor does the rule require DNR to determine whether each criterion is "significant."

DNR has adequately evaluated cumulative effects in the SEA.

6. **Comment:** The cumulative impacts discussion fails to disclose whether DNR evaluated reasonable foreseeable future actions that may compound the impacts.

   Response: In the SEA, DNR evaluated information regarding existing cumulative effects, including modeling by Kraft and Mechenich (2010), Kraft et al. (2012), and the SSPA site-specific model, information presented by Kenneth Wade and DNR records regarding high capacity wells approved in the vicinity of the proposed wells in the past ten years. DNR also evaluated "reasonably anticipated" related local actions or activities that would compound impacts by considering that additional water withdrawals in the area would increase existing stresses on the availability of groundwater to supply surface water bodies. DNR included its preliminary judgment that the effects of this type of reasonably anticipated cumulative reduction in groundwater availability would include decreased flow and increased temperature in headwater streams, and lowered lake levels in nearby lakes. Thus, DNR considered reasonable foreseeable future actions that may compound the impacts from the two proposed wells.

   The comment states that during the first ten months of 2012, 35 high capacity wells were approved in Adams County and 51 high capacity wells were approved in Waushara County. These numbers differ from DNR records, which show that during this time period, the actual number of high capacity wells (pumping capacity greater than 70 gpm) approved was 23 in Adams County and 25 in Waushara County. It should be noted that the high capacity wells approved are located throughout the entire county, not necessarily within the watersheds in the vicinity of the proposed Richfield Dairy high capacity wells.

7. **Comment:** DNR's conclusion that an EIS is not necessary, based solely on the expected impacts of the two wells at the initial pumping rate of 72.5 MGY, is flawed as a matter of law.

   Response: The Response to PLMD General Comment #1 explains that the Court concluded that DNR's original EA and addendum was sufficient to support DNR's conclusion that an EIS was not necessary. The Court remanded the EA to DNR to conduct additional factual investigation to allow a reasonably informed preliminary judgment about the environmental effects of the high capacity wells operating at 72.5 MGY. DNR conducted that additional factual investigation and reissued its determination that an EIS was not necessary.

   DNR concluded (as it did in the original EA) that the proposed action is not a "major action" and the EIS process is not required. The SEA includes a statement that an EIS is not required, considering the expected impacts of the two wells at the pumping limit of 72.5 MGY, because DNR was specifically directed by the Court on remand to evaluate the

impacts of the wells at their proposed pumping rate. DNR's evaluation also considered and complied with the criteria and requirements in ch. NR 150, Wis. Adm. Code.

In addition, it is important to note that DNR included in the SEA "proposed draft conditions" for the amended high capacity well approval that are designed to avoid or minimize the potential for adverse environmental impacts to waters of the state. The proposed pumping limit and the requirement to monitor groundwater levels near the proposed high capacity wells to confirm the groundwater model results are both intended to control for any potential adverse environmental impacts from the wells. This is an acceptable way to achieve WEPA compliance, as the Supreme Court concluded in *State ex rel. Boehm v. DNR*, 174 Wis.2d 657 (1993).

8. **Comment:** There are factual inconsistencies and likely inaccuracies in the SEA.

   Response: Regarding the question of the maximum depth of Pleasant Lake: two bathymetry surveys (July 1964 and June 2012) reported maximum lake depths of 24 feet and 23.7 feet respectively. The source of the 30-foot depth reported in the DNR water body description appears to be the 1996 Lake Management Plan (recorded during a period of unusually high water). Water depths reported on the DNR website may be somewhat imprecise due to the variety of sources from which the information is derived, as well as variable lake level conditions and timing of bathymetric surveys. In evaluating impacts to Pleasant Lake, DNR used the range of historical lake depths that have been reported.

   Regarding the historic variability of lake levels for Pleasant Lake (1964-2012): The maximum reported lake level was 983.75 feet MSL (7/18/1994); the minimum reported lake level was 978.27 feet MSL (8/3/2007). The difference between these two levels is 5.48 feet. DNR does not know how Waushara County calculated a 5.32-foot variation in lake levels.

   Regarding the surface area of Pleasant Lake: The SSPA model used air photo analysis to arrive at a surface area of 130 acres for moderately low water level conditions. A 1964 lake survey estimated a lake surface area of 126.5 acres. DNR based its analysis in the SEA on a range of acreages because actual lake surface area varies depending on water level.

9. **Comment:** DNR uses vague terminology throughout the SEA, characterizing the impacts from the wells as "unexpected" or "unlikely" to be significant.

   Response: DNR's SEA provides a preliminary factual investigation of sufficient depth to allow a reasonably informed preliminary judgment about the environmental and cumulative effects of the wells operating at the proposed pumping limit.

   DNR's preliminary investigation and preliminary judgment regarding the effects of the wells is based in part on site-specific modeling, which is "currently the best tool available for evaluating the long-term effects of groundwater withdrawals in a large, complex system" (SEA at page 2). While site-specific modeling is the best tool available to predict impacts from groundwater withdrawals, the impacts cannot be fully understood until years of groundwater withdrawals have occurred. Therefore, it is appropriate and prudent for DNR

to make a preliminary judgment that the wells are not "anticipated" to cause significant adverse environmental effects.

Given that the environmental effects are not completely certain, it is also correct for DNR to include conditions in the approval to avoid significant adverse environmental impacts, as DNR has proposed to do. The Wisconsin Supreme Court has held this to be an acceptable method to "control potential adverse environmental consequences through conditions that must be complied with to obtain approval." *State ex rel. Boehm v. DNR,* 174 Wis. 2d at 676.

PLMD Specific Comment Responses

1.

a. **Comment:** SSPA's 25-year model period was too short.

   Response: As discussed in the SEA, a 25-year time-frame allowed the system to come to a near-equilibrium state. Dr. George Kraft's assessment (in his comments attached to the PLMD submittal) was that the change in impact resulting from a longer model run would be on the order of tenths of an inch of drawdown in Pleasant Lake, for example.

b. **Comment:** Natural fluctuations comparison is inappropriate for assessing impacts.

   Response: As the comment points out, the existence of natural or historical fluctuations indicates that the existing biota is adapted to changes in water levels and flow variations. On a larger scale, sustained water level reduction does have the potential to cause significant impact to the lake. However, lake level changes, or permanent reductions, on the order of those predicted due to the Dairy's wells would be effectively indistinguishable from natural fluctuation and existing irrigation impacts.

c. **Comment:** DNR distorts stream/lake level data.

   i. **Comment:** 1964 lake level represents drought conditions and is not typical.

      Response: The 1964 lake level is relevant in that it represents a past minimum water level at Pleasant Lake prior to large-scale irrigation pumping in the area**.**

   ii. **Comment:** Levels since the 1990s show a consistent downward trend, not fluctuation.

      Response: The water level record for Pleasant Lake shows both a downward trend and seasonal/annual fluctuations. The downward trend may be slightly exaggerated because lake levels in the 1990s were atypically high. But, lake level records suggest that water level decline over the last 2 decades is on the order of 1-3 feet. Seasonal data are limited, but do exist for several years with multiple water level readings. As described in the SEA, the observed seasonal variability was 0.5-0.9 feet within the available data.

d. **Comment:** George Kraft's 11/28/11 report results were not included in SEA.

Response: The SSPA model was designed specifically to model pumping from the individual wells at Richfield Dairy and was therefore the primary source of modeling information for the projected impacts of the Dairy wells. Dr. Kraft's model was designed as a regional model to simulate the cumulative impacts of irrigation pumping. (For example, the Kraft and Mechenich model uses recharge reduction rather than individual wells to simulate the effects of pumping.) While Dr. Kraft's site-specific evaluation at 131.2 MGY was not explicitly cited in the SEA, it was used to test the reasonability of the site-specific SSPA model. Since Dr. Kraft's drawdown results are roughly linear with pumping rate, DNR calculated that the modeled drawdown was about 2.2 inches at Pleasant Lake for a pumping rate of 72.5 MGY; this result is similar to the SSPA model.

In addition to serving as a check on SSPA's results, Dr. Kraft's regional model was a primary source used to assess the cumulative impacts of irrigation pumping.

2. **Comment:** Wetlands – Potential wetland impacts were not sufficiently discussed in the SEA. The projected drawdown of less than one inch could have a significant impact. Wetlands associated with Pleasant Lake are not discussed.

Response: The wetlands identified in the SEA are a mix of forested, scrub/shrub, and emergent/wet meadow adjacent to the unnamed headwaters of Little Roche a Cri Creek. A water table drawdown of less than 1 inch after 25 years was identified by the SSPA model. DNR wetland staff experience indicates that in almost all cases, a water table drawdown of 1 inch or less would not have a significant impact on wetland ecology. (Exceptions would be highly groundwater-dependent wetland types such as sedge meadows and cedar swamps: there is no indication that the Little Roche a Cri headwater wetlands are in these categories.) It may also be noted that the Little Roche a Cri wetlands are located in an area of concentrated irrigation (6 irrigation wells within 1 mile), so there may be wetland impacts from existing groundwater withdrawals in the area.

There are two mapped wetlands in the vicinity of Pleasant Lake listed as "too small to delineate". The Pleasant Lake wetlands mentioned in the PLMD comments are mainly located in the shallow areas of the lake itself, but have not been delineated as wetlands in the Wisconsin wetland inventory. A 1996 Pleasant Lake Management Plan identified several parts of the Pleasant Lake shoreline as "Sensitive Areas". These areas include Turtle Bay (southwest bay), the south shoreline, and the sand and gravel bar extending from the north shore, providing important spawning and feeding grounds for the lake's fishery. DNR Wetland staff evaluated the impact of the projected ~2-inch reduction in lake level on the following factors: human use, wildlife habitat, fish and aquatic life, shoreline protection, storm and floodwater storage, water quality, and groundwater processes. This review concluded that, by itself, the 1.6 ± 0.26-inch drawdown modeled by SSPA would not result in adverse changes to wetland areas or shallow areas of Pleasant Lake or cause Turtle Bay to be cut off from Pleasant Lake.

DNR reviewers note that Pleasant Lake and the adjacent wetlands are currently impacted by existing groundwater withdrawals. As such, existing and future impacts could cause Turtle Bay to no longer support open water communities, causing loss of habitat.

3. **Comment:** Springs – The SEA analysis was deficient because only the Chaffee Creek spring was considered, and only the SSPA report was reviewed.

   Response: The spring at the headwaters of Chaffee Creek is the only large spring mapped within 5 miles of the proposed Richfield Dairy. The 1963 spring-flow rate is from a Water Resources Survey which provided only *estimates* of flow. Because of this, the change in flow between 1963 and 2003 cannot be quantified (could be more or less than 0.8 cfs).

   a-b. **Comment:** DNR suggests that the spring is outside the area of influence, based on "general" information about contribution areas. Spring flow data are almost ten years old and flow could have decreased since then.

   Response: The SEA's statement regarding contribution areas could be restated as, "because springs can be expected to have a contributing area of about 1 square mile per 1 cfs of flow, the model result is reasonable." SSPA model results show that around 15% of the Dairy's total pumping would be diverted from the Chaffee Creek headwater area.[1] This constitutes a 3.5% flow reduction to the spring. Conclusions about spring flows were based on available information, including past flow measurements and modeling results. Flow measurements for Chaffee Creek at County Highway CH, less than 1 mile downstream of the headwater spring, are also available for 2005-2011; these measurements were also used in the analysis of the spring's flow.

   c-d. **Comment:** DNR's analysis ignores other springs that feed nearby lakes and streams.

   Response: DNR's analysis assumed that the streams and seepage lakes in the area are groundwater-fed (small springs and seepages), even if no concentrated springs are mapped. The Department is aware that the fisheries and water quality of nearby streams depend on groundwater flow to maintain habitat for thermally sensitive fish species and macroinvertebrates, and considered these factors in its review.

4. **Comment:** Streams – DNR does not identify the source of its streamflow data. Depletion was not evaluated in the most sensitive, headwater areas of streams. Cumulative impacts could be significant.

   Response: The baseflows used for flow-reduction comparisons were derived from two different sources. The majority were based on flow data collected by UW-Stevens Point since 2005, with several based on data from USGS gaging stations. A list of flow data and sources can be found in Appendix G of the SSPA report.

   Flow locations and streamflow reduction estimates can be found in Table 1 of the SEA. Reductions due to the Dairy are calculated as a percentage of reduced baseflow (measured baseflow minus baseflow reduction due to existing pumping). Because no upstream data for Little Roche a Cri and Fordham Creeks was included in the initial SSPA report, flow reductions were requested at additional locations. Those results are also shown in Table 1

[1] The is essentially in agreement with George Kraft's modeling, which estimated that 11% of the water pumped by the Dairy was diverted from Chafee Creek (Kraft, October 7, 2011 letter to Eric Ebersberger)

of the SEA. In order to respond to comments from PLMD, among others, DNR also requested SSPA to provide model results for flow reductions in the upper mile of headwater streams (Fordham, Chaffee, and Tagatz Creeks, and Little Roche a Cri Creek tributaries). Modeled flow reductions ranged from 3 to 23 gpm (0.01-0.05 cfs), or about 0.8%-3.5% of modeled streamflow in these reaches. Pumping from the Dairy resulted in no decrease in modeled stream lengths.

The stream described in Specific Comment 4 is Chaffee Creek, with flow reduction of 22 gpm (3.4%) at CTH JJ. Modeled flow reduction at Little Roche a Cri Creek was 43 gpm (0.3%) at 10th Avenue and 28.5 gpm (<1%) at Cypress Avenue. See Responses to PLMD General Comments for discussion of cumulative impacts.

5. **Comment:** Pleasant Lake: The SEA's discussion of the lake was deficient or inaccurate.

   a. **Comment:** Surface area and depths may be inaccurate.

      Response: See Response to General Comment #8. DNR used an estimate of lake depth, area, and volume that would represent the "worst case" in terms of potential impact.

   b. **Comment:** The discussion of historical water level fluctuations ignores the impact of pumping on water level trends. Only four years have multiple water level measurements. Recent measurements generally show a declining trend in lake levels.

      Response: The Department acknowledges that as much as 3 feet of observed water level decline in Pleasant Lake in recent years could be attributed to existing groundwater pumping. However, Pleasant Lake's water levels in the 1990s were unusually high, and at least some of the decline since 1992 and observed seasonal changes are due to natural or climatic conditions.

   c. **Comment:** DNR's conclusions are not based on first-hand knowledge of the lake. The near-shore zones of Pleasant Lake, particularly Turtle Bay, support significant flora and fauna.

      Response: Department staff visited the lake on several occasions and reviewed information on aquatic vegetation gathered by UW Stevens Point investigators. More extensive investigation of near-shore biota was not conducted because the predicted impact of 2 inches of drawdown was determined not likely to cause significant impact in terms of changes to surface area, volume and water level, and thus evaluating the impacts to lake biota would not be necessary.

   d. **Comment:** The small predicted change in water level could impact wildlife. The banded killifish, a State Special Concern species, is present in Turtle Bay. The predicted change in water level could impact spawning and destroy the banded killifish population in Pleasant Lake.

      Response: Although the banded killifish is a State Special Concern fish, it is not tracked in the Natural Heritage Inventory, the database DNR uses to identify sensitive species during environmental reviews. Neither the banded killifish nor any other special

concern species were noted in the 1996 IPS Pleasant Lake Management Plan listing of fish species in Pleasant Lake.

According to DNR's records, the banded killifish was first identified in Pleasant Lake in 1999; 25 individuals were also identified in the lake in November, 2012.

The banded killifish prefers clear water of bays and quiet backwaters of large lakes and medium to large streams with sparse to no vegetation over gravel, sand, silt marl, clay detritus, or cobble. Spawning occurs from June through mid-August. Threats to the species include artificial water level stabilization, invasive species (such as Eurasian Water Milfoil and Curly-leaf Pondweed), non-point source pollution, habitat destruction due to boating (wave energy), aquatic plant control, and shoreline clearing. Many of these are existing concerns at Pleasant Lake.

DNR's wetland staff evaluated Turtle Bay and other shallow wetland areas of the lake and concluded that a the predicted water level reduction would not negatively impact habitat or aquatic life, including fish (see Response to Specific Comment #2). DNR fisheries staff concurs that it is very unlikely that the projected water level reduction would significantly impact the banded killifish present in Pleasant Lake. Fisheries staff also notes that it is likely that shoreline development and habitat degradation have already had some impact on this species.

e. **Comment:** The SEA ignored potential impacts to Turtle Bay and adjacent wetland areas.

   Response: See Response to PLMD Specific Comment #2 – Wetlands.

6. **Comment:** Other Lakes – The SEA's discussion of Lake Burnita and any other lakes that could be impacted was not sufficiently detailed.

   Response: In comparison to Pleasant Lake, very little information exists regarding Lake Burnita. However, based on the available water body and depth description, DNR used a conservative estimate of lake volume and area to evaluate the impact of drawdown at Lake Burnita, similar to the analyses applied to Pleasant Lake. There were no other lakes in the vicinity of the Richfield Dairy wells that were predicted to have drawdown effects greater than Pleasant Lake and Lake Burnita.

7. **Comment:** Cumulative Impacts Assessment

   Response: See Responses to General Comment #7 (Cumulative Impacts) and PLMD General Comments #4-6

8. **Comment:** Alternatives Analysis – The alternatives analysis in the SEA was not sufficiently detailed.

   Response: The SEA was prepared to specifically address the order of the Dane County Circuit Court (Court) which required DNR to analyze the environmental effects of the proposed wells operating at 72.5 MGY. The SEA is therefore not a standalone document. Rather the SEA is a portion of the DNR's EA for this project, which includes the original EA,

EA addendum, and all permit application and review documents. This reviewable record addresses short and long-term effects, secondary effects, cumulative effects, precedence, controversy, wetlands, springs, streams, lakes and alternatives.

B. <u>Responses to Dr. George Kraft's Comments on SEA</u>

[DNR Note: Dr. Kraft's complete comments are attached to the Comment Response document.]

<u>Kraft General Comment Responses</u>

1. **Comment:** DNR cannot determine if an impact is significant without setting a specific threshold that would be considered significant.

   Response: It is possible to determine whether an impact is significant or not without setting an absolute threshold, provided that the projected impact being evaluated, which in this case is the impact caused by the amount of groundwater proposed to be withdrawn, does not approach the range that would be considered significant. (See also Response to Kraft Detailed Comment #9).

2. **Comment:** Confusion in discussion of different methods of accounting for irrigation water losses.

   Response: See Response to Kraft Detailed Comment #3

3. **Comment:** Streams – Location of flow comparisons should be in headwater areas.

   Response: See Response to Kraft Detailed Comments #10-11, 18

4. **Comment:** Lake fluctuations should not be used as a means of assessing potential impacts.

   Response: It is correct that the effect of the Dairy's pumping on Pleasant Lake will be a continuous small reduction in water level imposed over the hydrograph of the lake (historic, seasonal, and annual water level fluctuations). The existence of these fluctuations indicates that lake ecology is already adapted to changes in lake level of several feet, so a change on the order of inches would be less likely to affect the lake than it would if levels were naturally extremely stable. Historic fluctuations (including both "natural" (climatic) and pumping-induced effects) were one of several factors the Department considered to determine the significance of the projected drawdown. Other factors that were considered included potential changes in lake volume, loss of groundwater input, surface area, and existing vegetation.

5. **Comment:** Pleasant Lake is not fluctuating naturally but is in decline.

   Response: The Department acknowledges that a significant portion of the lake level decline observed in the past several years is due to the cumulative impacts of groundwater pumping in the vicinity of Pleasant Lake. However, these declines are superimposed over seasonal and annual variations in water levels that are due to climatic effects, e.g. precipitation and evapotranspiration. Indeed, the highest water level in the record (1992) was recorded during a time of higher than normal precipitation, and the lowest level (2007) was recorded during a moderate to severe drought. Therefore, the observed 5.8-foot drop in elevation between 1992 and 2007 cannot be entirely attributed to groundwater pumping.

6. **Comment:** SEA ignores the existing impacts to Chaffee Creek/ spring and Pleasant Lake. (see also Kraft Detailed Comments #8, 9 for Springs, and Detailed Comment #5 for lake levels)

   Response: The comment points to differences in the level of Pleasant Lake visible on air photos between 1992 and 2005/2010. It should be noted that 1992 represents the highest water level on record for Pleasant Lake, so the shoreline shown on air photos for that year does not represent typical conditions (see response to previous comment). As discussed elsewhere, available evidence indicates that existing pumping may have lowered the entire hydrograph for Pleasant Lake by 1.5 feet or more. However, the projected impact of groundwater withdrawals from Richfield Dairy (around 2 inches) will not have a significant impact on the lake (see the SEA and Response to PLMD Specific Comment #5 for additional discussion of DNR's evaluation of impacts to Pleasant Lake). See Responses to PLMD Specific Comments #3 & 4 for a discussion of impacts to Chaffee Creek/spring.

<u>Kraft Detailed Comment Responses</u>

1. **Comment:** Model grid spacing should have been reported in feet, not square feet.

   Response: This was an error in the SEA – units should have been reported in feet.

2. **Comment:** Site specific model had 2 model layers for sand and 1 for sandstone.

   Response: The SSPA model was constructed as described in the comment.

3. **Comment:** There are problems with the SSPA model and SEA's treatment and discussion of consumptive use, net recharge reduction, and "missing water" associated with modeling irrigation withdrawals.

   Response: The SEA's discussion of the modeling of water losses did not describe in detail the differences in modeling methods. Dr. Kraft's comment correctly points out that the terminology "missing water" was misapplied – the term "consumptive use" should have been used. The intent of the EA statement was to point out that Dr. Kraft's model represented irrigation water loss by reducing net annual recharge over an irrigated area by approximately 2 inches, while SSPA represented the same type of losses by simulating pumping from irrigation wells but only using a pumping rate that was 20% of the actual observed pumping rate. Subsequent information from SSPA (Papadopulos, 2013b) indicates that the average irrigation pumping was roughly equivalent to applying 10 inches of water/ acre per year; therefore, simulating irrigation pumping at 20% of the actual pumping results in a loss of two inches of water per acre of irrigated land, similar to the approach in Dr. Kraft's modeling.

   The comment pointed out that the 20% water loss used by SSPA is much lower than the DNR's standard water loss coefficient of 70% loss for irrigation pumping, and from water losses reported by irrigators. The reason for this difference is that the two values represent losses over different time scales. The higher loss amount represents the percent of irrigation water that is lost from the groundwater system during the period of irrigation. That is, a

70% water loss assumes that 70% of the water applied through irrigation is incorporated into the crop or is lost through other mechanisms, primarily evapotranspiration. The 20% loss SSPA used for modeling purposes represents the annual difference in recharge between irrigated and non-irrigated conditions. Annually, the high percentage of water lost through irrigation during summer is somewhat offset by increased water table recharge in fall on irrigated land vs. non-irrigated land. The increased recharge occurs because irrigated soil is kept near its water-holding capacity, as opposed to drying out during summer as under natural conditions. The end result is effectively a 2 inch/year reduction in recharge on irrigated lands which is consistent with Dr. Kraft's approach.

The SSPA and Kraft and Mechenich models were constructed using similar input data and assumptions, so model results (such as drawdown contours) are quite similar (Figure 2 of Papadopulos, 2013a). Differences, such as SSPA's modeled existing drawdown at Pleasant Lake (0.7 ft., versus the statistically-derived drawdown of 1.5 feet reported by Kraft and Mechenich (2010)) stem from different scales of the models and in the way water bodies are represented.

Comment: The SSPA model's results for existing irrigation pumping are erroneous because of lack of accurate pumpage reporting.

Response: The comment correctly points out that the reporting records of high capacity well pumping histories are incomplete, and that this causes added uncertainty in the modeled impacts of existing irrigation pumping. The issues with the pumping record noted by Dr. Kraft, while legitimate, do not invalidate the model results. Additionally, the results of SSPA modeling of existing pumping impacts are in general quite similar to the results of the Kraft model (Papadopulos, 2013a).

Comment: There is a large difference between the Kraft and SSPA model drawdowns near the Dairy.

Response: The existing groundwater drawdown in the vicinity of Richfield Dairy in the July 27, 2012 SSPA report should have read 2.8 feet, not 2.8 inches. This typographical error was corrected during the review process. 2.8 feet of existing drawdown at the Dairy is much more similar to the amount Dr. Kraft modeled in that area (2.1 feet).

4. **Comment:** DNR's review of cumulative impacts modeling (general). SSPA cumulative impacts modeling may be inaccurate.

   Response: The Department recognizes that there are several sources of potential error in the SSPA modeling of existing irrigation pumping. Some of these, such as water level records from well construction reports spanning several decades, were also utilized for Dr. Kraft's model. DNR's review of cumulative impacts used work by Kraft and Mechenich as one of the main sources of information; regional, cumulative impacts are precisely the types of impacts the Kraft and Mechenich model was designed to simulate. The SSPA model results are valuable confirmation of the impacts of existing pumping on lake levels and baseflow in streams.

The issues that are raised here regarding the SSPA modeling of cumulative impacts do not affect the model's ability to accurately predict the individual impacts of the Richfield Dairy wells on nearby water bodies.

5. **Comment:** 25 years may not be long enough to model impacts in water bodies other than Pleasant Lake.

   Response: Following a 25-year model run, the streamflow reductions at the most distant gauging locations on each stream account for a total of 116.1 gpm, or 84% of the Dairy's total maximum pumping rate of 137.9 gpm[2]. When one considers that some additional reduction would take place downstream of the listed gauging locations, this implies that the system is near a steady state, and that almost all of the pumped water is derived from recharge and surface water rather than aquifer storage.

6. **Comment:** Is five feet of drawdown really okay for private wells? What about cumulative impacts?

   Response: Based on DNR staff experience with private wells, drawdowns of less than five feet are not expected to cause significant changes in well function. There may be cases where a smaller drawdown could cause impacts, but for wells constructed according to legal standards, this would be very rare. Although the Department reviewed the Dairy impacts separately from the impacts of existing pumping, it should be noted that even if the modeled drawdowns associated with the Dairy wells (1.5 feet after 25 years) are added to existing pumping effects (2.8 feet), drawdown is still less than five feet. No impairment of well function is likely.

7. **Comment:** Wetlands – was 25 years a long enough time frame to model drawdowns?

   Response*:* Pleasant Lake, which is a mile further from the proposed wells than the nearest mapped wetlands, reached an approximate steady state following a 25-year simulation. Given the relatively homogeneous hydraulic properties of the area, it is reasonable to assume that the wetlands would be at or near steady state after 25 years.

8. **Comment:** Historic flow reductions in Chaffee Creek spring.

   Response: The Chaffee Creek spring may have experienced considerable flow reductions in the last 50 years. However, the flow amounts provided in the 1963 spring survey are general estimates, not precise measurements. Because of this, the flow value of 2 cfs is qualitative rather than quantitative (e.g., the flow reduction between 1963 and 2003 could be more or less than 0.8 cfs.)

9. **Comment:** Chaffee Creek spring - Location of flow measurements, threshold determination

   Response: In the case of large springs such as those at the headwaters of Chaffee Creek, ch. NR 820.31(4), Wis. Adm. Code, states that "The department may not approve a proposed

[2] 137.9 gallon/min = *72,500,00 gallon/yr. ÷ 365 day/yr. ÷ 1440 min/day*

high capacity well that is predicted to result in a reduction in flow from a spring such that the spring does not flow at one cubic foot per second or greater at least 80% of the time or that will reduce the average annual flow from a spring by greater than 20%. (Ch NR 820 *Wis. Adm. Code,* uses the definition of "Spring" from s. 281.34 (1) (f), Stats., meaning "an area of concentrated groundwater discharge occurring at the surface of the land that results in a flow of at least one cubic foot per second at least 80% of the time." In addition, DNR also uses the qualitative metric of "no significant adverse environmental impact" to waters of the state, including springs (s. NR 820.31, Wis. Adm. Code).

The modeled streamflow reduction in the headwaters of Chaffee Creek (including the spring area) is 22 gpm (0.05 cfs), or 3.5% of the flow modeled in the "irrigation pumping" scenario. Approximately one mile downstream from the spring, flow in Chaffee Creek has been measured between 0.3 cfs and 3.0 cfs, with an average flow of 1.8 cfs and flow less than 1 cfs occurring on at least one date in 2006, 2007, and 2012. The Dairy's groundwater withdrawals will not result in enough flow reduction to change the spring's flow to less than 1 cubic foot per second for greater than 80% of the time.

10-11. **Comment:** Headwater impacts to streams are more significant than impacts further downstream, where flow amounts are higher. Flow reductions should be evaluated in headwater areas.

Response: At DNR's request, SSPA provided model results for flow reductions in the headwater reaches of the stream systems closest to the Dairy (Papadopulos, 2013a). Results are summarized in Table 1. The maximum absolute flow reduction modeled was 23 gpm (0.05 cfs) in the Little Roche-a-Cri headwater ditches. The maximum percent flow reduction was 3.5%, in the headwater area of Chaffee Creek. There were no changes in modeled stream length for any of the streams (e.g., any changes in stream length were less than the width of the model cell). This is a realistic result, given the small modeled flow reductions and presence of springs at the heads of Chaffee and Tagatz Creeks.

Table 1. Flow reductions in stream headwaters (upper 1 mile). SSPA letter, February 12, 2013.

Stream	Modeled Change in Flow		Percent Change in Modeled Flow
	cfs	gpm	
Little Roche-a-Cri (unnamed tributary)	0.01	3	0.8%
Little Roche-a-Cri (headwater ditches)	0.05	23	1.0%
Fordham Creek	0.02	8	1.3%
Chaffee Creek	0.05	22	3.5%
Tagatz Creek	0.05	22	1.0%

12. **Comment:** The ultimate potential error in the estimate of Pleasant Lake drawdown is not the same as SSPA model prediction uncertainty. However, the modeled 1.6 inches of drawdown at Pleasant Lake is almost certainly accurate within a factor of two.

    Response: The model-predicted drawdown of 1.6 ± 0.26 inches is a reasonable estimate of lake drawdown resulting from the Richfield Dairy wells. It agrees with modeling provided by Dr. Kraft within a factor of two, as stated in the comment. Therefore, this amount was used for the Department's analysis of potential impacts to Pleasant Lake.

13. **Comment:** Lakes – The entire hydrograph will be lowered by the Dairy's pumping. Pleasant Lake is experiencing a downward trend, not natural seasonal and annual fluctuations.

    Response: The Department considered the projected pumping impacts on Pleasant Lake in the context of the historical hydrograph of the lake, which includes both historic high and low water conditions, as well as seasonal and annual fluctuations, and impacts of existing pumping in the vicinity of Pleasant Lake. The projected impacts of roughly two inches of additional drawdown were compared to the range of water levels observed over the past several decades, as well as estimates of the cumulative impacts of groundwater pumping provided by Kraft et al, 2010, 2011, 2012. Specifically, the Department determined that two inches of drawdown represent about 5.5% (4-11%) of additional impact of the entire hydrograph (using Kraft's estimate of 3 feet (1.5-3.8 ft.) of existing pumping impact.) The Department's determination of significance was based on whether this additional amount of water level decline on its own would constitute a significant impact over and above these historic fluctuations and existing impacts.

    See also Responses to Kraft General Comments #4 and 5

14. **Comment:** DNR has not determined a threshold level for "significant impact" to Pleasant Lake.

    Response: See Response to Kraft General Comment #1

15-16. **Comment:** The 1.5-foot decline described at Pleasant Lake was derived from lake monitoring data. Recent drawdown has been greater than three feet.

    Response: The 1.5-foot decline in Pleasant Lake due to existing pumping was derived from statistical analyses of lake data and was not a model output. The Department recognizes that larger drawdown amounts would be expected to occur in drought years (and/or in years with larger amounts of pumping).

17. **Comment:** The decrease in water level simulated by SSPA is substantially less than empirically observed. Results should be discounted.

    Response: See Response to Kraft Detailed Comment #3

18. **Comment:** Flow reductions due to existing pumping should be greater than listed in the SEA, because they should be calculated in headwater areas.

Response: Comment noted. SSPA modeling results do reflect higher percent depletion in headwater reaches relative to downstream locations in the Little Roche a Cri system and on Chaffee Creek, and similar percent depletion in headwater and downstream areas of Tagatz Creek. (The absolute volume of depletion is, however, higher in downstream reaches than headwater reaches.)

Table 2. SSPA Modeled Percent Depletion due to Cumulative Impacts of **Existing Pumping**

Stream	Depletion Rate (cfs)		Percent Depletion	
	Headwater	Downstream	Headwater	Downstream
Little Roche a Cri / Fordham	0.07-0.76	1.81	8-22%	5%
Chaffee Creek	0.33	0.47	19%	3%
Tagatz Creek	0.28	0.47	6%	6%

See also Response to Kraft Detailed Comments #10-11.

19. **Comment:** DNR needs to establish thresholds that would be considered significant impact levels in order to determine if cumulative impacts are significant.

    Response: See response to Kraft General Comment #1

20. **Comment:** The planned monitoring near the Dairy will be unable to confirm modeled changes to surface waters.

    Response: The purpose of the water level monitoring is to identify any major discrepancy between the groundwater drawdowns modeled by SSPA and drawdowns related to actual pumping. In the case such a discrepancy is noted, the accuracy of the model predictions would need to be re-examined to determine if additional pumping restrictions would be appropriate to protect waters of the State. In the case of a decrease in water supply in nearby wells, water level monitoring could also help to demonstrate whether or not pumping from the Dairy was linked to adverse impacts.

    The purpose of the proposed monitoring is not to directly identify impacts to surface waters (except in the sense of validating the groundwater model). The predicted impacts to these waters are quite small and would not be felt until several years after pumping commences. It would be extremely difficult to measure the direct effects of the proposed wells on surface water bodies in isolation from natural variability and the effects of other pumping.

C. <u>Responses to Francie Rowe's Comments on SEA and Conditions</u>

[DNR Note: Francie Rowe's comments are summarized below; the complete comments are attached to the Comment Response document.]

The comments below speak to the Supplemental Environmental Assessment reviewing the pumping impact of the proposed Richfield Dairy's high capacity wells. I support the comments submitted by the Pleasant Lake Management District. I would also like to raise three points related to the proposed conditions noted in the Supplemental Environmental Assessment. In my opinion the conditions proposed in the Supplemental Environmental Assessment are insufficient and inadequate to manage the problems resulting from the permitting of the proposed Richfield high capacity wells.

1. **Comment:** Pumping Limit of 72.5 million gallons.

   Because of the well-documented cumulative impacts of existing pumping, area lakes and streams are already stressed to the point where it is unreasonable to allow further groundwater withdrawals in the area, no matter the amount. The existing impacts have already been empirically observed and are acknowledged by DNR in the SEA.

   It is also clear that the Dairy intends to increase its herd size in the future. What is to prevent the Dairy from doing this and increasing its water withdrawals at that time? DNR is very unlikely to deny a request for an increase in approved groundwater withdrawals.

   Response: See responses to PLMD General Comments regarding cumulative impacts and the response to PLMD General Comment #3 regarding future increases in water withdrawal amount.

2. **Comment:** Monitoring wells.

   Condition two of the SEA includes groundwater monitoring as part of the Richfield Dairy's amended high capacity well approval. What is to be done with these data? Will water bodies be monitored as well? How will you separate the effects of these two wells from the impacts of hundreds of other wells and natural variability? Monitoring wells are only useful if responses to monitoring outcomes are predetermined.

   What is the purpose of the monitoring? Could the data to be used to revoke the well in the event of harm to surface waters? The high capacity well permit should be limited or revoked if regional water levels drop, and this should be clear in the permit.

   Since it is well known that surface waters will drop as the result of additional pumping, the permit should not be issued. Harm should be prevented before it occurs, and the applicant should not have to deal with the uncertainty of possibly having the approval revoked.

   Response: The purpose of the water level monitoring is to identify any major discrepancy between the groundwater drawdowns modeled by SSPA and

groundwater drawdowns related to actual pumping. In the case such a discrepancy was noted, the accuracy of the model predictions would need to be re-examined to determine if additional pumping restrictions would be appropriate to protect waters of the state. In the case of a decrease in water supply in nearby wells, water level monitoring could also help to demonstrate whether or not pumping from the Dairy was linked to adverse impacts.

The purpose of the proposed monitoring is not to directly identify impacts to surface waters (except in the sense of validating the groundwater model). The predicted impacts to these waters attributable to the proposed wells are quite small and would occur gradually over several years after pumping commences. As the comment points out, it would be extremely difficult to measure the direct effects of the proposed wells on surface water bodies in isolation from natural variability and the effects of other pumping.

3. **Comment:** New pumping volume requests.

The third condition is that any increase in groundwater withdrawal will require a new high capacity well approval. This condition is missing criteria for assessing harm to nearby water bodies, which should be a prerequisite to any additional pumping being considered. The criteria for resource health in the new review are not specified in the condition. The condition also contains no requirement for notifying various interested parties of a request for an increased pumping limit. Please require notification to stakeholders within a 5 mile radius.

Response: See Response to PLMD General Comment #3 regarding potential future water withdrawal increases. Regarding the request to notify interested parties of such a request, the Water Use Section is developing a web page to display pending high capacity well applications, to be released in the next several months. Information about any application for increased pumpage from the Dairy would be available to the public on that web site.

D. <u>Responses to Friends of Central Sands (FOCS) Comments on SEA</u>
[DNR Note: FOCS comments are summarized below; the complete comments are attached to the Comment Response document.]

1. **Comment:** The SEA does not satisfy WEPA.

   a. Required Contents of an Environmental Assessment.

   <u>Response</u>: The Comment accurately states that the purpose of WEPA is to ensure that agencies consider environmental impacts during decision-making and to inform the public about a proposed action. The Comment accurately reproduces portions of s. NR 150.22, Wis. Adm. Code, relating to the content of an "environmental analysis" under that rule.

   The Comment cites to one case relating to the adequacy of an EA, *Town of Centerville v. DNR,* 142 Wis. 2d 240, 417 N.W.2d 901 (Ct. App. 1987). While the Court of Appeals found the EA to be inadequate in that case, the legal analysis in the case, when applied to the Original EA and Addendum and SEA in this case, supports the conclusion that they are adequate and comply with the requirements of WEPA (see Responses to PLMD General Comments).

   b. **Comment:** The SEA for the proposed wells is deficient.

   <u>Response</u>: For a general Response to the Comment, see Response to PLMD General Comment #1.

      i. **Comment:** The SEA relies on many generalized statements and does not state what constitutes a "significant" environmental impact for wetlands.

         Response: See Responses to PLMD General Comments #9 and 2, respectively.

      ii. **Comment:** Modeling was conducted for a 25-year period, rather than an indefinite term.

         Response: See Response to PLMD Specific Comment #1a and Response to Kraft Specific Comment #5.

      iii. **Comment:** The consumptive use coefficient of 20% used by SSPA is not explained or justified.

         Response: See Response to Kraft Specific Comment #3.

      iv. **Comment:** The SEA does not discuss the precedent-setting effect of the approval, the degree of controversy, the need for the approval and proposed preventive and mitigating measures.

         Response: These issues were discussed in the Original EA and Addendum and do not need to be discussed again in the SEA.

v. **Comment:** The alternatives analysis is inadequate.

Response: See Response to PLMD Specific Comment #8.

2. **Comment:** DNR must conduct a heightened review of the proposed wells or deny the high capacity well approval, pursuant to the *Lake Beulah* decision.

Response: DNR agrees that it has the authority and a general duty to consider the environmental impact of a proposed high capacity well on waters of the state when presented with "sufficient concrete, scientific evidence of potential harm to waters of the state" that may be caused by the well. The Original EA was triggered by the request for issuance of a WPDES Permit "for discharges from facilities which result in development of a new site," which is a Type II action under ch. NR 150, Wis. Adm. Code (see Type List in s. NR 150.03, Wis. Adm. Code).

While the request for a WPDES Permit triggered preparation of the environmental analysis under ch. NR 150, Wis. Adm. Code, DNR has also fulfilled its responsibility under the *Lake Beulah* decision by considering the environmental impact of the proposed high capacity wells in this case. DNR has done this by following the requirements of ch. NR 150, Wis. Adm. Code, for an environmental analysis of the potential impact of the wells, both in the Original EA and Addendum and the SEA.

For a response to the Comment that DNR has failed to adequately evaluate the cumulative effects of groundwater withdrawals, see Responses to PLMD General Comments #1, 4, 5 and 6. For a response to the more specific Comments regarding DNR's analysis of impacts from the proposed wells and regarding the draft conditions in the proposed high capacity well approval, see the Responses to Specific Comments from PLMD and Dr. George Kraft.

E. Responses to Ray White Comments on SEA

[DNR Note: Ray White's comments are summarized below; the complete comments are attached to the Comment Response document.]

1. **Comment:** The SEA did not sufficiently consider geomorphic and biological ramifications of the projected flow reductions to streams.

   Response: The modeled flow reductions due to the proposed Richfield Dairy wells and existing wells were shared with DNR fisheries biologists. The comments from Mr. Ray White, Mr. Ken Wade, PLMD, and Dr. George Kraft were provided to regional staff for Adams and Waushara/Marquette Counties for review and comment. Fisheries staff expressed concerns regarding the cumulative impacts of existing pumping on stream health for several streams in the modeled area. However, staff indicated that the withdrawals from the Richfield Dairy wells, without consideration of the existing wells, would not significantly alter the stream health (temperature, fish habitat, etc.) of nearby streams.

   The SEA does not conclude that there are no cumulative impacts on streams in the Central Sands region related to existing pumping. Both the SSPA model and modeling by Dr. George Kraft show baseflow reductions that could reasonably be expected to result in alterations to stream ecology. For example, the SSPA model of existing pumping impacts showed a baseflow reduction of 40.8% on Carter Creek (reported to be dry over several miles during summer of 2012), and flow reductions of around 18% on several other streams within the model domain (see SEA Table 1). The Department generally accepts that the issues raised by Mr. White and others regarding the negative impacts of existing withdrawals and prolonged dry periods are valid concerns.

2. **Comment:** The analysis of stream impacts should be based on conditions during drought, since these conditions limit the types of organisms that can survive in a particular stream.

   Response: Richfield Dairy may not pump more than 72.5 million gallons in any year, including drought years, so its maximum withdrawal will not increase during dry conditions. But because baseflow in streams is lower in drought years, the relative impact of the pumping would be increased compared to a typical year. Irrigation pumping also increases in dry years, so drought tends to intensify the cumulative impacts of pumping. Depending on the distance from the pumping well to the water body of concern, this increased pumping impact may be felt during or after the drought period.

   DNR acknowledges that organisms are restricted by minimum flows and associated conditions. Drought year streamflows for 2007 are available for Little Roche-a-Cri Creek and Chaffee Creek. In that year, Little Roche-a-Cri Creek at 10th Avenue experienced a 9% flow reduction compared to average measured baseflow. Chaffee Creek at County Highway CH experienced a 33-83% flow reduction from an average flow of 1.8 cfs to a minimum flow of 0.3 cfs. (The measured decreases reflect both natural and pumping-related reductions.) At this location (within a mile of Chaffee Creek's headwaters), the modeled baseflow reduction after 25 years of constant pumping at the Dairy's maximum approved rate is 22 gpm, or 0.049 cfs.

Impacts to Pleasant Lake were assessed in the SEA using the minimum recorded water level as a baseline.

3. **Comment:** Baseflow is very important to trout populations in streams. Decreased groundwater inflow causes a decrease in the trout population due to increased water temperatures.

   Response: Comment noted. See also Reply to White Comment #1

4-5. **Comment:** Any reduction in streamflow will reduce the length of the trout zone – the length of course that has suitable conditions to sustain a naturally-reproducing trout population. The SEA doesn't sufficiently deal with reductions in headwater areas, which are extremely important for trout habitat and spawning.

   Response: Groundwater withdrawal from the Dairy will slightly decrease groundwater flow to headwater areas of nearby streams and may cause a corresponding slight reduction in trout zone length. The modeled flow reductions in the headwater areas of trout streams range from 3-23 gpm (0.8%-3.5% of modeled streamflow), and changes in stream length are small enough that modeled stream lengths are unchanged from background conditions. Given the small amount of flow reduction, the Department's determination is that the degree of change that could be reasonably expected would not be significant to the health of the stream or fishery. Both SSPA modeling of a 72.5 MGY pumping rate and Dr. Kraft's modeled streamflow reductions at water withdrawals from the Dairy of 52.5 MGY and 131.2 MGY were considered in making this determination.

6. **Comment:** The sites that SSPA analyzed for streamflow reduction were too far downstream, and in some cases, not in the stream segments designated as trout water.

   Response: Streamflow changes were initially assessed in areas where flow measurements were available. In addition, DNR requested SSPA to provide flow reduction amounts for headwater areas of Chaffee Creek, Tagatz Creek, Fordham Creek, and the unnamed tributaries to Little Roche-a-Cri Creek. The reductions in these reaches (which are either within or upstream from reaches designated as trout water) were 0.8%-3.5% of modeled streamflow.

7. **Comment:** Michigan Assessment Tool. The EA's conclusions rely on the Michigan Water Withdrawal Assessment Process and are not specific to the biological and ecological characteristics of the streams at issue. The Michigan WWAP does not consider low flow or drought conditions. In Michigan, the WWAP is used additively to regulate cumulative impacts within water management areas. The Michigan WWAP does not take into account several factors such as fish size and headwater areas.

   Response: The Michigan fish models were developed for streams in a climatic setting similar to Wisconsin. They predict the general degree of impact that a decrease in groundwater recharge will have on fish assemblages (as a proxy for general stream health). The Department's statutory authority for high capacity well approval decisions differs from Michigan's, in that Michigan has statutory authority to consider cumulative impacts of withdrawals from other properties in its high capacity well permitting decisions. The

Michigan models are used as one tool in Wisconsin, along with DNR staff experience and expertise, to guide determinations of whether a certain amount of flow reduction is likely to be significant to a particular stream.

8. **Comment:** The EA does not adequately deal with thermal impacts. Changes in baseflow impact summer and winter temperatures and other habitat variables such as dissolved oxygen and flow velocity.

   Response: See Reply to White Comment #1

9. **Comment:** Parts of Fordham and Little Roche-a-Cri Creeks are sensitive, cold-transitional-type streams and are very vulnerable to changes in flow.

   Response: The modeled flow reductions due to the proposed 72.5 MGY maximum withdrawal amount are lower than those that would be expected to have observable impacts on a cold-transitional stream.

10. **Comment:** According to Kraft's modeling, the current baseflow in the streams at issue has already been reduced significantly by existing pumping. The cumulative impact is already truly immense. Added pumping will further decrease flows to these already-impacted streams.

    Response: The Department does not interpret its legal authority to allow conditioning or denying individual high capacity well approvals based on cumulative impacts of groundwater withdrawals from other nearby properties. See response to General Comment #7 for a discussion of cumulative impacts regarding the decision whether to approve the wells.

    See also Response to White Comment #1 for discussion of existing impacts.

F. **Response to Ken Wade's Comments on the SEA**
[DNR Note: Ken Wade's comments are summarized below; the complete comments are attached to the Comment Response document.]

Comments: Mr. Wade's comments can be summarized into several topics:

- Flow reductions in the headwaters of streams (Little Roche-a-Cri tributaries, Fordham, Chaffee, and Tagatz) are significant.
    - Kraft modeling of withdrawals of 52.5 MGY and 131.2 MGY showed baseflow reductions of more than 5% over several hundred meters in the extreme headwater reaches of nearby creeks, especially the unnamed tributaries to Little Roche a Cri Creek.
    - These reductions are on top of existing reductions due to irrigation pumping.
- The SSPA model underestimates the impact of existing irrigation pumping
    - 20% consumptive use is too low.
    - Inaccuracies and incompleteness in reported irrigation pumping cause the model to underestimate impact.
    - Pleasant Lake drawdown is underestimated relative to regression curves and Kraft groundwater model.
- Cumulative impacts need to be addressed.
- Seasonal and drought conditions need to be addressed.
    - Need a transient model that varies recharge seasonally and annually in order to simulate cumulative impacts and impacts from the Dairy.
        - Example: Chaffee Creek flows in 2007 (moderate drought)
- Need a larger, regional model so that modeled impacts can be compared to known impacts.
- Because of pre-existing cumulative impacts to wetlands, the small decrease due to the Dairy is significant.
- Because of pre-existing cumulative impacts to Pleasant Lake, the decrease due to the Dairy is significant. Pleasant Lake should have a public rights stage set.

Response: These comments include several excellent suggestions related to regional groundwater studies and management. However, undertaking a major, area-wide study and groundwater management scheme is beyond the scope of the environmental analysis for the Richfield Dairy proposal (for purposes of the original EA) and of the revised high capacity well application (for purposes of the SEA).

See the response to Dr. George Kraft's comments on the SEA for a discussion of the technical topics covered in these comments.

See the General Comment Responses and Responses to PLMD for responses to comments related to Cumulative Impacts.

G. <u>Michael Best & Friedrich – Response to Technical Comments on SEA</u>

[DNR Note: The complete Michael Best & Friedrich comments are attached to the Comment Response document.]

Comment: Page 2, second full paragraph: The most recent pumping data is the most relevant for purposes of comparison between the existing irrigation well and the proposed dairy wells. From 2007 through 2011, the average pump rate from the irrigation was 46.5 million gpy, which is 64% of the pump rate requested by Richfield Dairy. As such, the paragraph should read, "Based on pumpage reported for the years 2007-2011, 72.5 MGY is roughly 33% more than the amount of water that was previously pumped for irrigation purposes."

Response: The comment asserts that it would be more appropriate to compare past and future water withdrawals using only recent pumping records rather than all available pumping records. In either case, the proposed maximum withdrawal amount represents a substantial increase over past pumping.

Comment: Page 2, third full paragraph: The model grid spacing measurements should be in feet (ft.), not square feet (ft^2)

Response: The comment is correct; model grid spacing should be in feet.

Comment: Page 2, third full paragraph: The term "missing water" should be replaced with the term "consumptive use."

Response: Agreed. This is also discussed further in the response to Dr. George Kraft's comments.

Comment: Page 4, first full paragraph: Fordham Creek is 4.5 miles west-southwest, not southwest.

Response: Noted.

Comment: Page 4, third full paragraph: There is a reference to "Novitski & Devaul; House," but there is no corresponding "House" included in the reference list at the end of the document.

Response: The House reference was included in the SEA reference list.

Comment: Page 6, second paragraph under Cumulative Impacts heading: Irrigation pumping from area high capacity wells was calculated to have depressed the water level in Pleasant Lake by about <u>2.7</u> feet, not 0.7 feet. The original report contained a typographical error, which was corrected by email to WDNR on September 11, 2012.

Response: This comment was in error. The SSPA modeled drawdown at Pleasant Lake due to existing irrigation pumping is 0.7 feet. The figure that was corrected in the September 11, 2012 email was the modeled groundwater drawdown at the Dairy due to existing pumping, which should be 2.8 feet, not 2.8 inches (conversation with Anna Wildeman, Michael Best & Friedrich, attorney for Richfield Dairy, 1/24/2013).

Comment: Page 6, second paragraph under Cumulative Impacts heading: The sentence should be revised as follows: "Some streams within the model domain were calculated to have flow reduced by higher percentage <u>than calculated by the Kraft Model</u> (up to 41%) due to existing irrigation pumping."

Response: The SEA was not making a comparison to the Kraft and Mechenich model. The SEA intended to state that the SSPA-modeled existing impacts were higher at some streams more distant from the Dairy than at the streams closer to the Dairy.

Comment: Page 7, carryover paragraph: The SEA references information provided by Kenneth Wade, but there is no corresponding reference in the list at the end of the document.

Response: Wade reference: Wade, Kenneth. September 22, 2011, Letter to Terry Kafka, DNR.

H. Response to Hanaman/Garnett Comments on the SEA

[DNR Note: Complete comments from Hanaman/Garnett are attached to the Comment Response document. Below, the Department extracted the comments that seemed to require responses.]

Comment: DNR's SEA is incomplete. DNR did not consider hydrogeology reports showing large future drawdowns to Pleasant Lake. [DNR note: references to specific hydrogeology reports were not provided with the comment]

Response: In addition to the reports and other information reviewed for the initial Environmental Assessment, the SEA includes analyses of the results of the SSPA site-specific groundwater model and a more detailed review of the significance of modeled water table drawdown and flow reductions relative to specific characteristics of Pleasant Lake and nearby streams.

DNR used all information available to it to perform analysis of potential impacts of the proposed wells on waters of the state, including Pleasant Lake.

Comment: DNR needs to consider cumulative impacts as part of its permitting decisions in order to fulfill its public trust duties under the Wisconsin Supreme Court's *Lake Beulah* decision. Cumulative impacts are significant. Pleasant Lake in particular is sensitive to drawdown and has already experienced negative impacts from existing pumping.

Response: See General Comment Responses on "Cumulative Impacts" and Responses to PLMD General Comments

Comment: DNR's finding of "no significant adverse impact" is flawed because a 1.5-foot drawdown is significant to Pleasant Lake, and a large part of this drawdown will be caused by the Dairy. Negative impacts of lowered lake levels (environmental, recreational, economic) will be exacerbated by the Dairy.

Response: The 1.5-foot drawdown referenced here appears to be the average impact of existing irrigation withdrawals calculated by Dr. George Kraft. No analysis that the DNR is aware of has indicated that drawdown due to Richfield Dairy's pumping would be more than around two inches at Pleasant Lake, which DNR has determined not to be significant.

Comment: We request that DNR (1) deny the Dairy's permit application, or (2) mandate more natural resource-protecting re-siting farther to the west

Response: The final decision on approval of the high capacity wells will be based on DNR's assessment of the potential impacts of these proposed wells on waters of the state. DNR's final decision on whether to approve the wells is designed to avoid the potential for significant impacts, including requiring a pumping limit and groundwater monitoring. The Department is not aware of any evidence suggesting that a location farther to the west would result in lesser impacts to waters of the state than the current location. Furthermore, DNR cannot mandate the location of facilities.

Comment: The EA fails to address the change in high capacity well operation purpose from irrigation (which returns water to the ground) to cattle sustenance/maintenance (which returns virtually none).

Response: The SSPA model analyzed in the SEA accounts for the change in water use from irrigation to dairy farming by assuming 100% water loss for the proposed dairy pumping. The change in consumptive use is therefore reflected in the model results.

Comment: DNR's review fails to incorporate groundwater modeling analysis which shows at least 2 foot draw down to Pleasant Lake within eight years. The modeling referenced is the following…
"The aquifer is not of infinite areal extent. Over long periods of pumping the system will be significantly affected by boundary conditions not represented in the model which will cause the simulation to be unrealistic. The simulations cannot produce a realistic steady state solution because the cone of depression continues to expand infinitely. Since the proposed pumping wells are expected to be in use for many years the impact of longer pumping can be evaluated with the same models using the same aquifer data. Increasing the pumping period from 300 days to 3000 days (8.2 years) produces a Jacob drawdown result showing drawdown increasing to approximately ... 2.0 feet at 10,000 feet (or approximately 2 miles)." -- from Hydrogeologist Ken Wade's report

Response: This comment refers to analysis in Mr. Ken Wade's Sept. 22, 2011 letter to DNR. <u>Mr. Wade's analysis was not meant to predict actual impacts from the Dairy's proposed pumping</u>. The stated purpose for the analysis was to demonstrate that the results of simple analytical models (Jacob, Theis) were not realistic because they allowed drawdown to increase infinitely. Among other things, the model assumes that all water pumped comes from storage in the aquifer, with no input from precipitation. Models that more realistically simulate real-world conditions (the Kraft and SSPA models),on which DNR relied for the SEA, show an ultimate drawdown of around two inches at Pleasant Lake due to the proposed wells.

Comment: Additional requirements necessary to achieve and maintain water quantity protection standards for Pleasant Lake should be analyzed, and set as conditions to any permits.

Response: Comment noted. Water quantity and quality standards could potentially be a part of a future groundwater management strategy for the entire region. However, because of the proposed wells' small projected impact to Pleasant Lake relative to existing pumping and other factors, it is not practicable (and would almost certainly not be possible) to detect direct impacts from the Richfield Dairy wells on the lake.

Comment: DNR's analysis relied on outdated groundwater maps which are no longer accurate given the addition of 800+ high capacity wells in Waushara County along with other factors.

Response: A water table map of the area was produced as part of the calibrated SSPA groundwater flow model. Also note that water table drawdown and stream depletion due to a pumping well are not dependent on the direction of groundwater flow (Barlow and Leake, 2012, pp. 40-41).

Comment: An EIS must be completed to assure that the DNR's cumulative impacts review is consistent with WEPA requirements, including consideration of the "(cumulative) impacts of repeated actions of this same type" because they "can [easily] be anticipated". NR 150.22(2)a(2). An EIS is also required under WEPA standards of "significant impact(s) or unique circumstances (i.e. the porous soils in the Central Sands).

Response: See Responses to PLMD General Comments

I. Response to Thomas Kune Comments on the SEA

[DNR Note: Thomas Kune's comments are summarized below; the complete comments are attached to the Comment Response document.]

Comment: The SEA lacks technical and professional basis. The discussion of impacts to Pleasant Lake is based on generalized information rather than specific data and analysis. The statement that the "expected change in groundwater input is small enough that no measurable changes to lake chemistry or clarity are expected". This statement represents significant speculation without technical basis.

Response: Terms such as "not expected" and "unlikely" are meant to convey the inherent uncertainty involved in analyzing future impacts in any real-world system. However, the Department's "no significant impact" determinations were based on modeling, past work in the area, and professional judgment. Circumstances that are "generally" or "typically" true were used to test whether the modeling results for these specific water bodies were reasonable. (See also Response to PLMD General Comment #9—use of vague terminology)

Comment: Potential impacts to Pleasant Lake. I am familiar with the water quality and lake levels in Pleasant Lake. Reduction of lake levels due to additional high capacity well pumping will expose more shoreline and silt sediments in shallow bays to disturbance which in turn will bring about changes in vegetation and water chemistry (e.g. nitrogen and phosphorous, both contributors to eutrophication of surface water bodies).

Response: See Responses to PLMD Specific Comments 2 and 5

Comment: Cumulative Impacts: The SEA is contradictory from section to section. In the discussion about Cumulative Impacts, the case is presented rationally regarding the significant impact that will result from cumulative effects of the growing number of high capacity wells nearby within five miles of the proposed Dairy. Then, later in that section DNR states that "when DNR determines whether or not to approve an application for a high capacity well, DNR is limited to considering whether the proposed well or wells on the high capacity property may cause significant adverse environmental impacts". This is not protecting Waters of the State.

DNR discusses the cumulative impact on waters of the state beyond the Dairy property (and certainly can be classified as significant); then DNR claims it can't consider cumulative impact beyond the Dairy property. DNR finishes by listing DNR decision alternatives, including "deny the application for high capacity well(s) based on probable significant adverse environmental impacts to waters of the state that cannot be avoided by placing conditions on the construction or use of the well(s)". DNR goes on to select an alternative that only requires water level monitoring, even though the models used by various experts predicts impact that can be considered significant to the waters of the state.

Response: The comment alleges that different parts of the SEA reach different conclusions regarding cumulative impacts. The SEA discusses two separate aspects of DNR's consideration of cumulative impacts: consideration of the extent of cumulative

effects for the purposes of the EA; and whether cumulative effects can be taken into account when making the high capacity well approval decision. The Department took a hard look at the cumulative effects of existing groundwater withdrawals for the purposes of the Environmental Assessment in order to inform its decision making. However, as explained in Response to General Comment #7, DNR does not interpret its authority to allow conditioning or denying individual high capacity well approvals based on cumulative impacts from existing groundwater withdrawals. The environmental impacts caused by the proposed wells themselves are not expected to be significant.

Comment: DNR needs to consider impacts that extend beyond property lines.
Hydrogeology recognizes cross-property, regional interactions regarding both flow and quality. Consideration of only the on-property impacts of a high cap well defies science and will not serve to protect the waters of the state.

DNR can regulation of impact on groundwater beyond property lines. At solid waste landfills, for example DNR is not limited to the evaluation or protection of groundwater only beneath the landfill property boundaries.

Response: In its decision-making on the requested well approval and for purposes of the SEA, DNR conducted its review with the understanding that impacts from groundwater pumping extend beyond property boundaries. The SEA examined potential impacts to waters of the state located several miles away from the Dairy property. No significant adverse environmental impacts were identified resulting from the proposed wells.

J. Response to Sierra Club Comments on the SEA

[DNR Note: Complete Sierra Club comments are attached to the Comment Response document. The majority of the topics raised in the Sierra Club comments are discussed in the Responses to PLMD and to Dr. George Kraft.]

Comment: The Sierra Club included a comment regarding pumping limits not covered elsewhere in the comment response document. The comment states that "during droughts, the DNR routinely allows high capacity well users to increase capacity in order to prevent losses to crops or livestock, and this could result in water drawdowns that exceed predicted levels."

Response: Allowing high capacity well users to exceed approved withdrawal amounts is not something that DNR does "routinely", but is a rare occurrence. It is very unlikely that the Dairy would need to request such an increase in pumping, since the proposed monthly pumping limit in the revised draft approval is well above typical water needs, even for a hot, dry summer month. The Dairy's annual pumping limit is closer to their actual water needs, so unusually high water use during summer months may need to be offset by lower use during the rest of the year.

References

Barlow, P.M., and Leake, S.A., 2012, Streamflow depletion by wells – Understanding and managing the effects of groundwater pumping on streamflow: U.S. Geological Survey Circular 1376, 84 p.

Hamilton, D.A. and P.W. Seelbach, 2011. Michigan's Water Withdrawal Assessment Process and Internet Screening Tool. Michigan Department of Natural Resources. Fisheries Special Report 55, Lansing.

IPS Environmental and Analytical Services, 1996, Phase I Pleasant Lake Management Plan, Waushara County, Wisconsin: Report to Pleasant Lake Improvement Corporation.

Kraft, G.J. and D.J. Mechenich, 2010, Groundwater Pumping Effects on Groundwater Levels, Lake Levels, and Streamflows in the Wisconsin Central Sands. Report to the Wisconsin Department of Natural Resources in Completion of Project NMI00000247. Center for Watershed Science and Education, University of Wisconsin – Stevens Point / Extension.

S.S. Papadopulos & Associates, Inc., 2012, Evaluation of Groundwater Pumping for Richfield Dairy, LLC, Town of Richfield, Adams County, Wisconsin, July 27.

S.S. Papadopulos & Associates, Inc., 2013a, Response to DNR Request for Additional Information, February 12, 2013.

S.S. Papadopulos & Associates, Inc., 2013b, Response to DNR Request for Additional Information on Irrigation Water Use, February 25, 2013.

Richfield Dairy Supplemental Environmental Assessment
Appendix of Comments

Section 1:

Comments of Dana Lynn Hanaman, Esquire.
Comments of Kestrel Management Services, LLC by Thomas P. Kunes, P.E.
Comments of Pleasant Lake Management District by Jean MacCubbin, President
Comments of Ms. Francie Rowe
Comments of Sierra Club—John Muir Chapter by Shahla M. Werner
Comments of Kenneth S. Wade, P.E., P.G..
Comments of Ray J. White, Ph. D..
Comments of McGillivray Westerberg & Bender LLC by Christa Westerberg, Esquire
Comments of George J. Kraft, Ph.D., P.H.
Comments of Michael Best & Friedrich LLP by David A. Crass, Esquire

Section 2:

Additional Comments

Section 3:

Additional Comments

From: DLH [mailto:manyrivers@gmail.com]
Sent: Sunday, January 06, 2013 10:12 PM
To: Greve, Rachel M - DNR
Cc: Kafka, Terence - DNR; DNR SECRETARY; Ebersberger, Eric K - DNR; Sen.Lassa - LEGIS; Rep.Krug@legis.wi.gov
Subject: Fwd: Property owner-residents' oppositional comments to supp. EA (dated 11/ re Richfield CAFO, HCapWell permit application (in Adam's County), associated with its proposed PDES permit #0064815-01-0

Wisconsin Department of Natural Resources
Rachel Greve, DG/5;
Bureau of Drinking Water and Groundwater
Private Water Supply Section
101 S. Webster St., Box 7921
Madison WI 53707-7921

Dear Ms. Greve
and our state representatives:

Having already delivered oral and written comments against this super-polluting and groundwater-sucking, proposed Richfield factory farm dairy CAFO (hereinafter "the CAFO") last July 2011, and also filing a Contested Case Petition against its illegal permitting last December 2011, I am hereby writing, yet again, to you to express our *extreme dissatisfaction* with the DNR's faulty, biased, non-thorough and/or incomplete environmental review process in this supposed supplemental environmental assessment, still to date, continuing after the CAFO's sudden new application, and its pending improper permitting of this detrimental CAFO. This new supplemental EA adds very little additional evidence of review and analysis than the original EA released 5/31/11, which is now moot, due to a Superior Court Judge Markson's over-rule of the original EA found lacking.

We, as long-time Pleasant Lake residents and property owners, share grave concerns (along with MANY other neighbors) over the now, very clearly, scientifically and concretely-documented significant harm and threats to the precious and pristine seepage Pleasant Lake upon which we live and recreate. We have continued to express these concerns and backed them up with scientific proof, but the DNR continues to outright REFUSE to analyze or acknowledge this CAFO's significant negative impact on Pleasant Lake, despite the July 2011 WI Supreme Court ruling in Buelah mandating DNR's **duty** to consider significant, negative impacts to surface waters by groundwater withdrawals, and despite the DNR itself acknowledging the CAFO's high cap wells' pumping as yet ANOTHER of many negative cumulative causation pumping impacts of over 400 mgy directly within 5 miles of Pleasant Lake. Pleasant Lake has an extremely public groundwater aquifer-dependent water quantity level, which has now been shown, via multiple scientific hydrogeology reports (already sited and submitted to the DNR**, see below), to suffer, in particular, a very large future drawn down by this CAFO's proposed very proximate siting in Richfield, less than 2.5 miles away.

You, the DNR, readily admit in this Supp. EA that: "Modeling by Kraft and Mechenich (2010) shows an average water table drawdown of 1.5 feet at Pleasant Lake;...in last 10 years, ...within 5 miles of the proposed Richfield Dairy,...(alone, you have already freely permitted) SIX...agricultural irrigation wells with pump capacities of 400-1200 gpm; ... **it is expected that similar increases in groundwater withdrawal could continue in the future, (and finally, that) the**

addition of the Richfield Dairy wells, or any additional water withdrawal in the area, will increase existing stresses on the availability of groundwater to supply surface water bodies. However, when DNR determines whether or not to approve an application for a high capacity well, *DNR is limited* to considering whether the proposed well or wells on the high capacity property may cause significant adverse environmental impacts." (p. 6-7 of Supp. EA)

We would like to know where this invoked "limitation" came from, and/or how the DNR, particularly post-Buelah, via DOJ, has come to assert such BOGUS, politically-motivated "limitation?" **For the DNR to outright refuse to consider and review "cumulative impacts" in reviewing high cap well permits, utterly eviscerates ANY ability and DUTY of the DNR to actually do its legal, statutory job, and serve and act as steward of the public trust.** In that the majority of ground and surface waters are connected and do not operate in a vacuum of environmental individualism, such unsubstantiated declaration by the DNR that it may "not" consider this CAFO's application in conjunction with actual reality, and the reality of interconnected nearby negative impacts, is absolutely absurd, irrational, and/or a clear and patent abuse of discretion, given the DNR's very clear duty of environmental protection of public trust natural resources. This is especially the case and reality here, of this CAFO's super-groundwater-pumping's significant negative environmental impact on Pleasant Lake that at present only averages, by DNR's own admission, 15 feet in depth. Pleasant Lake is hardly a renewable public water resource, yet the DNR has specifically chosen, via its questionable, disingenuous, self-imposed "limited" internal environmental review policies, to do nothing to protect it, thereby flouting its WI constitutional duties. The DNR's liability is clear, in that it has utterly abused its discretion in pronouncing now, via this deficient supplemental EA, that the CAFO's high cap wells, while still seeking to be permitted at 72.5 mgy, will have no significant negative environmental impact on Pleasant Lake. In that regard, this supp. EA is, yet again, deficient and demonstrates that the DNR continues to choose to disregard public surface waters it is held to protect, failing to act legally, under governing common and statutory law, to properly assess, review and permit high cap wells.

We urge the DNR to do its job fully and *properly*, re-consider its deficient review, and thoroughly consider its cumulative/associated potentially harmful impacts to protect public waters of the state as is the DNR's duty, according to the recent Lake Buelah Supreme Court precedent, such that it does not abuse its discretion. We join in all comments to date and hereinafter submitted by the PLMD and/or Frances Rowe in relation to any of the Richfield CAFO's applications, in addition to these comments. Further, We also hereby formally bring our concerns to the greater attention of our state legislative representatives, including those in whose districts this CAFO is soliciting to operate (specifically, in the Richfield Township of Adams County), and request that they immediately also take action in terms of ensuring the safeguard of nearby private residential wells and highly threatened, extremely valuable nearby public waters like Pleasant Lake, which generate much tourism economic dollars and recreation opportunities (swimming, boating, fishing, hunting) in their districts which are irreplaceable. **It is all of your responsibilities to ensure that local public**

waters, particularly those most immediately threatened by the proposed CAFO site, like Pleasant Lake, are not harmed.

If you allow Pleasant Lake to be severely drawn down by the illegal permitting of yet another 6K+ cow Milk Source CAFO, much like the other horrible one already operating just 10 miles to the South which **has already destroyed the adjacent public surface water of Patrick Lake and local Grand Marsh area,** there is no getting Pleasant Lake back. It will be impossible to reverse or turn back the devastation of this CAFO if it is allowed to be improperly sited in Richfield to our detriment. Please address these concerns and respond in writing. We continue NOT to be dissuaded and intend to do *whatever* is legally necessary to defeat this, yet another, irresponsible, uncaring, mega-corporation, attempting to illegally take over and destroy our precious natural resources and waters without even any financial liability, and only ridiculously being required to pay $125/year for such extreme water use. We will continue to fight to protect Pleasant Lake, but also the whole surrounding WI Central Sands area from the expanding, irresponsible, deregulated, DNR-rubber stamped, "Open for Business" development which most certainly doesn't benefit WI residential property owners and individuals, but rather only benefits the big corporate farms in question. We will NOT allow these mega-agriculture operations to continue to rape and pillage our precious natural resources like Pleasant Lake for FREE, and even more atrociously, via our public subsidy that they have most definitely stolen from us.

As long-standing resident, tax-paying, law-abiding, property-owning Wisconsin citizens within 2.5 miles of this proposed factory farm CAFO, we are thoroughly disturbed by its ominousness. Our families have long recreated and lived on Pleasant Lake and want, intend and have the RIGHT to do so for many generations to come. We have matured together here, seen our children grow up together swimming, skiing, diving, sailing, fishing and even working (right on the Lake) here, and continue to drink and depend on our clean private well waters to sustain ourselves. I myself worked right on the Lake at the former, historic Sunset Point Resort, in my very first job.

Very unfortunately, we have *already* witnessed and directly experienced the horrible effects of a severely lowered Pleasant Lake level, not being able to swim off or ski from around our piers because the water is already too shallow now. When I was young, being under five feet, I could not stand whatsoever at the end of our pier; now, I am lucky if the water comes up to my knee, DESPITE having extended our pier *much* farther out into the Lake many years ago due to the ever lower Lake. Each year we have to keep extending our pier further so that our pontoon boat is not resting on the sand, and we have some water to wade in, at least.

Therefore, this supp. EA is deficient and the DNR must do something MORE to prevent the loss of this precious public water altogether (due to continued, unregulated high cap well permitting and operation which has and continues to lower and dry up lakes and streams), including specifically, reversing its unsubstantiated finding of "no significant adverse impact", performance of an EIS, and the denial of this high cap well permit for this devastating CAFO less than 2.5 miles away. Given the acknowledged average depth of only 15 feet of Pleasant Lake, it is abundantly clear that an average draw down of 1.5 feet, to be caused in heavy part by this CAFO's high cap well permitting, will completely decimate it.

There is no question about the continued lower Pleasant Lake levels to come, that will occur, in grand part, as a result of any permitting of this CAFO, as documented. This means: silt on the beaches from boats stirring up the bottom due to shallow water, disruption of the fishery due to boats running over the sand point in shallow water where bluegills nest, NO Lake whatsoever to look at from our house as we have for years as long as I can remember/every year of my life, no friends visiting/staying as they have at the Lake for years, and sunsets that are no longer over any water. Lowered or absent lake levels mean no continued swimming as I have my entire life across the Lake, no paddleboating, no pontooning with friends, and no further Lake recreating in general, because no motorized crafts nor us as humans, will be able to proceed through low water or water that is not there. This Richfield CAFO EQUALS lowered Pleasant Lake levels, if not the all out drying up of Pleasant Lake, which in turns means total loss of recreation, enjoyment here, not to mention the plummeting of our private property values, which the DNR and Milk Source would be jointly responsible for, and whom we would hold liable. Protection of this immediate public water is the duty of the DNR, and therefore, it can NOT legally permit the high cap well's this CAFO seeks in Richfield. By allowing the CAFO wells to proceed, and this supp. EA to stand as is, the DNR will directly allow the further devastation of Pleasant Lake's water quantity, not to mention quality, and the all-out ruining of the whole pristine area's clean, rural green space, recreational opportunities in the surrounding 3 mile radius, due to the awful 6000+ cows' manure stench (with nothing preventing 3000+ more cows in future years), heavy load traffic noise and pollution, and overall development that WILL necessarily occur.

I, and my immediate family and neighbors, feel very alienated/ignored, disrespected/disregarded and disturbed/disappointed by the DNR EA's clearly erroneous and unsubstantiated claims of "no harm" and "no impact" to the public waters very close by the proposed CAFO livestock factory (particularly Pleasant Lake, where we live and work). We are also quite abhorred at the incomplete review by the DNR of Milk Source's application, and expect the DNR to (1) DENY its permit application, or in the very least (2) mandate alternate, more natural resource-protecting and responsible re-siting of this CAFO deeper West into Adams County, and/or (3) now complete the EIS which should have begun a long time ago as required (under WEPA/DNR standards of "signifcant impact(s) and/or unique, never before considered conditions/circumstances (i.e. the Central sandy, pourous soil topography of the area).

At present, the DNR's EA is severely lacking in the area of the immediate surrounding waters' quantity and quality protection, evidencing glaring omissions in its summary conclusions, as already documented.** The EA fails to address the change in HCW operation purpose from irrigation which returns water to the ground, to cattle sustenance/maintenance which returns virtually none. It also all out fails to do or incorporate proper, accurate and current groundwater modelling analysis which shows at least 2 foot draw down to Pleasant Lake within EIGHT years!** Any and all other additional requirements necessary to achieve and MAINTAIN water quantity protection standards for Pleasant Lake, in particular, under the public trust doctrine, should be analyzed, and in the very least, set as conditions to any permits. The groundwater maps

being relied upon in the DNR's analysis are now over 30 years old and a DNR representative him/herself has acknowledged that these maps/modelling can no longer be accurate given the addition of 800+ high capacity wells in Waushara County alone since then, and because of ever-changing groundwater flows and other geological boundaries and drawdowns in the vicinity surrounding the proposed CAFO.

An EIS must be completed/documented to assure that the DNR's environmental cumulative impacts review is reflective and consistent with WEPA as required, including consideration of the "(cumulative) impacts of repeated actions of this same type" because they "can (EASILY) be anticipated" in Adams County with effects extending necessarily to the immediate adjacent Waushara County, particularly 2.5 miles SouthEast into Waushara where Pleasant Lake is located, as the presently proposed CAFO site is located precisely on this county line. NR 150.22(2)a(2). The DNR is required to base its analyses on up-to-date information and accurate, long term modelling, and especially because these have now been provided by respected scientists, they must do so, or their any permitting of this CAFO *will be illegal* and met with further intense and unflattering litigation.

The DNR is Wisconsin's environmental resource steward and is obligated to protect public waters (especially from big business' pollution and lack of accountability for their destruction). If the DNR refuses to be the steward of natural resources, as is its mission, WHO will be? and WHAT, pray tell, has this State and its supposed "democratic government" come to?? The 50 jobs claimed to be created by this CAFO, with at least half of them assuredly being pitiful, minimum wage labor positions most likely going to non-citizens and not even local residents, is not worth much, and NO WHERE NEAR JUSTIFICATION TO DEVASTATE SURROUNDING PUBLIC WATERS, ESPECIALLY NOT PLEASANT LAKE. Where is the environmental pre-tax on these corporations that only want to take, and take, and take?? They instead get tax-BREAKS and a free pass because they certainly can't re-fill a Lake now will or can they?

We appreciate your *thorough* review and incorporation of these oppositional comments in a timely fashion and your continued improved review process. Ultimately, we request that you DENY this CAFO's permits altogether, or in the very least deny permitting now *at this site (and mandate a different one)* due to the extreme potential well-documented harms to the immediate public waters of Wisconsin, and complete an EIS before any other permitting can proceed. **We will hold the WI DNR accountable and encourage you, who are supposed to be representing us, to do your jobs and do so as well.** Thank you very much.

Sincerely,

Dana Lynn Hanaman, Esq.
on behalf of our Hanaman Family (as 20+ year property owners),
and our neighbors, the Jongerius and Sundeen families

W13388 Czech Dr.

Pleasant Lake
Coloma, WI 54930

*** "The aquifer is not of infinite areal extent. Over long periods of pumping the system will be significantly affected by boundary conditions not represented in the model which will cause the simulation to be unrealistic. The simulations cannot produce a realistic steady state solution because the cone of depression continues to expand infinitely. Since the proposed pumping wells are expected to be in use for many years the impact of longer pumping can be evaluated with the same models using the same aquifer data. Increasing the pumping period from 300 days to 3000 days (8.2 years) produces a Jacob drawdown result showing drawdown increasing to approximately ... **2.0 feet at 10,000 feet** *(or approximately 2 miles)."*
---from Hydrogeologist Ken Wade's report; see also George Kraft's scientific report, as already submitted to the DNR in opposition to this CAFO
(So this can be extrapolated to Pleasant Lake experiencing at least an approximate 2 foot loss, located about 2.4 miles away, within eight years, and not figuring for real boundary conditions and more geological water drawdown contributing factors!)

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January 6, 2013

Ms Rachel Greve, DG/5
Wisconsin Department of Natural Resources
101 S. Webster Street
P.O. Box 7921
Madison, WI 53707-7921

Regarding: Comments on DNR's Supplemental EA for Richfield Dairy's Proposal for High-Capacity Wells

Dear Ms Greve,

I am writing this letter to express my concerns about WDNR's work on the Supplemental EA for Richfield Dairy's proposal for high capacity wells, related to their anticipated impact on groundwater receptors such as the many trout streams, wetlands, springs and lakes, namely Pleasant Lake and Lake Burnita.

The Supplemental EA lacks technical and professional basis. For example, regarding impact on Pleasant Lake, the discussion by DNR reviewers appears to be based on generalized information rather than specific data and analysis. The statement that the "expected change in groundwater input is small enough that no measurable changes to lake chemistry or clarity are expected". This statement represents significant speculation without technical basis. I am familiar with the water quality and lake levels in Pleasant Lake. Reduction of lake levels due to additional high capacity well pumping will expose more shoreline and silt sediments in shallow bays to disturbance which in turn will bring about changes in vegetation and water chemistry (e.g. nitrogen and phosphorous, both contributors to eutrophication of surface water bodies).

Additionally, the Supplemental EA is contradictory from section to section. In the discussion about Cumulative Impacts, the case is presented rationally regarding the significant impact that will result from cumulative effects of the growing number of high capacity wells nearby within five miles of the proposed Dairy. DNR states that "the addition of the Richfield Dairy wells, or any additional water withdrawal in the area, will increase existing stresses on the availability of groundwater to supply surface water bodies". Then, later in that section DNR states that "when DNR determines whether or not to approve an application for a high capacity well, DNR is limited to considering whether the proposed well or wells <u>on the high capacity property</u> may cause significant adverse environmental impacts". Is this what the Legislature and state citizens should expect from WDNR regarding the Protection of Waters of the State?

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The science of hydrogeology (groundwater capacity, flow and quality) irrefutably recognizes cross-property, regional interactions regarding both flow and quality. Consideration of only the on-property impacts of a high cap well defies science and will not serve to protect the waters of the state.

Important precedent was long ago established regarding regulation of impact on groundwater beyond property lines. In DNR's regulation of solid waste landfills, for example, maximum contaminant levels of chemical constituents of concern in the groundwater are set at property lines and beyond to prevent significant impact on the adjacent and surrounding properties. The primary way these contaminants can travel from the groundwater of the landfill property to the groundwater under adjacent or surrounding properties is via groundwater flow. For landfills, DNR is not limited to the evaluation or protection of groundwater only beneath the landfill property boundaries.

As further evidence of DNR's contradictory analysis, the cumulative impact on waters of the state beyond the Dairy property is discussed (and certainly can be classified as significant); then DNR claims it can't consider cumulative impact beyond the Dairy property; then DNR finishes the discussion by listing DNR decision alternatives, including "deny the application for high capacity well(s) based on probable significant adverse environmental impacts to waters of the state that cannot be avoided by placing conditions on the construction or use of the well(s)". DNR goes on to select an alternative that only requires water level monitoring, even though the models used by various experts predicts impact that can be considered significant to the waters of the state.

In my opinion, the conclusions reached by the DNR in the Supplemental EA are neither technically sound nor based on good professional practice. Protection of the Waters of the State requires better work by our state's primary environmental protection agency.

The basis for my comments includes 35 years of environmental engineering consulting, preceded by nearly 7 years in the WDNR's Solid Waste Management program. I have BS and MS degrees from the UW-Madison Department of Civil and Environmental Engineering where I now serve that Department as a member of the Adjunct Faculty. in the early 1980s, I served on the Wisconsin Legislative Council Special Committee on Groundwater Quality which developed the framework and technical basis for pioneering legislation that was passed to protect groundwater quality in the state.

I hope that my comments are helpful as you reconsider the Richfield Dairy wells.

Sincerely,

Thomas P. Kunes, PE, Principal

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JAN 07 2013
DRINKING WATER & GW

Pleasant Lake Management District
P.O. Box 230, Coloma, Wisconsin 54930

January 4, 2013

Via E-Mail and U.S. Mail

Ms. Rachel Greve, DG/5
Wisconsin Department of Natural Resources
101 S. Webster St.
P.O. Box 7921
Madison, WI 53707-7921

RE: Comments on Supplemental Environmental Assessment
Richfield Dairy

Dear Ms. Greve:

Please accept this letter and referenced and enclosed materials as the comments of the Pleasant Lake Management District ("PLMD") regarding the "Richfield Dairy High Capacity Well Supplemental Environmental Assessment – 72.5 MGY," undated but issued on or about November 27, 2012 (hereinafter "Supplemental EA"). PLMD believes that the Supplemental EA is inadequate, inaccurate, internally inconsistent, and does not satisfy the Department of Natural Resources' ("DNR") obligations under the Wisconsin Environmental Policy Act ("WEPA"), Wis. Stat. § 1.11(2)(c) and associated regulations in Wis. Admin. Code ch. NR 150. Additionally, the Supplemental EA fails to provide the minimally required information that must be collected and evaluated by DNR and disclosed to inform the public; and that document therefore must be revised and reissued for public comment.

In addition to and support of PLMD's comments, we are enclosing several documents:

1. A letter from Dr. George Kraft, a professor at the University of Wisconsin-Stevens Point and authority on ground and surface water hydrology and modeling in the Central Sands area of Wisconsin, dated October 9, 2012. Those comments focus on the modeling performed by S.S. Papadopulos & Associates ("SSPA") on behalf of Richfield Dairy.

2. A letter from Dr. Kraft on DNR's prior determination that withdrawal of 131.2 million gallons per year ("mgy") would not cause significant impacts, dated November 28, 2011.

3. A report from Dr. Kraft and others entitled "Information Support for Groundwater Management in the Wisconsin Central Sands, 2009-2011," dated October 1, 2012.

4. A letter from Dr. Kraft including his comments on the Supplemental EA, dated January 2, 2013.

5. The deposition transcript of Tim Asplund, dated June 4, 2012.

6. The deposition transcript of Rachel Greve, dated June 4, 2012.

7. Barlow, P. M. and Leake, S. A. 2012, *Streamflow Depletion by Wells – Understanding and Managing the Effects of Groundwater Pumping on Streamflow*, USGS Circular 1376.

Background to Comments

The Supplemental EA has been prepared because of deficiencies identified by the Circuit Court for Dane County in July 2012. The court held that DNR had not adequately evaluated the impacts associated with the proposed high capacity wells at the pumping rate approved by DNR, and remanded the matter for further evaluation. Specifically, the court criticized DNR for approving the wells with a pumping rate of 131.2 mgy, based on an evaluation of impacts at 52.5 mgy.

Subsequent to the court's decision, Richfield Dairy submitted an amended application, requesting that the wells be approved with an initial pumping rate of 72.5 mgy. Richfield Dairy also submitted a report from SSPA, which included, *inter alia*, revised groundwater modeling of the expected impacts of the wells on Pleasant Lake and certain other resources at the proposed pumping rate.

The Supplemental EA is an 8+ page document generally describing the history of the permit and WEPA process; the SSPA report; environmental impacts expected by DNR; a very brief discussion of alternatives (deny, approve, approve with conditions); and proposed conditions of approval.

General Comments

1. The Supplemental EA does not satisfy the minimum requirements of WEPA, and does not even suggest that DNR conducted any independent evaluation of impacts. Under Wis. Admin. Code § NR 150.22(2), DNR is required to evaluate and disclose, *inter alia*, short-term, long-term, secondary, and cumulative effects, precedential effects on future actions, the degree of controversy, and alternatives. These information disclosures are required to inform the public of the expected impacts, and to allow the public to critique DNR's analysis. This document, however, is extremely cursory and provides almost no substantive information. For example:

    a. The discussion of wetlands consists of two sentences. It does not specifically identify any wetlands, the basis for its conclusion that the expected drawdown would be less than one inch, or how or why DNR concluded that a one-inch drawdown for those affected resources would not be significant. There is no discussion of an Index of Biological Integrity being completed for the Turtle Bay wetland.

    b. Discussions of springs and streams are somewhat longer. However, the discussions are limited to noting the modeled expected reductions in flow, and offer no information about the resulting impacts on those water bodies or why DNR believes that they would not be significant. No mention is made of the pirate perch, a Wisconsin Species of Special Concern, known to be living in the Little Roche-A-Cri, a stream the DNR

acknowledges will experience stream flow reduction of 43 gallons per minute as result of the aquifer drawdown created by the Richfield high capacity wells.

c. The discussion of Pleasant Lake similarly focuses on the applicant's modeled drawdown and provides literally no data regarding the ecology of the lake or the effects of modeled drawdown on the lake.

2. The Supplemental EA repeatedly asserts that no significant environment impacts will result from the permitting of the Richfield Dairy high capacity wells, but fails to define "significant environmental impact" in this context. It also does not identify the criteria that were used to draw this conclusion. There is no description of what a significant environmental impact would be for any affected lake, river, wetland, or stream in the region. This is particularly relevant because Mr. Asplund previously testified in his deposition (attached), as a water resources manager, that he does not know what would make an impact significant, and that there were numerous factors that he would consider as part of an impact analysis. Additionally, as Dr. Kraft observed in his comments on the Supplemental EA (attached), DNR apparently has not considered whether the added impact of the next two inches of drawdown has a significant impact on an already stressed resource.

3. The Supplemental EA only addresses Richfield Dairy's requested initial pumping rate. Neither SSPA nor DNR has assessed the impact of increased pumping rates from these wells in the future. DNR should expect that there will be increased pumping from these wells based on history. Richfield Dairy previously worked with DNR, privately and without public disclosure, to arrive at an approved pumping rate of 131.2 mgy, an amount not disclosed for public comment. Based on Dr. Kraft's calculations, this would have resulted in a 5.6-inch drawdown of Pleasant Lake and seriously depleted flow in nearby ERW and ORW streams. Extrapolating from SPPA's more recent modeling, the drawdown would be over 3 inches; yet the impacts of this pumping rate still have not been evaluated. At the proposed well pumping capacity of 525 mgy, the drawdown at Pleasant Lake would be over one foot. It is apparent that Richfield Dairy has asked for 72.5 mgy based on its modeling of a drawdown previously considered acceptable by DNR, knowing that it can request increases in the pumping rates in the future without any public notice or scrutiny. In her deposition (attached), Ms. Greve deposition notes that the amount of pumping will impact surface water resources, yet the Supplemental EA does not discuss this impact.

4. The discussion of cumulative impacts does not include any independent evaluation. It merely identifies other wells in the vicinity of Richfield Dairy, reiterates information in the Kraft and Mechenich 2010 report and the SSPA report, and then acknowledges that the Richfield Dairy wells will increase existing stresses by decreasing flow (streams) and water levels (lakes) and increasing water temperature. The Supplemental EA states that DNR evaluated these cumulative effects, but that evaluation is not disclosed in the document.

5. The cumulative impacts section does not disclose whether DNR expects the cumulative impacts to be significant. While acknowledging that cumulative impacts will occur, DNR does not evaluate them. Rather, DNR asserts that it is limited to reviewing only the impacts of the proposed wells and, on that basis, expects that the impacts will not be significant.

6. The cumulative impacts discussion also fails to disclose whether DNR evaluated reasonable foreseeable future actions that may compound the impacts, as required by Wis. Admin. Code § NR 150.22(2)(a)2. It correctly observes that the SSPA report only modeled the impacts of the two proposed wells and other existing irrigation wells in the vicinity of the proposed wells. There is no evaluation or discussion of expected future additional wells or increased pumping from existing wells in the watershed, or increased pumping from the two Richfield Dairy wells. While the Supplemental EA states that DNR has approved seven new wells within five miles of the proposed Dairy in the last 10 years, it does not identify how many wells have been added in the vicinity of affected resources, or how many wells have had increased pumping rates. In fact, for the first ten months of 2012, there have been 35 wells approved in Adams County and 51 wells approved in Waushara County. Plainly, DNR must expect and therefore should evaluate future applications for new or increased pumping rates.

7. PLMD does not agree with DNR's statement of its authority to consider cumulative impacts in its decision on the well under Wis. Stat. ch. 281, which we understand has been developed while the initial application for these wells was pending. Irrespective of its authority under ch. 281, DNR has improperly conflated its obligations under WEPA with its decision-making authority. Even if DNR were correct in the statement of its chapter 281 authority, that authority would not limit its obligation to evaluate and assess the severity of cumulative impacts. The conclusion that an EIS is not necessary, based solely on the expected impacts of the two wells at the initial pumping rate of 72.5 mgy, is flawed as a matter of law.

8. There are factual inconsistencies and likely inaccuracies in the Supplemental EA. For example, that document states that the maximum depth of Pleasant Lake is 23.7 feet, while DNR's web page reports 30 feet. The document at page 4 asserts a 5.5-foot variation in lake level since 2004, but a Waushara County report calculates the variation as 5.32 feet. SSPA's calculations are based on an assumed the surface area of 130 acres, DNR's web site identifies Pleasant Lake as 120 acres, and the Supplemental EA uses an imprecise range of 129-135 acres.

9. Throughout the document, DNR uses vague terminology, characterizing the impacts from the wells as "unexpected" or "unlikely" to be significant. It also discusses impacts on springs and streams by comparing them to "generally" or "typically" observed conditions, reflecting a lack of any evaluation specific to the impacted springs and streams. This terminology reinforces the apparent incomplete, imprecise and ineffective review and lack of alternatives analysis.

Specific Comments

1. Specific critiques of the SSPA report and modeling and the Supplemental EA, by Dr. Kraft, are attached to this letter. In connection with Dr. Kraft's reports, we would like to highlight the following:

    a. DNR's decision to limit its analysis to the first twenty-five years of impact as the "long-term" impact is inappropriate. As discussed in greater detail in Dr. Kraft's report, the drawdowns and flow reductions associated with the Richfield Dairy wells will not have reached an equilibrium state in twenty-five years.

b. The comparison of the impacts of these wells to "natural fluctuations" in water level or flow is inappropriate. The effect of the wells for Richfield Dairy's planned use is a permanent decline in water levels, both seasonally and longer term. While the existing biota of a lake or stream are adapted to any natural fluctuations, the Supplemental EA identifies no information that suggests that they would similarly adapt to a permanent reduction in water level or flow.

c. DNR manipulates and distorts the documented evidence of fluctuations in stream and particularly lake levels, evidencing a bias to downplay the significance of these and other high capacity wells in the Central Sands.

   i. DNR relies heavily on a 1964 low water datum to support the conclusions that there are large natural water level fluctuations in Pleasant Lake levels. However, the 1964 datum was obtained during a particularly water-stressed year, the last in a particularly long drought period. It is the single data point that exists until 1973. Accordingly, the 1964 value is an outlier that has little significance in characterizing a representative range of water levels.

   ii. There is little evidence presented to support the claim of "natural" seasonal and annual fluctuations for Pleasant Lake. Seasonal fluctuations cannot be well quantified because for most years, there are no data or only one data point. Since 1993, the data show a clear trend of declining water level, as opposed to simple fluctuation, which correlates with the increase in number of nearby high capacity wells and withdrawal from those wells. Other lakes and streams in the Central Sands region near high capacity wells similarly have experienced unnatural declines in water levels or flow.

d. Although Dr. Kraft's November 28, 2011 report was submitted to the DNR on December 3, 2011, no mention is made of it in the Supplemental EA. This is a significant omission, as this work supports the statement made by Ms. Greve during her deposition (attached) that there is a general linear correlation between pumping rate and resource drawdown.

2. Wetlands: The discussion of wetlands is limited to two sentences, and the finding of no significant impact appears to rest entirely on the modeled drawdown on one wetland after 25 years. There is no inventory of affected wetlands – even the noted wetland is not identified. Additionally, there is no evaluation or discussion of why the expected impact is not significant. There is no description of the ecology of any wetlands, or how the projected one-inch drawdown will affect local biota. For example, if there are areas of the wetland that are only 2-3 inches deep during times of the year and are sensitive to indigenous species, a one-inch permanent decline may have a very significant impact.

No mention is made of Pleasant Lake's attached and nearby wetlands, their biota, or the role they play is maintaining the lake's fishery, biological diversity, water chemistry, and water temperature. As discussed below, we know that there are wetlands adjacent to Pleasant Lake that are very shallow but support important species.

The public simply has no way of knowing whether DNR conducted any investigation or evaluation of any wetlands in the watershed or vicinity of the proposed Richfield Dairy wells.

3. Springs: The paragraph on springs is similarly devoid of supporting information. It describes only one spring, at the headwaters of Chaffee Creek, a Class I and II trout stream and both an Exceptional Resource Water (Waushara County) and an Outstanding Resource Water (Marquette County). It notes the remarkable information that the flow of that spring has been reduced by nearly 50% over time, and it is noteworthy that the 1963 measurement was during a series of drought years. That is, the reduction from natural flow conditions may have been significantly greater.

   As with wetlands, DNR's only evaluation of impacts appears to be its review of the SSPA report, which calculated about a 5% reduction at Chaffee Creek at gaging station 1. This discussion is inadequate for at least the following reasons (in addition to the pertinent comments by Dr. Kraft about the selected locations for calculating impacts):

   a. The calculated impact is inconsistent with DNR's suggestion that the spring is outside the area of influence, based on "general" information about contribution areas.

   b. The most recent stated datum is already nearly ten years old, and one can expect that the increase in water withdrawals in the intervening years has further reduced spring flow. The age of this datum makes it impossible to calculate the anticipated impact on Chaffee Creek, although it suggests that the impact would be greater than 5%.

   c. The discussion ignores other springs in the vicinity of Richfield Dairy. Pleasant Lake, only 2.5 miles away, is a spring-fed lake with substantial springs in Turtle Bay and on the northwest shoreline. It appears that DNR did not evaluate those springs or the associated impact from the proposed Richfield Dairy wells.

   d. It also appears that DNR performed no evaluation on springs feeding other nearby lakes and streams. For example, DNR observes that the headwaters of Little Roche a Cri Creek, a Class I and II trout stream and Exceptional Resource Water, is 2.5-2.9 miles away; yet there is no indication that DNR investigated or evaluated the impact on springs feeding that stream.

4. Streams: DNR's discussion of streams suffers from the same dearth of relevant information as in its discussion of springs. While it bases its conclusion that the impact is "unlikely" to be significant on a calculated percentage loss of stream flow, DNR does not identify the age, location, or accuracy of the data. Additionally, as discussed by Dr. Kraft, DNR's and SSPA's mathematical calculations are based on gauging station data at areas of higher flow, and not the most stressed reaches of the affected streams.

   DNR reiterates SSPA's calculated maximum flow reduction at Little Roche a Cri of 3.4%, but it concludes that this impact is unlikely to be significant because sensitive streams do not "typically" experience changes in fish population at less than 4%. That is, there is no discussion – and presumably has been no evaluation – of the impact of a 3.4% loss at this particular stream, which is already stressed due to the recent history of regional pumping. Moreover, if pumping from other wells has caused even a 0.6% loss of stream flow (likely

much higher), the effect of the added Richfield Dairy wells would, by DNR's measure, risk significant impacts to this ERW trout stream.

5. Pleasant Lake: The Supplemental EA devotes more attention to Pleasant Lake than any other resource, perhaps because the PLMD has litigated the last EA. However, that discussion is also deficient or inaccurate in numerous respects, including the following:

   a. As noted above, the discussion of surface area and depth is inconsistent and may be inaccurate.

   b. As also discussed above, DNR's discussion of historical water level fluctuations are misleading. The last 20 years of data show a trend of substantial decline in water levels, which those who have studied the lake and nearby lakes attribute largely to virtually unconstrained groundwater pumping. Additionally, there are only four years with more than one data point; and the two data points for 2011 and five data ponts for 2012 show a trend of declining water levels (except that 10/16/12 is < 1 inch higher than on 8/27/12).

   c. DNR's misleading presentation leads to flawed conclusions. The Supplemental EA states: "Emergent vegetation and submerged species in the nearshore zone are likely limited due to historical water level fluctuations and shoreland development ...." Use of the term "likely" indicates that DNR has conducted no reconnaissance or investigation of actual nearshore biota. Had it done so, it would have learned that there are significant flora and fauna in the nearshore zone, particularly in the vicinity of Turtle Bay.

   d. DNR states that "Pleasant Lake currently supports little emergent vegetation that would be most susceptible to small changes in water levels." From this statement, DNR then concludes that the drawdown would not impact the fishery or aquatic wildlife. This statement is demonstrably false. In fact, the nearshore zone in Turtle Bay supports a population of banded killifish, an important "State Special Concern" fish. The spawning area for this species is very shallow water, including the shallow connection between the bay and adjacent wetlands. Moreover, the spawning season for killifish is summer, when one would expect water levels to be at their lowest if there are seasonal fluctuations. A reduction of 1.6+ inches could destroy this population.

   e. There are other impacts ignored by DNR. These include the fact that the calculated reduction would cut off Turtle Bay from adjacent wetlands, which provide important habitat for water-dependent upland species (*e.g.*, frogs), and sediment filtration for the lake. It is apparent that DNR has not inventoried either plants or wildlife in this area, yet another shortfall in its cursory evaluation for the new pumping rate.

6. Other lakes: The Supplemental EA provides even less information for any other lake. For Lake Burnita, it reports a modeled water level drawdown of 2.2-2.7%, apparently based on water level information that is 50 years old. There is literally no discussion of the ecology of the lake, any more recent information, or the effects of this drawdown on the lake ecology. Additionally, DNR apparently has ignored any other lakes that may be impacted, or any impacts at a pumping rate greater than the initial proposed pumping rate of 72.5 mgy.

7. Cumulative impacts: Beginning on page 6, DNR describes how agricultural pumping of groundwater has impacted the waters of the state in the Central Sands. It notes that there are 90 high capacity wells within four miles of the requested new high capacity wells and that seven of those wells have been approved in the last ten years. The EA goes on to state: "Groundwater modeling and observations of various water bodies indicates that a reduction in water quantity has occurred due to the high volume of irrigation and other water withdrawals in the Central Sand region of the state." The EA also states:

> The addition of the Richfield Dairy wells, or any additional water withdrawal in the area, will increase existing stresses on the availability of groundwater to supply surface water bodies. The effects of this type of cumulative reduction in groundwater availability include decreased flow and increased temperature in headwater streams, and lowered lake levels in nearby lakes (such as Pleasant Lake).

These statements are both understatements and indicative of a larger problem. Long Lake was mostly dry due to pumping in 2006-2009, and now has only a few feet of water. The Little Plover River was dry in stretches from 2005-2009 and has been below the public rights stage and historical low flows through most of the recent past. Multiple other surface waters are currently low-water impaired: Wolf Lake (where the public beach has been unusable for a decade), Lake Huron, Pleasant Lake, Patrick Lake, the Little Roche a Cri, and Tagatz Creek, to name just a few. The summer of 2012 saw dramatic flow declines, to the point of drying, in Central Sands irrigated-area headwater streams. Hydrologists know, and so should the DNR, that individual wells may have little effect on lake levels, stream flow, or wetlands, but that pumping within a basin by many wells combines to produce substantial effects on surface resources and aquatic habitats. *See* Barlow & Leake, 2012 (attached).

Despite these acknowledgements and existing conditions on numerous water bodies in the Central Sands, DNR concludes that the proposed wells are "not anticipated to result in significant adverse environmental effects ...." DNR reaches this conclusion by first stating that it is limited to considering only the wells on the specific property where new wells are proposed, and then only at the initial proposed pumping rate.

DNR is wrong on both counts. First, it has conflated its duty under WEPA with its newly created interpretation of its authority under Wis. Stat. ch. 281. Irrespective of whether DNR can or should limit its attention to the individual well or well property when deciding whether to approve a new well, the well statute does not limit its duty to determine whether impacts are significant under WEPA. That is, DNR must prepare an EIS if the project is expected to have significant impacts, as the scope of inquiry is defined under WEPA and Wis. Admin. Code ch. NR 150.

Additionally, there is nothing in Wis. Stat. ch. 281 or Wis. Admin. Code ch. NR 150 that limits DNR's inquiry to the proposed initial pumping rate. On the contrary, an increased pumping rate plainly is a reasonably anticipated compounding condition that must be evaluated under § NR 150.22(2)(a)2., unless the conditions of approval are going to include a prohibition on ever increasing the pumping rate. That evaluation is more critical here, because: a) Richfield Dairy has previously requested a higher pumping rate and is likely to do so in the future; b) Richfield Dairy's affiliate, Milk Source, LLC, requested increased pumping at New Chester only ___ months after its original permit was issued, based on the business plan to increase the number of animal units at its facilities; c) there is no requirement for WEPA review for increased water withdrawals; and d) there is no public notice or review of a high capacity well application for an increased pumping rate.

The history of this project already bears out the conclusion that Richfield Dairy will request an increased pumping rate. Its planed high capacity wells will have the capacity to pump 525 mgy. It originally requested 52.5 mgy (10% of capacity); then negotiated with DNR outside of the public eye for 131.2 mgy; and now is now requesting 72.5.

8. Alternatives analysis: Under Wis. Admin. Code § NR 150.22(2)(e), the EA must include "a rigorous exploration and objective evaluation of the environmental impacts of all reasonable alternatives, particularly those that might avoid all or some of the adverse environmental effects of the proposed action." The Supplemental EA merely lists three alternatives as bullet points: deny, approve, or approve with conditions. That document therefore wholly fails to comply with WEPA.

   The conditions of approval are unlikely to meaningfully curtail the adverse impacts that are likely to occur, or which DNR has ignored. The restriction to 72.5 mgy is only an initial restriction, which may be increased without any public notice or further environmental scrutiny. DNR's lack of scrutiny to date does not instill confidence that an application to increase the pumping rate will receive serious review. Finally, the requirement to install one piezometer-monitoring well nest at some undefined location down-gradient of the wells also is unlikely to provide the breadth of information necessary to verify SSPA's modeling.

Conclusion

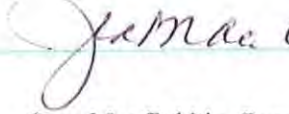
DNR has done a grossly inadequate job of performing its obligations under WEPA. It plainly has failed to conduct the breadth and depth of investigation and disclosure of environmental impacts. While it has acknowledged significant potential cumulative impacts, it has failed to investigate, evaluate or disclose those impacts. Moreover, DNR's lack of scrutiny potentially sets a disturbing precedent for future well applications for the Central Sands and elsewhere, creating self-imposed blinders to ignore the ever-increasing and significant adverse impacts from groundwater withdrawals to the State's precious surface waters.

For all of these reasons, the Supplemental EA is inadequate and flawed, and does not provide enough information for meaningful public comment. We therefore strongly urge you to prepare a complete and legally sufficient EA, and reissue the same for public comment.

Thank you for your consideration of these comments.

Sincerely,

PLEASANT LAKE MANAGEMENT DISTRICT



Jean MacCubbin, President
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cc: Prof. Frances Rowe
Attorney Carl A. Sinderbrand

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M. Frances Rowe
W13475 Czech Lane
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January 7, 2013

Ms. Rachel Greve, DG/5
Wisconsin Department of Natural Resources
101 S. Webster St.
P.O. Box 7921
Madison, WI 53707-7921

Dear Ms. Greve,

The comments below speak to the Supplemental Environmental Assessment prepared by the Wisconsin Department of Natural Resources in response to Judge John Markson's July 20, 2012 order to review the pumping impact of the proposed Richfield Dairy's high capacity wells. First, I have read and support the comments submitted by the Pleasant Lake Management District. I urge you to address the concerns they have raised. In addition, I would like to bring to your attention three points that relate to the proposed conditions noted in the Supplemental Environmental Assessment. In my opinion the conditions proposed in the Supplemental Environmental Assessment are insufficient and inadequate to manage the problems resulting from the permitting of the proposed Richfield high capacity wells.

1. Pumping Limit of 72.5 million gallons.

Page 6 of the Supplemental Environmental Assessment (SuppEA) notes that **"The addition of the Richfield Dairy wells, or any additional water withdrawal in the area, will increase existing stresses on the availability of groundwater to supply surface water bodies."** Yet the tone of the SuppEA leads me to conclude that the Department intends to approve the request for two new wells in the region. The first condition noted in the SuppEA limits the pumping from these two wells to 72.5 million gallons per year.

The question at hand is, how much water can be removed permanently from Pleasant Lake, the Little Roche-A-Cri, Tagatz Creek, and Chaffee Creek before an adverse environmental impact results? I claim we are already there; too much groundwater is already being removed. These water resources are already stressed from current high capacity well pumping in the region (based on Waushara County data, Pleasant Lake has lost over 5 feet of water to date), to add two additional high capacity wells to an already over taxed aquifer is unreasonable, no matter the capacity cap. Data that support this point of view are voluminous. See, Kraft & Mechenich, 2010; Barlow and Leake, 2012, USGS Circular 1376; Kraft, et al, 2012a; Kraft, Mechenich, & Haucke, 2012b.

Hydrologic modeling completed to date not only tells us what we can expect, but observations on the ground have already demonstrated and confirmed the predictions made years ago. This area of the state cannot support any more high capacity wells. Furthermore, although this first condition caps the pumping volume at 72.5 mgy, it is clear that there is an expectation that an increase in this number is to be expected (see number 3). Once a cattle herd is in place, who will have the authority or the backbone to deny watering the cattle? The solution is to deny the permit initially as the natural resources of the region will not support large scale dairying in this region of the Wisconsin without causing significant damage to the state's surface water resources and groundwater aquifer.

2. Monitoring wells.

Condition two of the SuppEA provides for the inclusion of groundwater monitoring via a piezometer as part of the Richfield Dairy's amended high capacity well approval. What is to be done with these data? Will lakes, rivers, wetlands, and streams be monitored as well? How will you separate the effects of these two wells with the impacts of hundreds of other wells and natural variability? Monitoring wells are useful if, and only if, an action predicated on monitoring outcomes has been established prior to monitoring. Twenty years of data already exist to support the modeling that has been completed, collection of new data will only add to that assemblage.

If the data collected are to be used to assess damage and "turn off" the wells when surface water levels drop, it does not say so in the SuppEA. What is to be accomplished with this monitoring? Are these data to be used to revoke the well permits if and when harm to surface resources has been established? If and when surface water levels are observed to drop in the region, which all agree they will, the high capacity well permit should be limited or revoked. And, that possibility should be made clear to the applicant at the onset. It should be clearly stated in the permit that if Pleasant Lake, wetlands, or streams in the region drop following the installation of the Richfield wells that the permit will be revoked. That way no claim can be made at a later date that such a condition was unknown.

This is a circular argument. It is well known that the surface waters will drop as the result of additional pumping in the region; all models completed to date demonstrate this. Why issue a permit at all? To issue a high capacity well permit, monitor for damage, and then revoke the permit appears to me to be wrong. It is unfair to the applicant, will result in unnecessary damage to lakes, wetlands, and streams, and will be expensive to all concerned. Therefore, given this situation no permit should be issued in the first place.

3. New pumping volume requests.

The third condition imposed on the applicant is that any increase in groundwater withdrawal will require a new high capacity well approval. I welcome this as a first step in assuring the aquifer will be protected, but what is missing here is specific criteria for how harm to the local surface waters will be established, which should be a prerequisite to any additional pumping being considered. No mention is made as to how the new review will be conducted or what criteria for resource health would be employed.

Moreover, there is no requirement for notification to neighboring lake districts, villages, townships, counties, private and municipal well owners, or environmental groups regarding such a request. Please add language that will require notification of any new pumping requests to stakeholders within a 5 mile radius.

Conclusion

Although well intentioned, I believe the conditions placed on this permit will not protect the surface water resources or the aquifer of the region. Any pumping is too much pumping for this area of this aquifer, no mention is made as to how the monitoring data are to be used, and the assumption that the pumping volume can and will be increased is problematic.

The Central Sands aquifer is in trouble. This conclusion is clear from modeling, existing data, and simple observation. One does not have to be a hydrologist or a biologist to identify a dry lake or stream or to observe that what once was a shallow water habitat is now dry land. The conditions placed on this permit are not sufficient or adequate to protect the aquifer or the region's rivers, streams, wetlands, and lakes. If issued, this high capacity well permit needs to include specific language that will identify criteria to assess harm to surface water bodies, it must require that pumping volume be reduced or suspended when harm has been identified to surface waters or the aquifer, and these wells must be capped at the original volume request - no additional pumping to be allowed.

Thank you for your time and your consideration of my points of view.

Sincerely,

Francie Rowe

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John Muir Chapter

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January 7, 2013

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Re: Comments on the revised Environmental Assessment for Richfield Dairy's proposed high capacity wells

Dear Ms. Greve:
Thank you for providing us with this opportunity to comment on the revised Environmental Assessment (EA) for Richfield Dairy's permit application to install two high capacity wells associated with their proposed Confined Animal Feeding Operation (CAFO) in Adams County. The Sierra Club – John Muir Chapter is concerned that the DNR's decision to approve the revised EA with conditions isn't adequate to protect water quantity over the long term in the Central Sands Region, a water-limited area of Wisconsin that is already facing significant drawdowns related to crop irrigation and other activities.

The Sierra Club helped pass Act 310, Wisconsin's current groundwater law, an important step for conserving groundwater and highlighting its connection to surface waters. We also supported implementing follow-up recommendations of the Groundwater Advisory Committee that would have allowed the DNR to practice adaptive management, enhance protection for small springs, and develop a means of designating new Groundwater Management Areas. The Central Sands Region would be a prime candidate for GMA designation, as irrigation pumping has reduced streamflow by 25-30% in this area, and severe water drawdowns have already occurred on the Little Plover River and Bloody Run Creek a Class 1 trout stream (http://www.lakebeulah.org/pdf/hicaplaw.pdf). Similarly, the proposed Richfield CAFO could impact Class 1 trout streams including Fordham Creek, Little Roche-a-Cri Creek, Chaffee Creek, and Tagatz Creek in future years.

Members of Sierra Club's Water Sentinels visited Lake Pleasant and other nearby areas in 2012 that would potentially be impacted by the proposed Richfield CAFO. At the time, the area had been experiencing prolonged, severe drought conditions evident through impacts on nearby farm fields, some of which no longer had access to water needed for crop irrigation. We also spoke with local residents and saw evidence that Pleasant Lake was experiencing permanent drawdowns – such as the historical location of swimming piers and docks that were now many feet away from the water's edge – that were likely result of many years of intense water use in the nearby area. Finally, we observed alarming drawdowns at Patrick's Lake, which was in close proximity to the existing New Chester Dairy, which has proposed doubling in size (with corresponding increases in water use) in the next few years.

DNR's modeling suggests that Richfield's high capacity wells will result in 1.6 $\pm$ 0.26 inches of additional drawdowns of Lake Pleasant. However, more frequent climate change-related droughts and elevated temperatures in Wisconsin could impact the model, both in terms of increasing actual lake drawdowns and by increasing the water use of the applicant and the other existing and future high capacity wells in the area. It is our understanding that during droughts, the DNR routinely allows high capacity well users to increase capacity in order to prevent losses to crops or livestock, and this could result water drawdowns that exceed predicted levels. Modeling water impacts for this and other high capacity wells should therefore account for the potential impacts of climate change in order to maximize predictive accuracy.

One of the Sierra Club's biggest concerns with the proposed high capacity wells associated with the proposed Richfield CAFO are their cumulative impacts relative to existing and future water withdrawals in the water-limited Central Sands region. The DNR touches on cumulative impacts on pages 6-7 in the revised EA. This section mentions that there are 90 existing high capacity wells with a capacity of over 70 gpm within 4 miles. In addition, the DNR has permitted 51 high capacity wells in Waushara County and 35 in Adams County in the past 10 months alone. Dr. Kraft and DNR predict cumulative water table drawdown impacts of 1.5 - 0.7 feet at Pleasant Lake, as well as flow reductions of 1.5 - 15% or 3 - 6% in nearby trout streams respectively, depending on which model is used. The EA then goes on to state that DNR is limited to considering whether the proposed wells on the high capacity property may cause significant adverse environmental impacts. However, the 2011 Lake Beulah Supreme Court decision suggests that the DNR may be able to go further in limiting the permitting of additional high capacity wells in areas where negative impacts on surface areas are observed (http://www.jsonline.com/news/wisconsin/125193059.html). The Sierra Club urges the DNR to exercise their full authority to protect groundwater and surface water from excessive withdrawls based on this decision. Exercising this authority will benefit residential, commercial and recreational water users in the area in coming years.

In Wisconsin we are blessed with plentiful groundwater almost everywhere, but we've learned that we cannot take it for granted. We are all dependent on groundwater in a myriad of ways for supporting business, agriculture, fisheries, wildlife, recreation and tourism. However it is more than that -- it is one of our crown jewels as a society because drinking water is so critical to sustaining life.

Thank you for considering our comments on this matter. We hope that they will move us toward our shared goals of having both a healthy environment and long term economic prosperity. Please contact us any time with questions or concerns regarding this issue.

Sincerely,

Shahla M. Werner, Director, Sierra Club - John Muir Chapter

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January 7, 2013

Via email and U.S. Mail

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RE: Proposed Richfield Dairy, Tn. of Richfield, Adams Co., WI – Comments Regarding Supplemental Environmental Assessment for High Capacity Wells

Dear Ms. Greve:

I previously provided comments to you on behalf of the Friends of the Central Sands and Bob Clarke regarding hydrologic impacts associated with the proposed Richfield Dairy (RD) Site on July 25, 1011 and September 22, 2011. I have reviewed information related to the November 28, 2012 Supplemental Environmental Assessment for the high capacity wells associated with the proposed Richfield Dairy.

Respectfully, my review concludes that the WDNR environmental analysis does not sufficiently describe nor adequately evaluate the significance of the impacts posed by the proposed wells to the water resources of the State. In particular the supplemental EA did not evaluate impacts at the nearby sensitive stream headwaters and did not evaluate the significance of the direct impact of the proposed wells as part of the cumulative impacts caused by the pumping associated with the irrigation wells previously approved by the Department in the vicinity. My specific comments follow.

1) The supplemental EA did not evaluate impacts at the upper stream headwaters in the RD vicinity where the effects of both the existing irrigation pumping and the proposed wells will be most pronounced. The October 7, 2011 letter report from George Kraft, UW-Stevens Point to Eric Ebersberger included groundwater modeling of the upper 1.7 miles of the tributary of Little Roche-

ATTACHMENT A

A-Cri Creek closest to the proposed wells. The results showed the existing irrigation pumping during average climatic conditions has resulted in the reduction of groundwater discharge at the upper 400 meters of the stream to the point the stream dries up. The upper 1600 meters (one mile) shows a 31% stream flow reduction and the flow reduction is 22% at 2800 meters (1.7 miles) downstream. Kraft then simulates the proposed RD wells pumping at 52.5 million gallons per year (100 gpm) less the impacts of the current RD site irrigation well #146 (1.9" recharge reduction over 240 acres = 24 gpm) for a total direct impact of 76 gpm. This analysis showed additional reductions in stream flow of greater than 5% within the upper mile of the stream. Since the proposed pumping rate for the RD wells has since been increased to 138 gpm (72.5 million gallons/year) the impact would be 138 gpm less 24 gpm for a total of 114 gpm. Since 114 gpm is 1.5 times larger than 76 gpm the additional direct impact of the RD wells can be correspondingly extrapolated from greater than a 5% to greater than a 7.5% reduction in flow in the upper mile of the Little Roche-A-Cri tributary.

The supplemental EA utilized model results from S.S. Papadopulos & Associates (SSPA) to evaluate impacts at the Little Roche -A- Cri headwaters. The SSPA analysis of existing irrigation pumping impacts has a large degree of uncertainty due to dependence on historical pumping records known to be incomplete and inaccurate, along with unjustified reliance on a value of 20% for irrigation consumptive use. The SSPA prediction of irrigated pumping impacts at Pleasant Lake was significantly less than that demonstrated through the historical water level regression analysis reported in Kraft & Mechenich (2010) and Kraft et.al. (2012), indicating a lack of model reliability. SSPA reported existing irrigated impacts on Little Roche- A- Cri at 10th Ave. caused a 5.1% reduction in average flow while Kraft & Mechenich reported a 5.3% reduction. SSPA used a transient model simulation of proposed RD well pumping and predicted direct impacts to Little Roche- A- Cri at Cypress Ave., approximately four miles below the headwaters, to be insignificant, with less than a one percent flow reduction. The SSPA analysis failed to evaluate the significant direct impacts of the proposed RD wells at the sensitive stream headwaters within the first mile of stream flow and the cumulative impacts of the existing irrigation pumping impacts in the same location. In addition, the SSPA transient RD well analysis is likely to significantly under predict long term pumping impacts by truncating their model simulation at 25 years. The relatively long distance from the headwaters to the proposed RD wells along with the large storage values for the aquifer materials require that a steady state simulation be used to evaluate the RD well impacts.

The October 7, 2011 letter report from George Kraft, UW-Stevens Point to Eric Ebersberger also included groundwater modeling results for the upper reach of Fordham Cr., a Class 1 trout stream. Existing irrigation pumping has resulted in a 5 to 10% reduction inflow along the upper 1400 meters of the stream. Extrapolating to the new 138 gpm proposed RD well pumping rate indicates a direct impact of up to a 0.75% additional decrease in flow within the upper 1400 meters of Fordham Cr. SSPA, using a transient 25 year simulation, reported an insignificant reduction in flow on Fordham Cr. at 8th Ave, approximately three miles below the headwaters. As with Little Roche -A- Cri Cr., SSPA analysis failed to consider the significant impacts of the direct impacts of the proposed RD wells and the cumulative impacts from the existing irrigation pumping at the sensitive stream

headwaters within the first mile of stream flow. As before, the 25-year SSPA transient analysis is likely to significantly under predict long term pumping impacts.

White et al, 1976, indicated reduction in trout biomass is correlated with reduced stream base flows. Specific factors for this reduction include increased summer water temperatures, decreased winter water temperatures, decreased living space, decreased stream edge and in-stream hiding cover. The existing irrigated pumping impacts must be evaluated with the cumulative impacts of the proposed RD wells to determine the significance of the reduced base flows on trout habitat.

2) The supplemental EA failed to evaluate the significance of seasonal and climatic fluctuations in relation to the direct impacts of the proposed RD wells and the existing irrigation groundwater pumping impacts.

   a) The SSPA, 2012 and Kraft, 2010 groundwater models used to evaluate well pumping impacts assumed a constant average recharge to the groundwater. Kraft, 2010, indicated seasonal and climatic fluctuations could result in significant variation in water levels and stream flows from those of the steady state model simulations using average conditions. This is expressed most dramatically in stream headwaters adjacent to high concentrations of irrigation wells. Carter Cr. stream flow at CTH "G" was modeled by SSPA with average steady state conditions with irrigation pumping to be 2.3 cfs compared to 3.3 cfs assuming no irrigation. However droughty conditions this summer resulted in flows decreasing from 4.6 cfs (5/24/12), 2.2 cfs (6/26/12), 0.315 cfs (7/23/12) and droughty conditions produced a low flow of 0.154 cfs on 8/9/07. SSPA, 2012a, as part of their transient groundwater modeling for the proposed Golden Sands Dairy, varied average groundwater recharge monthly, with most recharge added in spring, resulting in a modeled discharge of Ten Mile Cr. that varied from an average spring maximum of 90 cfs to a late fall and winter minimum of 30 cfs. This type of model simulation conformed well to the average measured monthly Ten Mile Cr. stream flow data. SSPA also varied the proposed irrigation pumping rate monthly to withdraw all of the irrigation water during the summer growing season. The SSPA model predicted stream impacts that varied monthly with the magnitude of the stream flow impacts increasing approximately ten fold from May/June to September.

      The direct impacts associated with the proposed RD pumping and the cumulative impacts associated with the irrigated pumping in the vicinity of the proposed RD wells can only be reasonably evaluated using transient groundwater modeling in a manner similar to the SSPA Golden Sands simulation discussed, where the groundwater recharge occurs primarily in spring and the irrigated pumping occurs in summer. In addition, the EA needs to evaluate water level and stream flow impacts during times of drought when base flow reductions produce the most significant impacts on the water resources. The pumping records for the high capacity irrigation well #146 at the RD site show that though the average pumping rate from 2007 through 2011 was 47 million gallons per year, during the time of drought in 1988 over 99 million gallons was pumped. High capacity well #4 average flow (2008, 2010, and 2011) was noted to be 22 million

gallons per year, but pumping in 1988 was 59 million gallons. The impact of irrigation pumping during a drought time is further increased due to the higher evapotranspiration rates present which prevents as much applied irrigation water to be recharged to the water table resulting in higher relative consumptive losses. In addition, during drought times the groundwater recharge rate in non-irrigated areas in the area would be significantly lower. The result is severe impacts in the headwater stream areas or lakes nearest the areas of irrigated agriculture and is evidenced by marked decrease or total elimination of headwater stream flow or lakes in these areas during drought times. The Wisconsin Central Sands has experienced approximately 20 moderate to extreme drought events since 1890.

b) The evaluation of the direct impacts associated with the proposed RD pumping and the cumulative impacts associated with the proposed RD wells or any other wells proposed in the Central Sands will require application of a transient regional groundwater model of the entire Central Sands region. This will allow input of recharge and irrigation pumping monthly using various estimates of pumping and recharge expected during both average and drought conditions. Model predicted water levels and flow can then be compared to measured water levels and stream flows at locations of known impact such as the Little Plover River or Carter Creek and water levels including Long Lake and Pleasant Lake during both average and drought conditions to help validate the model. Due to the relative uniformity of the Central Sands regional model hydrogeology, predictions of transient impacts will then be able to be used with some degree of confidence for evaluating transient impacts throughout the model area during both average and drought conditions.

3) The supplemental EA indicates the stream flow reductions associated with the proposed wells are unlikely to be significant because, according to Hamilton and Seelbach, 2011, at flow reductions less than 4% even sensitive stream types do not typically experience observable changes in fish populations. This conclusion is in error due to the EA's failure to evaluate trout habitat impacts in the upper headwaters of streams within the first mile of stream flow, the failure to evaluate the significance of the direct impacts in consideration of existing cumulative irrigation impacts, and failure to evaluate the direct and cumulative habitat impacts during seasonal and drought periods. Pumping impacts with stream flow headwater reductions of much greater than 4% are in evidence in the vicinity of the proposed RD.

a) This issue was discussed previously in point 1 above for Little Roche- A- Cri and Fordham Creeks with existing flow reduction due to irrigation causing impacts up to 31%.

b) Kraft, 2010, indicated existing irrigation pumping has reduced flow in the first mile of Tagatz Cr. by 5 to 10% during average steady state conditions. SSPA, 2012, modeling of Tagatz Cr. flow near Westfield under average steady state conditions decreased 6.7% due to irrigation impacts. SSPA reports a reduction of 27 gpm at this location due to the direct impact of the proposed RD wells. The Kraft October 7, 2011 letter showed proposed RD pumping would reduce flow within the upper 1.5 miles of Tagatz Cr. up to an additional 7.5 % when the increased withdrawal rate

of 138 gpm is considered assuming an extrapolated impact of 1.5 times that of 100 gpm. The EA needs to evaluate the direct and cumulative impacts of irrigation and proposed RD pumping in the Tagatz Cr. headwater area, including during drought conditions.

c) Kraft, 2010 indicated existing irrigation pumping has reduced flow in the first mile of Chafee Cr. by 2% to greater than 10% during average steady state conditions. SSPA, 2012, modeling of Chafee Cr. flow at CTH "CH" under average steady state conditions resulted in a decreased flow of 17.6% due to irrigation impacts. SSPA reports a reduction of 22 gpm (0.05 cfs) at this location due to the direct impact of the proposed RD wells. The Kraft October 7, 2011 letter showed the direct impacts of the proposed RD pumping would reduce flow at the Chafee Cr. headwaters up to an additional 7.5 % when the increased withdrawal rate of 138 gpm is considered assuming an extrapolated impact of 1.5 times that of 100 gpm. The Chafee Cr. stream data from 2007 at CTH "CH" also indicates existing irrigation pumping may be having a significant impact with flows declining seasonally during irrigation from 1.2 cfs (6/13/07), 0.95 cfs (7/12/07), 0.47 cfs (8/9/07) to 0.28 (11/16/07). It would be expected the Chaffee spring pond, located approximately 3800 feet upstream would have been experiencing even lower or no flow conditions at this time. The supplemental EA statement indicating the Chaffee spring would not be significantly affected by the SSPA modeled direct RD well impact of 0.05 cfs does not appear justified. As indicated earlier the SSPA understates impacts because of the lack of steady state simulation and that seasonal and climatic impacts were not considered. Even a 0.05 cfs reduction compared to the 11/16/07 flow of 0.28 cfs during a moderate drought produces an 18% reduction. The supplemental EA statement that the proposed RD wells lay outside the contributing area of the Chafee Spring is incorrect. Both the Kraft and SSPA modeling demonstrates reduction of groundwater flow in the vicinity of the proposed RD wells will lead to reductions in discharge in this headwater area. The supplemental EA needs to evaluate both the direct proposed RD pumping impact and the cumulative impacts of irrigation in the Chafee Cr. headwater area including during drought conditions.

4) The supplemental EA states the SSPA analysis of the proposed RD wells' groundwater level impacts at the wetland area 1.5 miles northwest of the well site would be less than one inch after 25 years of pumping and therefore not result in significant impacts. Kraft & Mechenich (2010) indicate existing irrigation pumping has caused approximately 0.5 to 1.0 feet of groundwater level reduction in this area. Seasonal and drought conditions will significantly increase these impacts due to close proximity of irrigation wells. These impacts may have already caused significant impacts to wetland plant communities dependent on maintaining saturated conditions within their root zone. The cumulative impacts of the proposed RD well pumping on the wetlands in this area requires evaluation, including consideration of seasonal and drought conditions.

5) The regression analysis of Kraft& Mechenich (2010) showed that steady state declines of at least 1.5 feet at Pleasant Lake were attributable to the current irrigation pumping west of the lake. The report indicates that the Pleasant Lake impacts are likely to be understated by 0.4 to 0.76 feet because the regression calibration reference points assumed not to be impacted by pumping had

actually experienced lake level declines due to pumping of 0.4 to 0.76 feet. SSPA, 2012, steady state model simulation indicates the existing irrigation pumping results in a 0.7 foot decline in the Pleasant lake water elevation. The Kraft & Mechenich, 2010, regression analysis of groundwater elevations and lake stages provide convincing evidence that the SSPA modeling is under-predicting irrigation pumping impacts on Pleasant Lake. Large potential uncertainties in the SSPA model simulation include an unjustified estimate of 20% for irrigation pumping consumptive loss and incomplete and inaccurate historic irrigation pumping data. It is possible the constant head boundary along the east side of the SSPA model domain may be constraining the response of the groundwater heads in the Pleasant Lake and Chaffee and Tagatz Cr. headwater locations. The October 7, 2011 letter report from George Kraft, UW-Stevens Point to Eric Ebersberger indicates the 2007 irrigated pumping impacts resulted in a 3.3 foot drawdown at Pleasant Lake and estimated, using steady state simulation of average conditions, and an additional direct impact of 100 gpm pumping from the proposed RD wells to result in 2 inches of additional drawdown. As discussed previously the latest proposed RD pumping rate of 138 gpm would result in approximately 1.5 times the water removal from the proposed wells and a corresponding increase in direct drawdown impacts. The SSPA, 2012, transient simulation of the 138 gpm proposed RD well pumping resulted in less than 2.0 inches of lake stage decline. This analysis is flawed in that a more appropriate steady state simulation is likely to result in a significant increase in pumping impact. The SSPA prediction uncertainty analysis using a 90% confidence interval should not be given very much credence due to the lack of a steady state simulation, the lack of calibration to the lake level regression analysis of Kraft & Mechenich, 2010, the lack of evaluation in conjunction with irrigation pumping under seasonal and climatic cumulative impact conditions, and uncertainty evidenced at model flux boundaries such as at the South Branch of Wedde Cr. at CTH "JJ" where flows were estimated at 7 cfs, but model calculated flows were 2.2 cfs without irrigation impacts and 2.1 cfs with irrigation impacts.

While the Pleasant lake levels do fluctuate due to natural seasonal impacts related to variations in precipitation, evapotranspiration, and seepage to groundwater, the cumulative impacts of existing irrigation plus the direct impact of the proposed RD wells resulting in a 2.0 foot lake level decline during average steady state conditions represent significant adverse impacts to Pleasant Lake's water resource values, being expressed by shore line recession, access problems with docks, and fish habitat impacts related to a decreased water depth and volume, increased water temperature fluctuations, and loss of lake bed structure. With reduced recharge and increased irrigation pumping and consumptive losses during expected drought episodes the magnitude of the impacts would increase significantly as indicated by the estimated 3.3 foot water level decline of Pleasant Lake during the moderate drought period of 2006/2007. The supplemental EA assertion that pumping impacts are acceptable because they are within the range of natural Pleasant Lake level fluctuation is not reasonable or logical since the pumping impacts must be evaluated in an additive fashion to the natural lake fluctuation and a determination of significance presented. It must be recognized that the pumping of the proposed RD wells will result in a relatively steady permanent direct impact at the stream headwaters and lakes closest to RD in addition to the significant

fluctuation of irrigation pumping and natural recharge rates due to climatic variations. A public interest lake stage should be established to which the direct and cumulative impacts can be compared and the significance of the impact determined.

Conclusion

The supplemental EA does not sufficiently describe nor adequately evaluate the significance of the impacts posed by the proposed RD wells to the water resources of the State. In particular, the supplemental EA did not evaluate impacts at the nearby sensitive stream headwaters within the first mile of stream flow and did not evaluate the significance of the stream and lake impacts of the proposed wells as part of the cumulative impacts caused by the pumping associated with the irrigation wells previously approved by the Department in the vicinity. In addition, the supplemental EA neglected to evaluate the direct and cumulative impacts during seasonal and drought conditions when stressed resources are most susceptible to pumping effects most likely to result in significant adverse impacts to the State's waters. The specific evaluation of the significance of these direct and cumulative impacts in relation to trout habitat, minimum public interest stream flow, lake stage requirements, and wetland hydrological requirements is needed.

The evaluations required can be made by extending the existing groundwater modeling work already established utilizing a regional Central Sands model domain. Monthly recharge estimates could be used to establish initial calibration and estimates of average summer monthly irrigation pumping losses could be distributed at irrigated model cells to provide a base model simulation of irrigation pumping impacts with calibration to measured seasonal head and stream flow fluctuations. The simulation period should be sufficiently long to approach steady state conditions in model domain locations distant from the concentrations of irrigation wells. The model could then be further validated through transient simulations of various estimated periods of drought scenarios through reductions in recharge and increases in irrigation pumping. These simulations could be calibrated to historic stream flows, groundwater elevations, and lake stages. The relative simplicity of the Central sands hydrogeological system would then allow the model to evaluate proposed pumping impacts or management alternatives with some degree of confidence throughout the model domain. The establishment of a more comprehensive Central Sand headwater stream flow, lake level, and groundwater level monitoring program would aid in model validation.

Prepared by Kenneth S. Wade, P.E., P.G. – January 7, 2013

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S.S. Papadopulos & Associates. July 27, 2012 Evaluation of Groundwater Pumping for Richfield Dairy, LLC, Town of Richfield, Adams County, Wisconsin.

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Experience

2011 to present – Hydrogeological and environmental engineering consulting in areas of waste land spreading, high capacity wells, chlorinated solvent spills, and wetland hydrology.

1993 to 2011 – manage the hazardous materials program for Wisconsin Department of Transportation, Southeast Region. Major projects include Miller Park Baseball Stadium, Lake Arterial Parkway, Park East, and Marquette Interchange. Manage hydrologic assessment of WisDOT wetland program issues.

1987 to 1993 – Wisconsin Department of Natural Resources, Bureau of Solid Waste Management, made feasibility determinations for solid waste facilities, coordinated hydrologic assessments of Crandon Mine Environmental Impact Statement.

1986 to 1987 – Idaho National Engineering Laboratory, Department of Energy (EG&G), hazardous and radioactive waste assessments for soil and groundwater, dioxin soil testing at Agent Orange storage sites (U.S. Department of Defense), with Level 1 security clearance.

1980 to 1985 – Wisconsin DNR, Bureau of Solid and Hazardous Waste Management with duties similar to DNR above.

1978 to 1980 – Colorado State University, graduate research, uranium solution mining impacts, reported to Colorado Dept. of Health.

1976 to 1977 – Brodhead High School, taught chemistry, advanced chemistry, and physics

1975 to 1976 – Solar Specialists, Inc., solar space heating and hot water installation

Education

1981 – 1985, U. of Wisconsin-Madison, graduate study in numerical groundwater flow and contaminant transport modeling; USGS Training Center, groundwater modeling

1978 – 1980, Colorado State University, Master of Geology

1970 – 1974, U. of Wisconsin-Madison, BS in secondary education

Other Experience

Town Board Chair – Town of Middleton, Dane County Wisconsin, 1989-1990

Restoration Ecology – Ongoing prairie, oak-savanna, wetland restoration in conjunction with "The Prairie Enthusiasts" on 226 acres of land in western Dane County.

Extensive outdoor experience including: mountaineering and rock climbing, winter camping, bicycling, and kayaking

Registration

Wisconsin Professional Engineer, # 30156

Wisconsin Professional Geologist, # 556

Hazardous Waste Operations and Emergency Response Certified (29 CFR1910.120)

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January 7, 2013

MEMO

To: Christa Westerberg, Atty.
McGillivray Westerberg & Bender, LLC

From: Ray J. White, Ph.D.

Ray J. White

Re: Comments on Wisconsin DNR's Richfield Dairy High Capacity Well Supplemental Environmental Assessment – 72.5 MGY

1. The EA cannot rightfully claim no significant impact on streams, if it ignores the organisms and the physical and ecological processes that depend on groundwater inflow, e.g., involvements of brook, brown and rainbow trout, of smaller creatures that are their food, of associated wildlife, and of the riparian vegetation that helps shape habitat for all those forms of life. The EA considers hydrology almost exclusively, whereas impacts of decreased groundwater-fed flow are geomorphic and ultimately biological. Besides water, a stream consists of the physical conformations, soils, vegetation, and animals of the channel and of the interacting riparian areas and wetlands. The EA fails to relate hydrology to the ways that the area's streams work physically and biologically—how the physical and biological processes are affected by the existing pumping-caused groundwater diminution and would be affected by cumulative impacts that include the proposed pumping. The EA superficially acknowledges trout; it fails even to mention a single fluvial geomorphic habitat ramification or a single species of plant or animal that exists in the affected streams or riparian areas. The EA doesn't bring to bear information from DNR files on fish, wildlife, and habitat in the impacted streams, riparian areas, and associated wetlands. There is no indication of EA input about streams by geomorphologists, ecologists, or fishery biologists. If the EA does not deal thoroughly with the ecologies of riparian vegetation, of stream fishes, and of associated wildlife and human uses of the fish and wildlife resources, no valid conclusion can be made about environmental impacts.

2. The EA is based on average flows, but organisms are restricted by minimum flows and associated severe conditions. Low baseflows and concomitant warm or cold extremes often cause the most harm for trout and the stream-and-riparian ecosystems. This omission is notable because Central Wisconsin has frequent droughts (Kraft et al. 2010, Fig. II-3). Baseflow reduction in headwater streams (1 mile below stream source) is 5% to 44% under present pumping, and these declines would be larger during seasonal drys and prolonged droughts (Kraft 2010, Fig. VII-4).

3. Stream-dwelling trout need all the baseflow they can get, except in streams that are excessively cold in summer. If a trout population is at carrying capacity (maximum number or biomass that the habitat can support indefinitely), then reducing baseflow by any amount is likely to decrease the population via decreased reproduction and/or decreased survival and/or decreased body growth. If the population is at lower than carrying capacity before baseflow reduction, it will be tending toward carrying capacity, and reducing the base flow will diminish the stream capacity toward which the trout population can expand. If baseflow reduction is slight and of short duration, then a trout

ATTACHMENT B

population at carrying-capacity will start to decrease but cease to do so when flow increases. If, within a given area along the course of a stream's trout zone, baseflow decrease is major and/or of long enough duration, then trout population decreases more or less proportionally in the long term to the proportion of baseflow decrease, but due to decreased thermal suitability of the water, the trout population may decrease more than would correspond to the proportion of baseflow reduction. Under reduced baseflow in a given stream area, the trout population will diminish progressively until some threshold of intolerability is reached (in terms of water temperature, living space, or availability of other habitat features or food), at which point the population will cease to exist, even before flow becomes zero.

4. In all or most of the kinds of trout streams that the proposed pumping will impact, any reduction in baseflow stands to reduce the trout zone's length—the length of course that has sufficient flow, temperature, and other habitat features for sustaining a naturally reproducing trout population. This shortening can happen by elimination of sufficient flow in small headwaters and by shrinking at either end of the trout zone the extent of thermally suitable water, i.e., water cool enough for trout during the hot season and warm enough for trout during winter.

5. Pumping impacts on headwaters are of concern in all the streams at issue. The EA deals inadequately with importance of headwaters to trout populations. In headwaters unaffected by water withdrawal or other human-generated damage, channels tend to be relatively narrow, fitted to small baseflow, and have interacting geomorphic and bank-vegetational features (course curvature, width constriction, bank undercutting, etc.) that form trout habitat. When pumping reduces baseflow, the water volume and flow patterns become underfitted to the channel. Shallowed water offers less protection from predators and shrinks living space. As wetted width decreases, trout find less hiding cover under banks and bank vegetation. Even extremely small amounts of water in headwater streams, i.e. one cubic foot per second or less, can support trout spawning and juvenile rearing, particularly for brook trout. Reduction in base flow can eliminate these areas. Brook trout eggs and sacfry develop during winter in streambed gravel or coarse sand, and depend on upwelling flow of groundwater for oxygen and suitable temperature. Pumping-induced reduction of groundwater inflow can prevent entry of adult brook trout into some headwater areas, or where they still can spawn, will then decrease oxygen supply and thermal suitability, resulting in slower development and higher mortality of eggs and sacfry. Fry that do emerge will find less habitat and less food. Those are among the impacts of low winter groundwater input and baseflow.

6. EA page 4, paragraph 2: "The maximum modeled flow reduction was 0.10 cfs . . . in Little Roche a Cri Creek at 10th Ave. This flow reduction constitutes about 0.3% of the measured baseflow (34 cfs) at this location." This is at the downstream limit of designated trout water, so consideration at this point has little meaning for the trout resource. In the SSPA report, Table 1: The sites Little Roche-a-Cri (10th Ave), Tagatz (near Westfield), and So. Br. Wedde (at JJ) are not headwaters; therefore, judging effects of flow reductions at these points is not crucial in assessing impact on trout.

7. The EA's conclusions on stream impacts rely on the Michigan Water Withdrawal Assessment Process (Hamilton & Seelbach 2011)—hereafter "Michigan WWAP"—but do not relate it to the hydro-geomorphic and biological characteristics and ecologies of the streams at issue. The EA states at p 4, ¶ 2: "At flow reductions of less than 4%, even sensitive stream types do not typically experience observable changes in fish populations (Hamilton and Seelbach, 2011). The expected flow reductions due to the proposed Dairy wells are unlikely to cause a significant environmental impact to the streams." The conclusion is not based on any discussion of relationships between flow and the habitat requirements and life histories of pertinent organisms. It doesn't properly consider annual low flow and drought conditions or cumulative biological impacts. And the Michigan WWAP is inappropriate for EA use because: (a) Under the WWAP, when a well is permitted, the amount pumped decreases the amount that can be pumped at future proposed well sites in the same water

management area (WMA) of Michigan's 5,400 WMAs, so the WWAP considers cumulative effects in a way for which Wisconsin DNR has not set up a procedure. (b) The WWAP is severely flawed, in that, although based on certain relationships between baseflow, fish habitat, and fish presence at 1700 stream sites, it is not based on evidence from measurements of conditions on any stream before and after a flow reduction, it does not treat headwaters in a way that is appropriate to this case, it does not consider the trout resource in terms of the sizes of fish that anglers desire, and it fails to take drought and seasonal lows of baseflow into account (its "Index Flows" being *median* flows for August, not low baseflows). (c) The WWAP is preliminary (Hamilton & Seelbach 2011, p 34).

8. The EA deals inadequately with thermal impacts. "Habitat conditions during summer base flows limit fish distributions as water temperatures peak during this time period and have a dominant effect on fish physiology, growth, and survival . . . Reductions in base flow may also significantly alter other habitat variables (e.g., dissolved oxygen or flow velocity) and critical ecosystem functions (e.g., sediment transport or channel maintenance)" (Zorn et al. 2008, p 3). Critical baseflows may also occur in winter (White et al. 1976) and thus lead to unsuitably cold water.

9. Parts of Fordham and Little Roche-a-Cri Creeks are the cold-transitional type, described in Hamilton & Seelbach (2011), therefore especially vulnerable to trout population damage from relatively small reductions in baseflow. Indeed, all the trout streams under consideration have a core trout zone for part of their length but then become cold-transitional in downstream reaches.

10. For all the streams at issue, baseflow reduction indices (BRI) for existing pumping in the vicinity of the proposed Richfield wells are greater than 5% and in some parts greater than 10% for the average condition and <u>not what would be produced during dry seasons and dry years</u> (Kraft 2011, Fig. 2). Therefore, headwaters baseflow is already severely impacted, especially during dry periods. Adding an increase in BRI due to proposed Richfield wells (modeled for a pumping rate of 52.5 mgy, <u>far less than 72.5 mgy</u>; Kraft 2011, Fig. 4) makes the cumulative impact on trout truly immense. Present irrigation baseflow reductions of 22% to 100% occur in the upper 1.74 miles of a Little Roche-a-Cri Creek headwater in one modeled example, based on average conditions, not seasonal dry periods and prolonged droughts, when percent reduction would be greater (Kraft 2011, Table 2). It can be concluded that conditions in headwaters of this stream are already disastrous, and added pumping would extend those conditions further downstream.

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McGILLIVRAY
WESTERBERG
& BENDER LLC
ATTORNEYS

January 7, 2013

Via Email & Hand-Delivery

Rachel Greve, DG/5
Wisconsin Department of Natural Resources
101 S. Webster St.
Madison, WI 53707-7921
Rachel.Greve@wisconsin.gov

Re: Richfield Dairy, Comments on Draft Supplemental EA

Dear Ms. Greve:

This letter is submitted on behalf of Friends of the Central Sands ("FOCS"), a group of citizens concerned about water quality and quantity issues in the Central Sands region of Wisconsin. FOCS is particularly concerned about the proposed Richfield Dairy in Adams County, Wisconsin, a large-scale concentrated animal feeding operation which seeks to install two high-capacity wells in an area that is already experiencing acute environmental effects from high-capacity well pumping.

This letter and the attached comments from Mr. Kenneth Wade, P.E., P.G. (**Attachment A**), and Ray White, Ph.D. (**Attachment B**), are in response to the draft supplemental environmental assessment ("Supplemental EA") issued by the DNR in relation to the proposed high-capacity well permit sought by the dairy, with an annual pumping limit of 72.5 million gallons per year ("MGPY"). For the following reasons, the Supplemental EA is not supported by adequate analysis and fails to meet the requirements of the Wisconsin Environmental Policy Act, Wis. Stat. § 1.11 ("WEPA"). Additionally, FOCS has submitted sufficient evidence to trigger additional environmental review or permit denial under *Lake Beulah Management District v. DNR*, 2011 WI 54. The Supplemental EA should not be certified and the high-capacity well permit should not be issued.

A. *The Supplemental EA Does Not Satisfy WEPA.*

1. Required Contents of an Environmental Assessment.

As you know, "[t]he purpose of WEPA is to insure that agencies consider environmental impacts during decision making." *State* ex rel. *Boehm v. DNR*, 174 Wis. 2d 657, 665, 497 N.W.2d 445 (1993). In addition to informing the decisionmakers about a project's environmental impact, WEPA procedures are also intended to inform the public about a proposed action. *Wisconsin's Envtl. Decade, Inc. v. DNR*, 94 Wis. 2d 263, 271, 288 N.W.2d 168 (Ct. App. 1979). Under the DNR's regulations, environmental assessments "shall be an analytical document that enables environmental and economic factors to be considered in the development of a proposed action." Wis. Admin. Code § NR 150.22(b). Further, "[t]he environmental analysis shall include information which is important to evaluating reasonably foreseeable significant adverse impacts on the human environment." *Id.* § 150.22(e).

Wisconsin's regulations implementing WEPA are specific about what environmental assessments and environmental impact statements prepared under WEPA must contain. *See* Wis. Admin. Code § NR 150.22. The DNR must consider a number of factors in determining whether an action is major:

> 1. The extent of short-term and long-term environmental effects including secondary effects; particularly to geographically scarce resources such as historic or cultural resources, scenic and recreational resources, prime farmlands, threatened or endangered species or ecologically critical areas.
> 2. The extent of cumulative effects of repeated actions of the same type, or related actions or other activities occurring locally that can be reasonably anticipated and that would compound impacts.
> 3. The degree of risk or uncertainty in predicting environmental effects or effectively controlling potential environmental impacts including those relating to public health or safety.
> 4. The degree in which the action may establish a precedent for future actions or foreclose future options. This includes consistency with plans or policy of local, state or federal government.
> 5. The degree of controversy over the effects on the quality of the human environment.

Wis. Admin. Code § NR 150.22(2)(a). An EA must also contain "[a]n evaluation of the probable environmental consequences of the proposal." *Id.* § NR 150.22(b) (emphasis added). This evaluation includes "the positive and negative effects of the proposed action as it relates to the physical, biological, and socioeconomic environment." *Id.* And further, "[t]he discussion shall include adverse environmental effects which cannot be avoided should the proposal be implemented, the economic advantages and disadvantages, the relationship between short-term uses of the environment and the

maintenance and enhancement of long-term productivity, and any irreversible and irretrievable commitments of resources which would be involved." *Id.*

It is also clear what the DNR may not do in issuing environmental assessments, including relying on general or conclusory statements of impacts. In a case reviewing an environmental assessment's discussion of wetland impacts from a proposed landfill, the court rejected the DNR's unspecified, hypothetical statements that "proper engineering and operation of the site *should* avoid impacts" to wetland areas and that it is "*unlikely* that site excavation or operation" would affect the wetlands. *Town of Centerville v. DNR*, 142 Wis. 2d 240, 251, 417 N.W.2d 901 (Ct. App. 1987) (original emphasis) (affirming remand to agency for preparation of an EIS). Said the court, "[t]his approach 'leap-frogs' over any analysis of the potential problem or the solution." *Id.* at 251. Thus, not only was the court "left to speculate as to what investigation permitted the [DNR] to reach [its] conclusions," but it did not appear "that the department's expertise has actually been applied." *Id.*

Clearly, WEPA and the DNR regulations implementing it require comprehensive, accurate information about the proposed action and other existing or future actions like it, with a specific focus on long-term viability of the resource.[1] *E.g.*, Wis. Admin. Code § NR 150.22(2)(d).

2. <u>The Supplemental EA for the Proposed Wells is Deficient</u>.

The Supplemental EA for the proposed wells is deficient and cannot be finalized as written. *See* Wis. Admin. Code § NR 150.24.

FOCS primarily refers to the attached statements of Mr. Wade and Dr. White to explain omissions and deficiencies in the DNR's analysis, and the applicant's analysis to the extent the DNR relies on it.[2] These statements indicate the DNR has not assessed the environmental impacts of the proposed well in a manner that complies with WEPA and the regulations cited above. This is especially true as to short-term and long-term and secondary environmental effects, including ecologically critical areas like headwater streams and wetlands, NR 150.22(2)(a)1., cumulative effects and their ecological consequences, NR 150.22(2)(a)2., and an evaluation of the probable environmental consequences of the proposal, NR 150.22(2)(d).

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[1] Even where information is costly to obtain, unsettled, or lacking, the DNR must be say as much and provide the best analysis based on the available information. NR 150.22(1)(e), (2)(a)5.

[2] FOCS assumes information submitted during consideration of the initial EA is also part of the DNR's file for the Supplemental EA, and that it is not necessary to resubmit documents provided to the DNR previously.

FOCS also notes the following:

- The Supplemental EA relies on many generalized statements of impact that leapfrog over substantive analysis and fail the *Town of Centerville* test. For example, the wetlands analysis is two sentences long and states only that one inch of drawdown in one wetland is "not expected to cause significant environmental impacts." (Supp. EA at 3.) The DNR does not state what information it considered in drawing this conclusion, or even what constitutes a "significant" environmental impact in the context of wetlands.
- Modeling was conducted for a 25 year period, but the permit term is indefinite under Wis. Stat. § 281.34(7). The modeling should be revised or the permit approval limited in term to the period of time where environmental impacts were actually assessed.
- Mr. Wade's report explains that the consumptive use coefficient of 20% used in the SSPA modeling is not explained or justified. It is also inconsistent with the consumptive use coefficients in Wis. Admin. Code § NR 142.04.
- The Supplemental EA does not discuss the precedent-setting effect of the approval, NR 150.22(2)(a)4., the degree of controversy, NR 150.22(2)(a)5., the need for the approval, NR 150.22(b), and proposed preventive and mitigating measures, NR 150.22(2)(c).
- The alternatives analysis is inadequate (Supp. EA at 7-8), simply listing alternatives, choosing one, and nothing more. The DNR did not include "a rigorous exploration and objective consideration of the environmental impacts of all reasonable alternatives" as required by Wis. Admin. Code § NR 150.22(2)(e). For example, to what locations did Richfield Dairy consider relocating wells? What other permit conditions could be imposed that would avoid some environmental impacts, and if other conditions were rejected, why were they rejected? We have seen many instances of negotiations with the DNR between permit applicants regarding proposed conditions (including in this very case, see **Attachment C**), and if these negotiations occurred, the public should know and understand why various permit options and alternatives were rejected.

For these reasons, the DNR must try again to completely and accurately describe the environmental impacts of the proposed high-capacity wells in accordance with Wis. Stat. § 1.11 and Wis. Admin. Code § NR 150.22. Once it does, the DNR should recirculate the EA for public comment.

B. *The DNR Must Conduct a Heightened Review of the Proposed Wells or Deny the High-Capacity Well Approval.*

The agency's needed reconsideration of the high-capacity well permit application under WEPA should also contain additional analyses as required under the *Lake Beulah Management District v. DNR*, 2011 WI 54.

1. The *Lake Beulah* Decision.

The Wisconsin Supreme Court thoroughly evaluated the DNR's authority over high-capacity wells in *Lake Beulah*, a case where a new municipal well located near a lake threatened groundwater flow to the lake. The municipality had argued the DNR's authority to study, condition, or reject wells was limited to only a certain class of wells specified in Wis. Stat. §§ 281.34(4) and (5) and .35. 2011 WI 54, ¶ 29. The court roundly rejected this argument, finding instead that the DNR could thoroughly evaluate all high-capacity wells, including those pumping between 100,000 and 2,000,000 gallons per year. *Id.* ¶¶ 41-42.

Starting with the Public Trust Doctrine and continuing through Wis. Stat. ch. 281, the court concluded that "for all proposed high capacity wells, the legislature has expressly granted the DNR the authority and a general duty to review all permit applications and to decide whether to issue the permit with conditions, or to deny the application." *Id.* ¶ 39. The court additionally stated,

> The high capacity well permitting framework along with the DNR's authority and general duty to preserve waters of the state provides the DNR with the discretion to undertake the review it deems necessary for all proposed high capacity wells, including the authority and a general duty to consider the environmental impact of a proposed high capacity well on waters of the state.

Id.

The court also held that the DNR could not turn a blind eye to "sufficient concrete, scientific evidence of potential harm to waters of the state" posed by a high-capacity well. *Id.* ¶ 78. Rather, as trustee of public trust resources, the DNR has a duty to consider such evidence, as informed by the DNR's expertise in water resources management and its discretion. *Id.* In other words, when the DNR knows of harm or a risk of harm, it cannot blindly grant a high capacity well permit with no conditions to protect water resources. *Id.* ¶¶ 40-42. Instead, it has a duty to conduct further study, or condition or deny the requested approval.

2. Evidence Submitted to the DNR Requires the DNR to Conduct Further Study on or Deny the Proposed High-Capacity Well Permit.

Mr. Wade has explained how the applicant's and DNR's analyses understate the wells' projected drawdown of surface waters, and Dr. White has explained the environmental consequences of additional drawdown to area streams. Both also discuss the Supplemental EA's failure to discuss impacts in certain areas like headwater streams and the implications of this failure. The *Lake Beulah* trigger has been satisfied on this basis, at a minimum as to the need for further analysis.

The *Lake Beulah* trigger has also been satisfied because FOCS and others have shown that the cumulative effect of pumping at the Richfield Dairy wells and at other existing and reasonably foreseeable future wells in the region will cause serious environmental impacts. The Supplemental EA states the DNR will not consider cumulative impacts for purposes of issuing high-capacity well permits (Supp. EA at 7), but we strongly encourage the DNR to reconsider this position. We understand that the DNR has based this conclusion on its reading of *Lake Beulah,* which does not address cumulative impacts since such impacts were not an issue in that case, and *State v. Michels Pipeline Constru., Inc.*, 63 Wis. 2d 278, 217 N.W.2d 339 (1974), which simply recognized the right to sue one's neighbor in tort for unreasonable use of groundwater.

We believe the DNR's position is flawed because, *inter alia,* it does not recognize pre-existing authority finding that the DNR's evaluation of impacts to public trust waters must include an assessment of cumulative impacts, *e.g., Hilton v. DNR,* 2006 WI 84, ¶ 28, 293 Wis. 2d 1, 717 N.W.2d 166; *Hixon v. Public Serv. Comm'n,* 32 Wis. 2dd 608, 631, 146 N.W.2d 577 (1966), and because it ignores the DNR's charge to protect waters of the state, Wis. Stat. §§ 281.11, .12; *Lake Beulah,* 2011 WI 54, ¶¶ 33-35. There can be no dispute that these water resources are in need of protection: there is hardly a better case study of cumulative impacts than pumping-induced groundwater drawdown in the Central Sands and the impacts of that drawdown on surface water resources and private wells. For the agency to ignore the impacts of other wells when considering applications for yet more high capacity wells is wholly improper.

Finally, to the extent the proposed permit already includes conditions, the proposed conditions are insufficient and internally inconsistent.

- The prior well permit included both an annual *and* monthly pumping limit (131.2 and 21.6 MGPY, respectively), whereas the present permit includes only an annual limit. The draft EA states no rationale for omitting the monthly pumping limit, and removal of this limit could exacerbate the seasonal and drought-related impacts explained in the attached reports.

- It is unclear to which wells the monitoring requirement applies: the permitted wells, the monitoring wells required by the WPDES permit, the additional well/piezometer required by the high-capacity well approval, or all of the above? The final permit should clarify that monthly water level information is required from all of these wells.
- The annual limit applies in *any* 365-day period, but monthly monitoring results are only required to be submitted annually. In order to timely ensure compliance with the pumping limit, the final permit should require all monitoring results to be submitted on a monthly basis.

Thank you for the opportunity to submit comments. Please be advised that Friends of the Central Sands reserves the right to submit additional comments and evidence in any future contested case hearings regarding the proposed dairy and the two wells at issue. *Lake Beulah*, 2011 WI 54, ¶¶ 56-57.

Do not hesitate to let me know if you have any questions or need any further information. Thank you.

Sincerely,

McGillivray Westerberg & Bender LLC

Christa O. Westerberg

cc: Bob Clarke

Attachments:

A: Comments of Ken Wade, P.E., P.G.
B: Comments of Ray White, Ph.D.
C: Various Correspondence Between DNR and Richfield Dairy

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January 2, 2013

Dr. Francie Rowe
Pleasant Lake Management District
P.O. Box 230
Coloma WI 54930

Dear Dr. Rowe:

Per the request of the Pleasant Lake Management District, I have reviewed and offer the following comments on the undated "Richfield Dairy High Capacity Well Supplemental Environmental Assessment – 72.5 MGY."

General Comments

1. I found it odd that the Supplemental Environmental Assessment repeatedly asserted that the proposed pumping will not cause "significant environmental impacts" to wetlands, lakes, springs, and streams without ever elaborating on how much of a decline in wetland levels or lake levels or spring flows or stream flows is "significant." Without this elaboration, how would the Department know that the next inch or two of drawdown or tenth of a cfs of stream flow loss is not the one that crosses the significant impact threshold? Allow me to illustrate by example. Suppose an assessment for Pleasant Lake would determine that a 1.5 foot lowering of the long term hydrograph would result in a significant impact, such as the loss of a fish species or other critical habitat. Now suppose that 7 water pumpers each would lower lake levels by 0.2 feet (1.4 feet total), so that the lake is only 0.1 feet above the significant impact threshold. And then an eighth pumper comes into the area, who also wants pumping that will lower water levels by 0.2 feet. This last user would cross the 1.5 foot significant impact threshold, possibly diminishing a critical habitat or fish species. This notion that a level or flow threshold exists at which the next pumper causes a significant impact does not conflict with the Department's assertion that it can only regulate significant impacts from an individual high capacity property.

2. The EA contained several misunderstandings of the modeling performed by SSPA (discussed in detailed comments 1, 2, 3, and 10). The EA misstates that the method used by SSPA to account for existing irrigation pumping impacts was equivalent to that of Kraft et al. 2012a. This is not the case: if the two methods were equivalent, they would have produced nearly equivalent results. They did not. For example, SSPA estimated the existing drawdown at Pleasant Lake at 0.7 feet, substantially less than that estimated from empirical data and modeling by Kraft et al. 2012a. Hence calculations and conclusions about existing impacts on surface waters in the EA should be disregarded.

3. The EA chose metrics for assessing significant impacts on streams in a way that would be unable to define those impacts. Stream impacts were assessed as the amount of discharge diverted at some

historical gauging stations. The problem is that these stations are always located where stream flows are comparatively large, 1 to 35 cfs, whereas pumping impacts will mainly accrue where discharges are small - at the ultimate headwaters of streams where the stream first "wets up." The EA should have first assessed what the most vulnerable parts of the stream system were, and then developed metrics for gauging those impacts. Instead, it used gauging stations of convenience. The metric by which a significant impact should be assessed is, in my opinion, the fraction of discharge reduced in ultimate headwater stretches, and what length of additional stream (beyond what existing pumping is already impacting) will be dried. This can be accomplished by modeling, and was done in the letter from Kraft to Ebersberger (October 2011) regarding existing pumping impacts to streams.

4. The EA uses "natural fluctuation," among other things, as the gauge against which additional lake level decline is assessed. No justification nor reference was provided as to why natural fluctuation is a useful standard for assessing environmental impact. The EA ignores this very simple fact: pumping lowers the entire hydrograph – it brings down the lows, it brings down the average, and it brings down the highs. So the same amount of fluctuation may occur, but always at diminished levels. What is important for assessing significant impacts is how a systematic lowering of the hydrograph increases the incidence of undesirable conditions. This is lacking.

5. The EA ignores that Pleasant Lake is not fluctuating naturally, it is under a long term decline due to pumping. Water levels in recent times have been lower than levels during perhaps the most water stressed period in the last 100 years (late 1950 to early 1960s). The Department still has not recognized this reality, predicted in 1970 by the USGS and borne out by more recent reports. The statement of Asplund (Asplund to Greve 2012) demonstrates this lack of recognition: "It is difficult to know how much of this drop in [water] elevation is natural vs. that due to cumulative impacts of pumping." That this is "difficult to know" is not for a lack of research and communications with the Department. Kraft et al. (2010), in a report to the Department, provided a methodology for assessing water level declines, and showed an average 1.5 ft decline at Pleasant Lake during 1999-2008 due to pumping alone. Kraft et al. (2012a) contained a similar assessment published in a widely distributed international groundwater. The Asplund letter cited a Kraft to Ebersberger communication (October 7 2011) which states "An unbiased estimate pegs 2007 drawdowns at Pleasant Lake at 3.3 feet. An extreme interpretation of the data might conclude that the 2007 drawdown was only 2.1 feet, but a quite reasonable interpretation could also conclude that the 2007 drawdown was 3.8 feet." A more recent report to the Department (Kraft 2012b, dated October 1 2012 and submitted to the Department around November 1) provided updated assessments of pumping impacts on Pleasant as well as other area lakes.

6. The EA seems to systematically neglect loud and potentially alarming signals of pumping impacts on surface waters. For instance, the EA ignored an apparent great decline of spring flow from the Chaffee Creek spring (specific comment 8, below), and the stark contrast in Pleasant lake levels in 1992 compared with 2005 and 2010 (shown in Figures B4 and B5 in the SSPS report), where the drying of the wetland / bay in the southwest corner is unmistakable.

Detailed comments

1. Page 2, paragraph 3. *"Model grid spacing ranged from 125 square feet (ft^2) in the vicinity of the Dairy to 1000 ft^2 near the boundaries of the model."*

The EA misinterpreted the SSPA report: grid spacing was *125 ft square* to *1000 ft square* ("square" here meaning the dimension of a square on each side) which amounts to a cell size of 15625 to 1 million ft^2.

2. Page 2, paragraph 3. *"The site-specific model was constructed with model layers for the upper sand and gravel aquifer and for the lower sandstone aquifer."*

To be clear, the model was constructed with *two layers* representing the upper aquifer and one layer representing the sandstone aquifer.

3. Page 2, paragraph 3. *"Pumping from existing irrigation wells was explicitly modeled, with an irrigation water loss equivalent to the 2 inches of "missing water" identified in work by Kraft and others, 2012."*

This statement importantly misinterprets key concepts. Getting to the bottom of this misinterpretation requires some explanation. Note first that the reference provided in the Supplemental EA (Kraft et al. 2012a) says nothing about "2 inches" nor about "missing water." The term "missing water" was used in Kraft et al. 2010, but not in a way that related to a 2 inch "irrigation water loss equivalent."

What Kraft et al. (2012a) and Kraft et al. (2010) actually did was this: (1) statistically estimated a 10-year (1999-2008) average water level decline in monitoring wells and lakes that could not be explained by weather alone (leaving pumping as the only reasonable agent of causation), and then (2) determined how much "net recharge reduction" (only roughly corresponding to a "irrigation water loss") on irrigated land would be required to produce that decline. The decline is termed simply "decline" in Kraft et al. (2012a) and "missing water" in Kraft et al. (2010). But "decline" and "missing water" are NOT "an irrigation water loss," nor is the value two inches! The statistically-estimated 10-year average declines varied with monitoring well and lake location, ranging up to 3.6 feet at Huron Lake (it was 1.5 feet at Pleasant Lake).

"Net recharge reduction" on irrigated lands (perhaps getting to the point of the EA's "water loss") was produced using groundwater flow modeling. Effectively, the groundwater recharge rate on irrigated lands in the model was diminished until modeled declines matched the statistically estimated average 10-year declines. The net recharge reduction on irrigated lands IS in the neighborhood of 2 inches.

Setting aside issues of misconstruing "missing water" with "net recharge reduction," the "irrigation water loss" calculated in the SSPS report was not equivalent to the approach used by Kraft et al. (2012a). SSPA simulated irrigation pumping stresses (perhaps the same as what the Department means by "irrigation water loss") thusly: "Each of the high capacity [irrigation] wells was pumped at a rate reflecting 20 percent consumptive use relative to baseline conditions." The consumptive use was apparently calculated as 20% of the median reported pumpage of 425 wells in the model domain between 2007 and 2011.

Two problems accrue here.

First, the estimate of median pumping rates is prone to error due to missing or erroneous pumping reports, a problem that DNR has recognized and is trying to improve. Second, the 20% of the median pumping rate as the "consumptive use" is given without justification. It seems predicated on an incorrect notion that "Much of the applied irrigation water infiltrates back to the groundwater table as a result of the coarse-grained soils…" (SSPA, page 4), a statement with no basis in the irrigation scheduling literature

for the central sands (growers strive for zero infiltration to the water table). The only potential documentation that I saw for the 20% figure is in a footnote (SSPA, page 15) that states "Twenty percent consumptive use is consistent with the application of 10 inches of water to the fields and increased evapotranspiration of 2 inches." While the statement is tautologically true (20% of 10 is 2), the EA provided no evidence that it should apply here - the SSPA report did neither demonstrate that the median pumping rate has equivalence to an irrigation depth of 10 inches, nor justify a 20% consumptive use. If this footnote is what the Department was using to show "equivalence" of SSPA and Kraft et al. approaches, it could be correct only by coincidence or by contriving irrigation depths and percentages that happen to fit.

The upshot is that the SSPA approach described here may be prone to error in estimating the steady-state effects of existing pumping and the incremental effect of the proposed pumping. (The SSPA approach probably has little effect on estimating the discrete impact of the proposed pumping in isolation.)

The possibility that the SSPA approach results in error is indicated in the SSPA report (page 15): "The calculated [modeled] long-term water drawdown from baseline conditions [irrigated pumping compared to nonirrigation]... in the vicinity of the Richfield Dairy is about 2.8 inches, and the long term change in the water level in Pleasant Lake from baseline conditions [due to current irrigation pumping] is approximately 0.7 feet..." The modeling approach of Kraft et al. 2010, documented for instance in the letter from Kraft to Ebersberger (October 7 2011) calculated a drawdown of 2.1 feet compared to the SSPA 2.8 inches for the vicinity of the Richfield dairy. "Inches" in the SSPS report could be a typographical error (i.e., feet should be substituted for inches), but even if this is the case, the difference between the two is not negligible. The very low estimate (0.7 feet) of existing drawdown at Pleasant Lake is more problematic, as it does not compare well with the Kraft et al. 2012 modeling approach, nor to empirical estimates of drawdown at Pleasant Lake. I would discount it as inaccurate.

4. Page 2, paragraph 4. *"The site-specific model was run under background conditions (no pumping), current conditions (pumping from all existing irrigation wells), and existing irrigation pumping plus 72.5 MGY withdrawal from the Dairy."*

Because of comment 3 the "...current conditions (pumping from all existing irrigations wells) ..." may be inaccurate.

5. *"Model results were reported at 5 and 25 years of operation. After 25 years, the modeled system had equilibrated until groundwater drawdown was no longer increasing significantly with time (see graph of Pleasant Lake drawdowns over time, p. 17 of SSPA)."*

It seems odd and incorrect that this analysis would be truncated at 25 years if the applicants intend to run the dairy facility effectively in perpetuity. Why not take the calculations to steady-state (long times)? Granted, the figure on the top of page 17 shows Pleasant Lake may be close to a steady-state after 25 years, perhaps only increasing a few tenths of an inch more. But impacts to other water bodies may be more severely underestimated using this approach.

6. Page 3, paragraph 2, Private wells. *"In almost all cases where private wells have been constructed in accordance with the state's well code, water table drawdown of less than five feet will not cause significant impacts to private wells."*

No basis was provided for this statement. I suppose it depends what is meant by "In almost all case…" Does this mean 80%? 90%? 99%? I'm not sure. This statement does not consider that the water level in a well will be determined by natural fluctuations, on top of which existing drawdowns bring water levels lower, on top of which the new proposed wells bring them lower still.

7. Page 3, paragraph 4, Wetlands. *"The nearest mapped wetland is approximately 1.5 miles northwest of the proposed wells. The expected drawdown from the proposed wells at this wetland would be less than one inch after 25 years of pumping at the maximum proposed pumping rate (72.5 MGY), and this is not expected to cause significant environmental impacts."*

Once again, calculating a 25 year decline when the wells are expected to essentially pump in perpetuity makes no sense. The Department has not set a water level threshold for when a "significant impact" will occur in this wetland, so how can the EA be certain that such a threshold will not be crossed by this pumping?

8. Page 3, paragraph 5, Springs. *"A large spring is located 3.5 miles east of the proposed well site, at the headwaters of Chaffee Creek. The Wisconsin Springs Inventory identifies the spring's flow as approximately 2 cubic feet per second (cfs), measured in August, 1963. In July of 2003, flow at a monitoring station roughly 3800 feet downstream of the headwater spring was 1.2 cfs."*

It would seem to me that the Department would have concerns about flows at the spring being diminished from 2 cfs in 1963 to 1.2 cfs in 2003, at a location some 3800 feet downstream of the spring where larger flows would be expected. Weather does not seem to be a good explanation – conditions around 1963 were not appreciably wetter than 2003, and likely were drier. So first blush evidence would throw a caution that groundwater pumping may already be having an impact at this spring.

9. *"Modeling results confirm that flow reduction is expected to be around 0.05 cfs (Chaffee Creek gaging station 1 mile downstream of the headwater spring), or less than 5% of the spring's flow. The proposed wells are very unlikely to cause a significant decrease in flow from the spring and are not expected to have a significant environmental impact on the spring."*

It makes no sense to assess the impacts on the spring at a location 1 mile downstream of the spring instead of at the spring itself. Similar to the comment above about wetlands, the Department has not shown how it knows the proposed pumping will not cause a "significant" impact threshold to crossed, because it has not made a determination of that threshold.

10. Page 4, Streams. *"The SSPA model evaluated the impacts of the proposed wells on stream flows at gaging stations within the model domain on Little Roche a Cri Creek, Fordham Creek, Chaffee Creek, Tagatz Creek, Campbell Creek, Neenah Creek, Lawrence Creek, Carter Creek, the Mecan River,*

Schmudlack Creek, and the South Branch of Wedde Creek. The maximum modeled flow reduction was 0.10 cfs (43 gallons per minute) in Little Roche a Cri Creek at 10th Ave."

The analysis for streamflow impacts searches for the impacts at the wrong location. The EA chose to evaluate streamflow impacts where streamflows are comparatively large, between 1 and 35 cfs. Apparently they did so because it happens to be the location of where some stream measurements were taken in the past. The EA should have first asked what the most important metric for a significant impact would be and then develop a method to look at that impact. Significant impacts would be likeliest to accrue in the ultimate headwaters of the stream, i.e., where they first wet up and where discharges are small. The metric for evaluation of impact should be, by what fraction will discharge be reduced in the ultimate headwaters, and how much additional stream length will be dried? Methodology for doing this analysis was provided in the letter from Kraft to Ebersberger of October 2011.

11. *"At flow reductions of less than 4%, even sensitive stream types do not typically experience observable changes in fish populations (Hamilton and Seelbach, 2011). The expected flow reductions due to the proposed Dairy wells are unlikely to cause a significant environmental impact to the streams."*

The Department seems to be asserting a 4% flow reduction is a measure of significant environmental impact; let's allow that assertion. As the Kraft to Ebersberger letter demonstrated, existing pumping is already drying stream headwaters. Additional pumping will extend the length of dry stream, and decrease downstream discharges further. The Department has not shown how much additional headwater may be dried by this pumping, and how much more stream will have a 4% streamflow reduction from baseline conditions.

12. *"The site-specific SSPA groundwater model indicates that 25 years of pumping at the maximum proposed withdrawal amount of 72.5 MGY would result in 1.6 ± 0.26 inches of drawdown to Pleasant Lake."*

The "1.6 ± 0.26 inches" should not be misconstrued as the ultimate potential error in the estimate of drawdown at Pleasant Lake (the Asplund to Greve memo seems to interpret it this way). It is the measure of model prediction uncertainty. Nonetheless the 1.6 inches is a fair estimate, and it is almost certainly accurate to within a factor of two.

13. Page 4, Lakes. *"This change is small relative to the historically recorded 5.5-foot variation in water level."*

Comparing the impact of drawdown on a lake with the so-called natural variability has no basis that I can see for evaluating a significant environmental impact. The Department needs to fathom that groundwater pumping lowers the entire hydrograph –the highs are lower, the average is lower, and lows are lower. The increased frequency of lows and diminished highs should be the basis for evaluating an impact.

The EA ignores that what is going on at Pleasant Lake is not variability, but a trending decline. The amount of decline due to pumping could be around 3 feet since the mid 1990s (Kraft letter to Ebersberger October 2011, Kraft et al. 2012b). This pumping new adds to that decline.

14. *Overall, the impacts of the proposed wells on Pleasant Lake are likely to be insignificant, especially compared to the natural variability in lake level, the impact of existing shoreland development and lake use, and the cumulative impacts of existing pumping in the vicinity of Pleasant Lake.*

Once again, the Department has not made a determination of what level of drawdown crosses the significant impact threshold, whether that threshold has been already crossed, or will be crossed with this new pumping.

15. Page 6, cumulative impacts. *"Modeling by Kraft and Mechenich (2010) shows an average water table drawdown of 1.5 feet at Pleasant Lake…"*

More importantly than the modeling evidence is that the empirical monitoring data showed an average water table drawdown (1999-2008) of 1.5 feet. Modeling closes the loop by showing that this drawdown is explainable by 2 inches of net recharge reduction on irrigated lands. More crucial than the average is that drawdown is apparently increasing, with recent drawdowns of 3 feet or more (Kraft et al. 2012b).

16. "… *and streamflow reductions of 1.5 - 15% in headwater areas of nearby trout streams. This is attributed to water "missing" due to irrigation."*

This statement underestimates pumping impacts. Kraft et al. 2012a showed 30-44% discharge baseflow declines 2 km from stream sources, and modeling results communicated by Kraft to Ebersberger (October 2011) demonstrated pumping is drying stream headwaters.

17. *"The SSPA site-specific model also calculated impacts due to the cumulative impact of irrigation pumping. Irrigation pumping from area high capacity wells was calculated to have depressed the water level in Pleasant Lake by 0.7 feet…"*

This water level depression is substantially less than what is supported by empirical observation, and may be due to incorrectly simulating the effects of irrigation pumping (see detailed comment 2). It should be discounted.

18. "*…and reduced flow in nearby trout streams by 3-6% (0.5 - 1.8 cfs). Some streams within the model domain were calculated to have flow reduced by higher percentages (up to 41%) due to existing irrigation pumping.*

The origin of this 3-6% estimate within the SSPA report is unclear. If it refers to Table 1, it should be Noted that the 3-6% refers to places where streamflow is relatively large and a pumping impact would be small. Neither the 3-6% estimate nor the "higher percentages" elsewhere shed light on the impacts to the most vulnerable part of streams at the ultimate headwaters. This is a flaw.

19. Page 7. "*However, when DNR determines whether or not to approve an application for a high capacity well, DNR is limited to considering whether the proposed well or wells on the high capacity property may cause significant adverse environmental impacts. In this case, as described above, the*

Department's assessment of the available information is that the proposed wells are not likely to cause significant adverse environmental impacts."

What is striking to me is the Department never states what the threshold is for a significant environmental impact at any of the water bodies. How would it know if this particular development is the one that crosses the threshold?

20. Page 8. *The Department will require ongoing water level monitoring and reporting of results from monitoring wells on site.*

Monitoring of groundwater levels near the proposed high capacity wells is required to confirm the model results.

As part of the high capacity well approval, the applicant must also install a minimum of one additional piezometer nested with a monitoring well downgradient of the high capacity wells.

It seems the Department's intention is to install and monitor wells to "confirm the model results." The Department does not say how the model results will be confirmed, just that monitoring wells will be installed and then something will happen, at which point we'll know if the model results are confirmed or not. There are many open questions here - how will water levels be used to confirm the model? How will the drawdown signal be resolved from year to year variability, or the effects of adjacent wells? How will the monitoring well results inform on how well the model predicts streamflow depletions and lake level declines? My view is that installing a few nearby wells will be futile for the purpose of confirming model results. The Department needs to do something much more detailed than requesting a monitoring well or two if it wants to "confirm the model results." A lot more thought into this is needed.

Sincerely,

/s/

George J. Kraft, Ph.D., PH
Professor and Director

References

Kraft, G.J., D.J. Mechenich, K. Clancy, and J. Haucke. 2012a. Irrigation effects in the northern lake states – Wisconsin central sands revisited. Ground Water Journal 50:308-318.

Kraft, G.J., D. J. Mechenich, and J. Haucke. 2012b. Information support for groundwater management in the Wisconsin central sands, 2009-2011. Report to the Wisconsin Department of Natural Resources. Center for Watershed Science and Education, College of Natural Resources, University of Wisconsin – Stevens Point / Extension. http://www.uwsp.edu/cnr/watersheds/Reports_Publications/reports_publications.htm

Kraft, G.J. and D.J. Mechenich. 2010. Groundwater Pumping Effects on Groundwater Levels, Lake Levels, and Streamflows in the Wisconsin Central Sands. Report to the Wisconsin Department of Natural Resources in Completion of Project NMI00000247 Center for Watershed Science and Education, University of Wisconsin – Stevens Point / Extension.

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January 7, 2013

VIA EMAIL (RACHEL.GREVE@WISCONSIN.GOV)
AND U.S. MAIL

Ms. Rachel Greve, DG/5
Wisconsin Department of Natural Resources
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Madison, WI 53707-7921

Re: Richfield Dairy Supplemental Environmental Assessment
Public Comments

Dear Ms. Greve:

On November 27, 2012, the Department of Natural Resources (WDNR) issued public notice and made available for public comment a proposed Supplemental Environmental Assessment (SEA) and a technical groundwater modeling report generated by S.S. Papadopulos & Associates, LLC (SSPA) in support of Richfield Dairy's high capacity well permit modification request. WDNR relied on the SSPA report in performing the technical analysis reflected in the SEA. On behalf of Richfield Dairy, this letter provides comment on the SEA.

In its current form, the SEA provides more than sufficient technical support for the approval of the high capacity well permit modification request, and the Department has fully complied with its obligations under the Wisconsin Environmental Policy Act (WEPA). The SEA further provides more environmental impact review, consideration and analysis than is required for WDNR to process and approve Richfield Dairy's well permit modification request. Indeed, the technical analysis in the SEA and the SSPA report fully support the Department's conclusion that the proposed high capacity wells will not result in any significant impact to the environment. As such, Richfield Dairy's high capacity well permit modification request should be granted as soon as possible.[1]

[1] The public notice and comment period for the SEA was originally scheduled to close December 28, 2012, but was extended until January 7, 2013. We understand the extension request was made by an attorney representing parties currently challenging the prior-issued Richfield Dairy high capacity well permit and WPDES permit. We further understand that the basis for the extension request was that bad weather and the holiday season prevented the parties' expert consultant from adequately reviewing and commenting on the SEA. As indicated above, a large portion of the technical analysis in the SEA is based on the SSPA report, which was provided to all parties to the litigation in July 2012. All subsequent technical information and documents concerning the well modification request were also provided to the parties coincident with submittal to WDNR, as were related correspondence

The SEA and the WDNR Record Are More Than Sufficient to Satisfy WEPA.
WEPA requires WDNR to undertake an environmental review prior to taking an agency action. The scope of environmental review for particular actions is generally dictated by Wis. Stat. § 1.11, as well as Wis. Admin. Code chapter NR 150. Pursuant to §NR 150.03(8)(h)(1), the issuance of a high capacity well permit is typically a Type IV action which generally "do not require the EA or EIS process, do not require a news release, and are otherwise exempt from the procedural requirements of this chapter." *See* NR 150.20(1)(a). In this case, an environmental review was undertaken for the high capacity well permit application because WDNR determined that the well application was related to the dairy's WPDES permit application -- a Type II action which requires the agency to generate an Environmental Assessment (EA).

As noted in the SEA, the EA generated by WDNR for the Richfield Dairy was and continues to be the subject of administrative and judicial challenges. In 2012, a Dane County Circuit Court judge concluded that the EA generated by WDNR for the Richfield Dairy withstood all of the technical challenges raised by the challengers in the judicial review action, with the single exception that WDNR failed to evaluate impacts from the specific pumping volume approved by the agency. Because Richfield Dairy had already requested its approved pumping limit be reduced from 131.2 million gallons per year (gpy) to 72.5 million gpy, WDNR generated the SEA to satisfy the court's request for an updated EA and to inform its decision on the requested permit modification request.

In an overabundance of caution, to protect its investment to date, and to ensure the high capacity permit modification would overcome and render moot any meritless administrative and judicial challenges, Richfield Dairy provided WDNR with hundreds of pages of technical analysis concerning the proposed pumping volume of 72.5 million gpy. All of those documents, reports and correspondence are included in the WDNR record which demonstrates an exhaustive review was undertaken to evaluate potential impacts of the Richfield Dairy high capacity wells. Neither the extensive (and expensive) analysis generated by Richfield Dairy nor the exhaustive review performed by WDNR are required by any existing statute or promulgated administrative code provision. Indeed, the efforts of both Richfield Dairy and WDNR are well above and beyond what the legislature deemed is required for the application or issuance of the proposed high capacity well permit. *See* Wis. Stat. § 281.34, Wis. Admin Code § NR 150.03(8)(h)(1), chapters NR 812, 820.

The SEA and the hundreds of pages of technical analysis included in the WDNR record clearly demonstrate that the proposed wells will not result in any significant negative impact to the environment.

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between Richfield Dairy and WDNR. Based on the above and the fact that the SEA had already been publicly available for 30 days when the extension was requested, our view is that the extension of the comment period was not based on any technical need or scheduling problem, but instead was just another way for the litigants to cause further undue delay in the permitting process for the Richfield Dairy.

Technical Comments on the SEA
The following comments are related to the SEA itself and provide correction or clarifications.

Page 2, second full paragraph: The most recent pumping data is the most relevant for purposes of comparison between the existing irrigation well and the proposed dairy wells. From 2007 through 2011, the average pump rate from the irrigation was 46.5 million gpy, which is 64% of the pump rate requested by Richfield Dairy. As such, the paragraph should read, "Based on pumpage reported for the years 2007-2011, 72.5 MGY is roughly 33% more than the amount of water that was previously pumped for irrigation purposes."

Page 2, third full paragraph: The model grid spacing measurements should be in feet (ft), not square feet (ft^2).

Page 2, third full paragraph: The term "missing water" should be replaced with the term "consumptive use."
Page 4, first full paragraph: Fordham Creek is 4.5 miles west-southwest, not southwest.

Page 4, third full paragraph: There is a reference to "Novitski & Devaul; House," but there is no corresponding "House" included in the reference list at the end of the document.

Page 6, second paragraph under Cumulative Impacts heading: Irrigation pumping from area high capacity wells was calculated to have depressed the water level in Pleasant Lake by about 2.7 feet, not 0.7 feet. The original report contained a typographical error, which was corrected by email to WDNR on September 11, 2012.

Page 6, second paragraph under Cumulative Impacts heading: The sentence should be revised as follows: "Some streams within the model domain were calculated to have flow reduced by higher percentage than calculated by the Kraft Model (up to 41%) due to existing irrigation pumping."

Page 7, carryover paragraph: The SEA references information provided by Kenneth Wade, but there is no corresponding reference in the list at the end of the document.

As noted above, the 10-page SEA provides more than adequate information, analysis and consideration to satisfy WDNR's WEPA duties as provided by statute and promulgated administrative code. The SEA also serves to satisfy the directive from the Dane County Circuit Court, and should only be modified to address the technical items noted above.

MICHAEL BEST
& FRIEDRICH LLP

We appreciate the opportunity to provide comment on the SEA. Please contact me if you have any questions or comments concerning the information provided herein.

Sincerely,

MICHAEL BEST & FRIEDRICH LLP

David A. Crass

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Richfield Dairy Supplemental Environmental Assessment
Appendix of Comments

Section 1:

Comments of Dana Lynn Hanaman, Esquire.
Comments of Kestrel Management Services, LLC by Thomas P. Kunes, P.E.
Comments of Pleasant Lake Management District by Jean MacCubbin, President
Comments of Ms. Francie Rowe
Comments of Sierra Club—John Muir Chapter by Shahla M. Werner
Comments of Kenneth S. Wade, P.E., P.G..
Comments of Ray J. White, Ph. D..
Comments of McGillivray Westerberg & Bender LLC by Christa Westerberg, Esquire
Comments of George J. Kraft, Ph.D., P.H.
Comments of Michael Best & Friedrich LLP by David A. Crass, Esquire

Section 2:

Additional Comments

Section 3:

Additional Comments

RIVER ALLIANCE of Wisconsin

January 7, 2013

Ms. Rachel Greve

Wisconsin Dept. of Natural Resources

P.O. Box 7921

Madison, WI 53707

Dear Ms. Greve:

Please accept our comments and observations for the record concerning the application for a high-capacity well permit by Milk Source LLC for its proposed Richfield Dairy site in eastern Adams County, and your agency's development of an Environmental Assessment (EA).

The DNR was asked by a Dane County Circuit Judge to revisit a previously prepared EA that did not adequately consider the impacts of a well pumping 132 million gallons per year (mgy). Richfield Dairy subsequently requested a permit for 72.5 mgy. DNR than prepared a supplemental EA, and it is to this document that our comments are directed.

1. Cumulative Impacts

Our biggest concern with the supplemental EA is its casual dismissal of how the Richfield Dairy's 72.5 mgy of pumping might add to the cumulative (read negative) impacts to Pleasant Lake and other surface waters in the proposed dairy's vicinity. The agency acknowledges cumulative impacts are real, e.g. "...any additional water withdrawal in the area will increase existing stresses on . . . groundwater supply to surface water bodies..."

The EA then says, "DNR has evaluated these cumulative effects for the purposes of the EA, in order to perform its decision-making regarding the [Richfield Dairy] proposal." But rather than presenting any data or findings to solidify its earlier observation that cumulative impacts are "real," DNR simply lists "resources used" for its evaluation and comes to the conclusion that, even with acknowledging cumulative effects on surface waters by groundwater pumping, it is "limited" to reviewing only the wells on the "high-capacity property." Here the DNR cites no state or federal statutory or administrative limitations or proscriptions on assessing cumulative impacts or limiting its review to the property in question. Given DNR's Public Trust authority, it seems a grave oversight on the agency's part to simply punt this away in the case of Richfield Dairy.

From a common-sense point of view, it is the equivalent of DNR's point source regulators saying they can't regulate PCB deposits found in Green Bay coming from a paper mill in Kaukauna because their authority is limited, to paraphrase the agency's formulation in this case, "to the polluting property." Most disturbingly, that statement implies that the two high-capacity wells on

Milk Source's "high capacity property" are simply two pipes extending straight down into some underground tanks that no connection to the surrounding aquifer.

At some point, amidst the 2,000 + high-capacity wells in the Central Sands area, there has to be developed a science-based understanding of which well is "the last straw" for a particular groundwater-shed – the point at which one or three more wells tips the balance from sustainable to unsustainable water use. In this case, it may or may not be Richfield Dairy. But Richfield's wells will be pumping 24/7/365 (unlike the extant irrigation wells). Given the paltry attention DNR has given to cumulative effects of all these wells in this instance, the supplemental EA falls way short -- not only in giving not even cursory review to cumulative effects, but also failing to make a reasonable case for whatever analytical or regulatory limitations prevents the agency from doing so.

We urge the DNR to give cumulative effects of Richfield's and the other 90 wells in the vicinity of Pleasant Lake the serious consideration and analysis it deserves. It can be the analytical template for what needs to be applied all over the Central Sands where deleterious surface water drawdown from groundwater pumping is already obvious.

2. Permit Conditions

DNR spells out a handful of conditions for Richfield Dairy's permit. One glaring omission from this proposed set of conditions is that DNR will not require that any request by the permittee to increase its pumping capacity be made public. The sleight-of-hand attempted by Richfield Dairy in recent months regarding its water needs is rather transparent: if asking for 130 mgy gets too much scrutiny, they ask for half that to jump an easier regulatory hurdle. Given that Richfield's wells will have the capacity to pump 525 mgy, it is reasonable to assume they will be back asking for more capacity soon after operations begin (as they did at their New Chester Dairy).

We urge the DNR to make as a condition of this permit – should a permit ever be granted -- that the agency will make public any request by Richfield Dairy for a higher pumping rate as long as this facility is in business.

3. Pleasant Lake Water Levels

In reading what data the EA relied on for analyzing pumping effects by Richfield Dairy on Pleasant Lake, it summarized the lake's fluctuating levels over the decades as "historic variation."

We know that others will challenge the agency's analysis of that lake's changing levels. We would only point out that the more significant decrease in Pleasant Lake's levels have occurred in the past decade or so, coincident, it seems, with the increased groundwater pumping by the nearby high-capacity wells. A more thorough EA that didn't write off those varying water levels as "typical" or "historic" would examine just how much water had been removed from the aquifer that feeds Pleasant Lake by all the wells in its vicinity. This would help determine cumulative impacts of current and additional high-capacity wells – impacts the agency seems to wish away.

4. **"Significant"**

The entire premise of the Richfield Dairy supplemental EA is that no ecological impacts of its pumping 72.5 mgy will be "significant: -- on Pleasant Lake, an adjacent wetland, springs, and nearby creeks.

Yet nowhere in the EA is "significant" defined for any of these water bodies. The EA reads as if these impacts would not be "significant" because DNR analysts feel that they won't, without any scientific or analytic support, or definition of "significant" for any of the possibly affected water bodies.

5. **Steam Impacts**

DNR's analysis on the impacts on creeks Little Roche a Cri, Fordham, Chafee, and Tagatz is odd. It uses as its basis of analysis stream gauges rather than at the headwaters, which would be a more accurate "telling" of groundwater pumping on overall stream health. It relies on a method found in the "SSPA model," which takes us to our final comment.

6. **Sources of Data and Analysis**

We understand that the Dept. of Natural Resources is significantly understaffed to provide the kind of analysis necessary or desirable for these complex environmental issues. We appreciate that the DNR has to rely on data gathered and supplied by other scientists. In the case of Richfield Dairy, however, we find it discomfiting that "SSPA" – S.S. Papadopoulos and Associates – seems to be the dominant source of data collection and analysis that DNR draws on for its EA. SSPA was, of course, hired by Milk Source LLC to provide this data as part of its permit application. While DNR refers to research conducted by Prof. George Kraft and others in the EA, it is apparent that SSPA's work – work provided by a private contractor on behalf of a permit applicant -- got higher priority and more weight than did science provided by a public employee who works in the area and whose professional and academic focus and specialty has been the hydrology of the Central Sands.

We appreciate your consideration of our comments.

Sincerely,

Denny Caneff

Executive Director

Wisconsin State Senate
24th Senate District

Serving Wood, Portage, Adams
Waushara, Marathon & Marquette

JULIE LASSA
STATE SENATOR

January 7, 2013

Rachel Greve, DG/5
Wisconsin Department of Natural Resources,
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Dear Ms. Greve,

I am writing to urge the DNR to give careful consideration to the comments of my constituents in response to the Richfield Dairy Supplemental Environmental Assessment published in November. Although the assessment finds that the wells on the Richfield Dairy property "are not likely to cause significant adverse environmental impacts," the assessment itself documents the cumulative impact of the 90 high-capacity wells located within four miles of the proposed wells.

According to the assessment, current high-capacity pumping in the vicinity creates a substantial drawdown of base groundwater flow for local surface waters – in excess of 10 percent in five of the waters listed, and as much as 40 percent at one. In addition to the water lost to pumping, persistent drought conditions have also stressed the water supply in area lakes, rivers and creeks. New high capacity wells in this location will contribute to these trends and increase the potential threat to wildlife habitat, recreational use and property values along these waterways.

Further, while the estimates in the assessment are based on the applicant's stated intention to pump 72.5 million gallons of water annually, the proposed wells themselves have the capacity to pump more than seven times that amount; were they to do so, the impact on local surface waters would be devastating. A number of my constituents have expressed justifiable concerns about the impact of the new wells if they were ever permitted to operate close to their capacity.

The sensitive geology of the Central Sands region and the competing demands for groundwater make it crucial that DNR exercise caution in regulating wells in the region. The agency should listen carefully to in input of area residents, and I urge you to do so as you evaluate the Richfield Dairy well permit.

Sincerely,

Julie Lassa

JULIE LASSA
State Senator
24th Senate District

OFFICE: State Capitol. P.O. Box 7882, Madison, WI 53707-7882 PHONE: (608) 266-3123
TOLL-FREE: 1-800-925-7491 E-MAIL: sen.lassa@legis.wisconsin.gov DISTRICT NUMBER: (715) 342-3806

From: Anxious12@aol.com
To: Greve, Rachel M - DNR
Subject: (no subject)
Date: Sunday, January 06, 2013 5:19:11 PM

TO ALLOW ADDITIONAL HIGH CAPACITY WELLS AND NOT LOOK AT CUMULATIVE FUTURE IMPACT AND FUTURE ONES IS CRIMINAL. THIS COULD CAUSE A PERMANENT DRAW DOWN OF PLEASANT LAKE OF AROUND TWO FEET. IT WOULD ONLY BE A MATTER OF TIME AND PLEASANT LAKE AND OTHER SURROUDINGS LAKES, RIVERS, WETLANDS, ETC COULD BE DRIED UP. THE DNR NEEDS TO BE AWARE OF THIS AND EXPLAIN HOW THESE WELLS WOULD NOT HAVE A "SIGNIFICANT ENVIRONMENTAL IMPACT" EVEN THOUGH THEY HAVE APPROVED 7 NEW WELLS WITH PUMPING CAPACITIES GREATER THAN 70 GPM WITHIN 5 MILES OF THE PROPOSED RICHFIEL DAIRY. THEY MUST NOT ALLOW THESE ADDITIONAL WELLS TO PROTECT WHAT HAS BEEN THERE FOR MANY YEARS.

CINDY MASON
PLEASANT LAKE
N110 AND N123 CZECH DRIVE
COLOMA, WI

From: Emily Hein
To: Greve, Rachel M - DNR
Subject: Concern: High Capacity Wells in Central Sands
Date: Monday, January 07, 2013 1:36:57 PM

Dear Ms. Greve,

I am writing to express my deep concern regarding the proposed high-capacity wells for the Richfield Dairy. Our family has had a small cottage on Pleasant Lake for 4 generations and we are starting to fear this will be our last due to ongoing water level issues, which could be greatly mitigated with the help of the DNR. I am also concerned the impact the wells will have on nearby Little Roche a Cri Creek, Fordham Creek, Chaffee Creek, and Tagatz Creek.

Pleasant Lake has been experiencing very low water levels for several consecutive years, most likely as a result of the many high capacity wells in the Central Sands. Studies have shown impact to these waters at the original pumping request of 52 MGY and yet the DNR states that no *significant* impact would occur based on a higher amount of 72 MGY. In light of all other evidence, and the combination of the many other wells in the area, *significant* is a matter of interpretation. As an individual property owner who enjoys the use of these waters, these impacts are, in fact, significant!

While the DNR acknowledges the impact to these areas due to the large number of high capacity wells already in existence, the agency's position of ignoring these cumulative impacts is one of profound disappointment. As a proponent for Natural Resources (as is in your agency's name), it is deeply concerning and brings into question your agency's support – or lack therefore – of Wisconsin's most valued resources. I urge the DNR to more thoroughly address cumulative impacts: this region is located in the middle of highly intensive irrigated agriculture. Studies have shown that high-capacity wells in the region have led to reductions in water quantity in the Central Sands region of the state. I urge the DNR to deny the application for high capacity well(s) based on probable significant adverse environmental impacts to waters of the state that cannot be avoided by placing conditions on the construction or use of the well(s). At the very least, limits should be set and consideration for the people and animals of the region, <u>not solely the pockets of the businesses wishing to operate.</u>

Without sustainable water levels in Pleasant Lake and area waters, we are at risk of diminishing wild life, as well as our own properties upon these waters. Not only will our property values be impacted, but memories and happy lives are as well at stake as the water line continues to creep several feet farther away from the previous year's water line. Please remember us in your agency's ongoing review of this very important cause.

Sincerely,

Emily K. Hein
414-282-1122 (H)
414-732-0296 (C)

From: Kenneth Turner
To: Greve, Rachel M - DNR
Subject: DNR evaluation of Richfield project
Date: Sunday, January 06, 2013 1:06:58 PM

I am happy to provide these comments in regard to the proposed high-capacity wells for the Richfield Dairy. I feel an Environmental Impact Statement, EIS, is in order for several reasons:

1) There are many creeks, streams, and waters of the United States that will be impacted. Little Roche, Fordham, Chaffee, and others are all navigable, used by thousands for recreation, and valuable resources for the region. The impact of these high-capacity wells on these waters of the US as a valued commodity of the region is something that the EIS will determine.
2) Pleasant Lake, as its name implies, is another regional asset. Its value in terms of quality of life as well as its economic benefit to the entire region is enormous. Further study of the impact of these high-capacity wells is absolutely required! You cannot endanger a community's economic well-being without showing some other economic justification- and an Environmental Impact Statement is the governmentally required avenue for that justification.
   Pleasant Lake has experienced very low water levels, even previous to the recent drought. Studies have shown that there are impacts on Pleasant Lake even at the rate of 52 MGY; the current request is for even higher pumping levels! As the Department of Natural Resources is aware of the impacts at the lower levels, an Environmental Impact Statement is required.
3) There are already documented impacts on the wetlands northwest of the proposed high-capacity wells. Again, the Wisconsin Department of Natural Resources is legally required to determine the nature and severity of the impact, the possibility of decreasing the impact, the possible justification of the impact in terms of economic opportunity, etc. This is precisely the set of conditions that mandate an Environmental Impact Statement.

It is plainly shown that, at minimum, an Environmental Impact Statement must be required for this project. The project should be halted pending the outcome of this EIS. Anything less would be considered dereliction of duty by the Wisconsin Department of Natural Resources.

Ken Turner
Frequent Wisconsin Tourist! (bringing Illinois dollars to Wisconsin communities….)
And a stone's throw from Wisconsin-literally
415 Park
Warren, IL 61087
815-745-9013

From:	chris gusloff
To:	Greve, Rachel M - DNR
Subject:	Fw: Fwd: Property owner-residents" oppositional comments to supp. EA (dated 11/12) re Richfield CAFO"s 72.5 HightCapWells permit application
Date:	Monday, January 07, 2013 12:29:22 PM

Dear Ms. Grave,

My family has been coming up to Pleasant Lake for over 60 years. My grandparents started a great tradition and 4 generations later, we are still going strong. My parents met at this lake, and since then, our families have since purchased 5 homes around the lake. WE DO NOT WANT THIS TO END due to deteriorated lake levels.

As a long time owner for over 60 years, I would like it on the record that my family is in full support of the comments made below. I am forwarding the email to you as to spare you from re- reading my " personalized version".

I hope you consider the impact these wells will have on Pleasant Lake. The lake levels are low right now, the wells will destroy it!

Please confirm back.

Sincerely,

Chris Gusloff
N268 3rd lane.
Coloma, Wi.

Sent from Yahoo! Mail on Android

From: DLH <manyrivers@gmail.com>;
To: <gooseloff@sbcglobal.net>;
Subject: Fwd: Property owner-residents' oppositional comments to supp. EA (dated 11/12) re Richfield CAFO's 72.5 HightCapWells permit application
Sent: Mon, Jan 7, 2013 5:14:37 PM

No problem, Chris... yes, please see below and fw some of this w/ your edits before 4pm today!!
anything helps!

Yes, Milk Source will start pushing hard now...so BEWARE...we need to get ready for the BIG fight now! It is SO WRONG that not only are they only required to pay $125/yr for 400+ gallons of water (v. a muni well water family paying sometimes over 4x that here!), BUT WE'RE ALSO SUBSIDIZING THIS CRAP (via tax and dairy subsidies from OUR taxes)?? NO WAY, NO MORE...plz let everyone you know, know this BS is going on ALL over WI!
People just have no clue.
Dana Lynn Hanaman, Esq.
715-498-7155 (Mobile)

From: Suzan Jardine
To: Greve, Rachel M - DNR
Subject: Fw: Needing your help for Fish Lake
Date: Monday, January 07, 2013 6:07:34 AM

Ms. Greve,

I want to express my deep concern regarding the proposed high-capacity wells for the Richfield Dairy.

I am specifically concerned with the impact the wells will have on Little Roche a Cri Creek, Fordham Creek, Chaffee Creek, and Tagatz Creek as well as Pleasant Lake. I am troubled by the potential impact to Little Roche a Cri and Fordham Creeks which are both Exceptional Resource Waters, and Chaffee and Tagatz Creeks which are Outstanding Resource Waters. The wells also will have a detrimental effect on Pleasant Lake which has already been experiencing very low water levels for several consecutive years most likely as a result of the many high capacity wells in the Central Sands. The impact to the wetlands NW of the site is also of concern.

Studies have shown impact to these waters at the original pumping request of 52 MGY and yet the DNR states that no *significant* impact would occur based on a higher amount of 72 MGY. This is not logical. In light of all other evidence, and in combination of the many other wells in the area, *significant* is a matter of interpretation. As an individual who enjoys the use of these waters, these impacts are in fact significant!

While the DNR acknowledges the impact to these areas due to the large number of high capacity wells already in existence, the agency's position of ignoring these cumulative impacts is one of profound disappointment. I urge the DNR to more thoroughly address cumulative impacts; this region is located in the middle of highly intensive irrigated agriculture. Studies have shown that high-capacity wells in the region have led to reductions in water quantity in the Central Sands region of the state.

I urge the DNR to deny the application for high capacity well(s) based on probable significant adverse environmental impacts to waters of the state that cannot be avoided by placing conditions on the construction or use of the well(s).

Sincerely,

Suzan Jardine

From:	James Friedrich
To:	Greve, Rachel M - DNR
Cc:	jclarke@furstgroup.com; Scott Froehlke
Subject:	Fw: Richfield Dairy CAFO wells
Date:	Monday, January 07, 2013 7:58:06 AM

A clarification Rachel...
Regarding my reference to working "in this area", I refer to the geographical area. I worked in residuals regulation and management, with a broad array of industrial and municipal entities. I had oversight of their landspreading activities, which requires knowledge of associated water and soil resources.

From: James Friedrich
Sent: Sunday, January 06, 2013 9:22 AM
To: Rachel.Greve@wisconsin.gov
Cc: jclarke@furstgroup.com ; Scott Froehlke
Subject: Richfield Dairy CAFO wells

I am writing regarding the high-cap wells proposed for the Richfield Dairy CAFO. I worked for WDNR in this area for 16 years and have good grasp of the situation and the resource.

Given the vast pumping already taking place in the Wisconsin central sands area, and that we are currently in serious drought, the ***cumulative impact*** of the Richfield CAFO wells needs to be considered. This how WDNR plans to evaluate the proposed Golden Sands CAFO wells in the Town of Saratoga, and the situation is very similar for the Richfield CAFO. There are already many water resources adversely impacted in the central sands area, and acknowledged experts (such as George Kraft from UW-Stevens Point) recognize the fallacy of studying these wells individually, rather than in total.

For WDNR to ignore the cumulative impact of the combined well pumping defies both science and common sense. The primary mission of WDNR is to protect the resource, not to grease the wheels of ill conceived ag industry.

Jim Friedrich
Retired WDNR Wastewater Specialist/Residuals Regulator
Wisconsin Rapids Service Center

From: suzipe@aol.com
To: Greve, Rachel M - DNR
Subject: Fwd: Needing your help for Fish Lake
Date: Monday, January 07, 2013 7:24:16 AM

Ms. Greve, I want to express my deep concern regarding the proposed high-capacity wells for the Richfield Dairy. I am specifically concerned with the impact the wells will have on Little Roche a Cri Creek, Fordham Creek, Chaffee Creek, and Tagatz Creek as well as Pleasant Lake. I am troubled by the potential impact to Little Roche a Cri and Fordham Creeks which are both Exceptional Resource Waters, and Chaffee and Tagatz Creeks which are Outstanding Resource Waters. The wells also will have a detrimental effect on Pleasant Lake which has already been experiencing very low water levels for several consecutive years most likely as a result of the many high capacity wells in the Central Sands. The impact to the wetlands NW of the site is also of concern. Studies have shown impact to these waters at the original pumping request of 52 MGY and yet the DNR states that no significant impact would occur based on a higher amount of 72 MGY. This is not logical. In light of all other evidence, and in combination of the many other wells in the area, significant is a matter of interpretation. As an individual who enjoys the use of these waters, these impacts are in fact significant! While the DNR acknowledges the impact to these areas due to the large number of high capacity wells already in existence, the agency's position of ignoring these cumulative impacts is one of profound disappointment. I urge the DNR to more thoroughly address cumulative impacts; this region is located in the middle of highly intensive irrigated agriculture. Studies have shown that high-capacity wells in the region have led to reductions in water quantity in the Central Sands region of the state. I urge the DNR to deny the application for high capacity well(s) based on probable significant adverse environmental impacts to waters of the state that cannot be avoided by placing conditions on the construction or use of the well(s). Sincerely,

--
""As long as man continues to see the world in terms of 'we' and 'they'
, war is inevitable. Until we realize that 'we' are a part of
'them',peace is not possible."
Jim Parker 1944 - 1991

From:	Daniel Hoerchler
To:	Greve, Rachel M - DNR
Subject:	Fwd: Richfield dairy permit
Date:	Sunday, January 06, 2013 11:54:58 AM

Ms. Greve,

I want to express my deep concern regarding the proposed high-capacity wells for the Richfield Dairy.

I am specifically concerned with the impact the wells will have on Little Roche a Cri Creek, Fordham Creek, Chaffee Creek, and Tagatz Creek as well as Pleasant Lake. I am troubled by the potential impact to Little Roche a Cri and Fordham Creeks which are both Exceptional Resource Waters, and Chaffee and Tagatz Creeks which are Outstanding Resource Waters. The wells also will have a detrimental effect on Pleasant Lake which has already been experiencing very low water levels for several consecutive years most likely as a result of the many high capacity wells in the Central Sands. The impact to the wetlands NW of the site is also of concern.

Studies have shown impact to these waters at the original pumping request of 52 MGY and yet the DNR states that no ***significant*** impact would occur based on a higher amount of 72 MGY. This is not logical. In light of all other evidence, and in combination of the many other wells in the area, ***significant*** is a matter of interpretation. As an individual who enjoys the use of these waters, these impacts are in fact significant!

While the DNR acknowledges the impact to these areas due to the large number of high capacity wells already in existence, the agency's position of ignoring these cumulative impacts is one of profound disappointment. I urge the DNR to more thoroughly address cumulative impacts; this region is located in the middle of highly intensive irrigated agriculture. Studies have shown that high-capacity wells in the region have led to reductions in water quantity in the Central Sands region of the state.

I urge the DNR to deny the application for high capacity well(s) based on probable significant adverse environmental impacts to waters of the state that cannot be avoided by placing conditions on the construction or use of the well(s).

Sincerely,

Daniel Hoerchler

Pleasant Lake

W13371 Czech Drive

Coloma, Wi 54930

815-761-7015

From: Laurel Delaney
To: Greve, Rachel M - DNR
Subject: Help for Fish Lake
Date: Sunday, January 06, 2013 11:04:53 PM

Dear Ms. Greve,

I have been considering purchasing property in the area of Fish Lake in Hancock Wisconsin. I have delayed due to constant rumors and observable effects on the lake of water management practices in the area. I have a number of friends in the area who are property owners and who have passed along the following information to me. Wisconsin is so beautiful and I have always thought that as a state Wisconsin has always proudly maintained and watched over it's most cherished resources of waterways and forests. This area's ecological bio-diversity could suffer greatly from the proposed high-capacity wells. I would like to speak out for a return to more sustainable production in both agriculture and dairy farming. The following information details the specifics of our concerns about the Richfield Dairy high-capacity wells. Thank you for your consideration. Best Regards, Laurel Delaney

I want to express my deep concern regarding the proposed high-capacity wells for the Richfield Dairy.

I am specifically concerned with the impact the wells will have on Little Roche a Cri Creek, Fordham Creek, Chaffee Creek, and Tagatz Creek as well as Pleasant Lake. I am troubled by the potential impact to Little Roche a Cri and Fordham Creeks which are both Exceptional Resource Waters, and Chaffee and Tagatz Creeks which are Outstanding Resource Waters. The wells also will have a detrimental effect on Pleasant Lake which has already been experiencing very low water levels for several consecutive years most likely as a result of the many high capacity wells in the Central Sands. The impact to the wetlands NW of the site is also of concern.

Studies have shown impact to these waters at the original pumping request of 52 MGY and yet the DNR states that no *significant* impact would occur based on a higher amount of 72 MGY. This is not logical. In light of all other evidence, and in combination of the many other wells in the area, *significant* is a matter of interpretation. As an individual who enjoys the use of these waters, these impacts are in fact significant!

While the DNR acknowledges the impact to these areas due to the large number of high capacity wells already in existence, the agency's position of ignoring these cumulative impacts is one of profound disappointment. I urge the DNR to more thoroughly address cumulative impacts; this region is located in the middle of highly intensive irrigated agriculture. Studies have shown that high-capacity wells in the region have led to reductions in water quantity in the Central Sands region of the state.

I urge the DNR to deny the application for high capacity well(s) based on probable significant adverse environmental impacts to waters of the state that cannot be avoided by placing conditions on the construction or use of the well(s).

Sincerely,

Laurel Delaney

From: Mike & Fran Geier
To: Greve, Rachel M - DNR
Subject: Hi Cap wells in the Central sands plain
Date: Monday, January 07, 2013 9:57:21 AM

Ms. Greve;

My name is Michael Geier and I am the President of the Waushara County Watershed Lakes Council, Inc. (WCWLCI). This organization is made up of lake groups and concerned citizens in Waushara County who's goal is to protect, preserve and restore the waters of Waushara County. This job has been made increasingly difficult since 2000 with High Capacity Wells popping up everywhere in the Central Sands Plain. This area is being threatened yearly more and more with more hi-cap wells being approved daily by the Wisconsin Department of Natural Resources (WDNR). Just last year the WDNR permitted 51 new hi-cap wells in Waushara County and 36 hi-cap wells in Portage County. In 2011, the Wisconsin Supreme Court placed the WDNR in charge of all surface and groundwater in Wisconsin and since then the WDNR has become, "The Kids in the Candy Store". Since 1998, five lakes Waushara County have dried up and several other lakes in Waushara County are now threatened and are drying up. The only factor in this area that has changed reference water usage is the number of hi-cap wells being installed for irrigation systems and now CAFO's. Waushara County is loosing tax base and tourism dollars yearly. The WCWLCI strongly supports the efforts to block the construction of the Richfield Dairy near Pleasant Lake in Waushara County and we strongly encourage the WDNR to designate the Central Sands Plain as a Water Management Area. This will give the WDNR the time they will need to study the water usage in this area. The waters of Waushara County need your support and we need it NOW. Ms. Greve, come to this area to actually see what is taking place. The WDNR MUST look at these well permits and the *overall effect* they are having in this regent. Waushara County needs it's lakes, rivers and streams to generate revenue, there really isn't any other businesses here. Waushara County is known for it's lakes, rivers and streams and right now the WDNR is destroying the Central Sands Plain and Waushara County.

Sincerely,

Michael Geier, President
Waushara County Watershed lakes Council, Inc.

From: Alistair Stewart
To: Greve, Rachel M - DNR
Subject: High Cap Well for Richfield CAFO
Date: Sunday, January 06, 2013 8:26:15 PM

I want to express my deep concern regarding the proposed high-capacity wells for theRichfield Dairy. I am specifically concerned with the impact the wells will have on Little Roche a Cri Creek, Fordham Creek, Chaffee Creek, and Tagatz Creek as well as Pleasant Lake. I am troubled by the potential impact to Little Roche a Cri and Fordham Creeks which are both Exceptional Resource Waters, and Chaffee and Tagatz Creeks which are Outstanding Resource Waters. The wells also will have a detrimental effect on Pleasant Lake has already been experiencing very low water levels for several consecutive years most likely as a result of the many high capacity wells in the Central Sands. The impact to the wetlands NW of the site is also of concern. Studies have shown impact to these waters at the original pumping request of 52 MGY and yet the DNR states that no ***significant*** impact would occur based on a higher amount of 72 MGY. In light of all other evidence, and in combination of the many other wells in the area, ***significant*** is a matter of interpretation. As an individual property owner who enjoys the use of these waters, these impacts are in fact significant!

While the DNR acknowledges the impact to these areas due to the large number of high capacity wells already in existence, the agency s position of ignoring these cumulative impacts is one of profound disappointment. I urge the DNR to more thoroughly address cumulative impacts; this region is located in the middle of highly intensive irrigated agriculture. Studies have shown that high-capacity wells in the region have led to reductions in water quantity in the Central Sands region of the state. I urge the DNR to deny the application for high capacity well(s) based on probable significant adverse environmental impacts to waters of the state that cannot be avoided by placing conditions on the construction or use of the well(s).

Sent from my iPad

From: Chris Irvin
To: Greve, Rachel M - DNR
Subject: High Capacity Well for the Richfield Dairy
Date: Monday, January 07, 2013 6:21:00 PM

Ms Greve,

I am writing to express my concern for the Richfield Dairy's proposed high-capacity wells. I am particularly concerned with the impact the wells will have on Little Roche a Cri Creek, Fordham Creek, Chaffee Creek, and Tagatz Creek as well as Pleasant Lake. The potential impact to Little Roche a Cri and Fordham Creeks, which are both Exceptional Resource Waters, and Chaffee and Tagatz Creeks, which are Outstanding Resource Waters. The wells also will have a detrimental effect on Pleasant Lake, which is showing visible water level decreases already. The impact to the wetlands NW of the site is also of concern. Studies show the impact to these waters at the original pumping request of 52 MGY and yet the DNR states that *no significant* impact would occur based on a higher amount of 72 MGY. This "oversight" defies all logic. In light of all other evidence, and in combination with the many other wells in the area, "*no significant"* impact is a matter of interpretation. I recreate in and enjoy these waters, so as a part-time resident these impacts are very significant!

While the DNR acknowledges the impact to these waters due to the large number of high capacity wells already in existence, the agency's position of ignoring these cumulative impacts is very concerning and disappointing. I urge the DNR to more thoroughly address cumulative impacts; this region is located in the middle of highly intensive irrigated agriculture. Studies have shown that high-capacity wells in the region have led to reductions in water quantity in the Central Sands region of the state. I strongly urge the DNR to deny the application for high capacity well(s) based on probable significant adverse environmental impacts to waters of the state that cannot be avoided by placing conditions on the construction or use of the well(s).

Thank you for the opportunity to share my concerns.

--
Thanks
Chris Irvin, REHS
Sandpoint, Idaho (Coloma, Wisconsin)

From:	Paul Triezenberg
To:	Greve, Rachel M - DNR
Cc:	suzanne triezenberg
Subject:	High Capacity Wells Adverse Affects
Date:	Sunday, January 06, 2013 9:00:05 PM

I

want to express my deep concern regarding the proposed high-capacity wells for the Richfield Dairy. I am specifically concerned with the impact the wells will have on Little Roche aCri Creek, Fordham Creek, Chaffee Creek, and Tagatz Creek as well as Pleasant Lake. I am troubled by the potential impact to Little Roche a Cri and FordhamCreeks which are both Exceptional Resource Waters, and Chaffee and TagatzCreeks which are Outstanding Resource Waters. The wells also will have a detrimental effect on Pleasant Lake has already been experiencing very low water levels for several consecutive years most likely as a result of the many high capacity wells in the Central Sands. The impact to the wetlands NW of the site is also of concern. Studies have shown impact to these waters at the original pumping request of 52 MGY and yet the DNR states that no *significant* impact would occur based on a higher amount of 72 MGY. In light of all other evidence, and in combination of the many other wells in the area, *significant* is a matter of interpretation. As an individual property owner who enjoys the use of these waters, these impacts are in fact significant! We have experienced lower water levels on Pleasant for the last fours years. We experience issues with our piers and boat lifts. There are also issues with using the boat launch due to the decreasing water levels.

While the DNR acknowledges the impact to these areas due to the large number of high capacity wells already in existence, the agency's position of ignoring these cumulative impacts is one of profound disappointment. I urge the DNR to more thoroughly address cumulative impacts; this region is located in the middle of highly intensive irrigated agriculture. Studies have shown that high-capacity wells in the region have led to reductions in water quantity in the Central Sands region of the state. I urge the DNR to deny the application for high capacity well(s) based on probable significant adverse environmental impacts to waters of the state that cannot be avoided by placing conditions on the construction or use of the well(s).

Respectfully Submitted,

Paul Triezenberg

From: John Kinsman
To: Greve, Rachel M - DNR
Subject: High capacity wells -Richfield Dairy
Date: Monday, January 07, 2013 10:17:58 PM

I was a certified well pump installer. I saw what a new school in an area did to the ground water level. Neighbors had to drill new wells to reach groundwater. Pleasant Lake and the streams in the area are showing significant drop in water levels. Richfield Dairy by itself should not have a another high capacity well permit because of what it is doing to surface waters and ground water levels. When it is in the area of other high capacity wells, it will have disastrous effects on water levels. I recommend that you deny the Richfield Dairy a permit for another high capacity well.
John G. Kinsman, E2940 Hwy K, LaValle, WI 53941.

From: Jack Fahs
To: Greve, Rachel M - DNR
Subject: High Capacity Wells Richfield Diary
Date: Sunday, January 06, 2013 3:56:48 PM

Dear Rachel Greve, I am writing to voice my opinion about the high capacity wells being considered for the Richfield Dairy project. I always thought the DNR was set up to protect our natural resourses, not to give them away to individuals for cattle confinements or dairy farms. I have property on Lake Burnita (just south of Pleasant Lake) and the water is so low the past 6 or 7 years our children and grandchildren haven't even been able to go swimming there, let alone even put our dock in. This area has gone to a lot more irrigators the past few years adding much to our problem I'm sure, even though the DNR refuses to believe it. I feel everyone connected with the DNR should be. required to drive the area and see what our lakes look like ((spring fed)and talk with the adjoining land owners for their opinions . Our little lake Burnita has a meeting once a year to pay dues and discuss what has occured during the past year. Several years ago we invited a DNR to be a guest speaker for us. He informed us no uncertain terms that we better not disc or even mow our beaches as that would be bad for the wild life. I didn't realize the DNR has the power to tell you that you can not even mow your own property. OK, so now it's up to you folks to stop this insane idea about allowing multiple wells before you dry up our lakes and completely ruin the property values which are already on the skids. SINCERELY, J. Fahs

From: maurenquin@comcast.net
To: Greve, Rachel M - DNR
Subject: High Capacity Wells
Date: Sunday, January 06, 2013 4:24:03 PM

Ms. Greve

I am writing this email to express my concern over the proposed high-capacity wells for the Richfield Dairy. I am worried about the impact the wells will have. The wells proposed would impact Little Roche aCri Creek, Fordham Creek, Chaffee Creek, Tagatz Creed and Pleasant lake. The impact to the wetlands NW of the site is also a worry. As the DNR states that no significant impact would occur based on higher pumping I feel that it would be significant. I am hoping the DNR considers denying the application for high capacity wells based on the adverse envirnomental impacts to our waters and placing conditions on the construction or use of wells.

Maureen Quinn
Pleasant Lake
Coloma, WI

From: James L. Packard
To: Greve, Rachel M - DNR
Subject: High Capacity Wells
Date: Sunday, January 06, 2013 10:32:03 AM

Dear Ms. Greve,
I am writing to express my concern with the continued support the DNR has shown and continues to show regarding the addition of high capacity wells in the area of Pleasant lake in Waushara county. Our family has owned property on Pleasant Lake for over 60 years, and I presently own a home on the lake that is just six years old. Our lake is five feet below its normal level and continues to go down with the additional wells approved by the DNR. Pleasant Lake is not a dammed up stream. No water runs into or out of the lake. All the water is supplied by underground springs and water from the aquifers in the area. Additional wells will make an already bad situation worse, and will turn our lake into a grass filled valley if something isn't done to stop the uncontrolled pumping of water from the aquifer. Any amount of additional pumping will cause even greater damage to the aquifer, and lower the lakes in the area. *There are a number of case across the United States where over pumping of the aquifers have completely depleted the aquifers.* I am sure there are some right here in Wisconsin. Read the case studies, and look at the real facts.
I have some difficulty understanding how the DNR can just over look clear and simple facts, that clearly show that over pumping of an aquifer can cause them to go dry. I also don't understand how the DNR can deny this is in fact the case in the center sands area of Wisconsin, and particular in the Pleasant Lake area. I realize there is considerable pressure on the DNR to approve anything that will in other peoples words" bring jobs, and commerce to the state", and while I support more jobs, and commerce for Wisconsin I do not support it at the cost to others, or to our natural resources.
I don't want to become a part of the radical groups that over play everything that anyone does to our land and resources, but the continued lack of the DNR to act on real facts continues to lead me in a direction that the very principal of the situation warrants greater expense, then the result of the action will cost.
I strongly encourage you and the top level management of the DNR to focus very seriously on this situation, and realize that you cannot approve in additional high capacity wells, period!! in the central sands area. I will continue to follow your actions closely, and hope you determine that there is a real issue here, and that additional wells can't be allowed.
Thanks,
James L. Packard

From:	Connor Quinn
To:	Greve, Rachel M - DNR
Subject:	High Capacity Wells
Date:	Sunday, January 06, 2013 4:39:16 PM

Ms. Greve

I am writing this email to express my concern over the proposed high-capacity wells for the Richfield Dairy. I am worried about the impact the wells will have. The wells proposed would impact Little Roche aCri Creek, Fordham Creek, Chaffee Creek, Tagatz Creed and Pleasant lake. The impact to the wetlands NW of the site is also a worry. As the DNR states that no significant impact would occur based on higher pumping I feel that it would be significant. I am hoping the DNR considers denying the application for high capacity wells based on the adverse envirnomental impacts to our waters and placing conditions on the construction or use of wells.

Connor Quinn

Pleasant Lake
Coloma, WI

From: thomas quinn
To: Greve, Rachel M - DNR
Subject: High Capacity Wells
Date: Sunday, January 06, 2013 4:50:10 PM

Ms. Greve

I am writing this email to express my concern over the proposed high-capacity wells for the Richfield Dairy. I am worried about the impact the wells will have. The wells proposed would impact Little Roche aCri Creek, Fordham Creek, Chaffee Creek, Tagatz Creed and Pleasant lake. The impact to the wetlands NW of the site is also a worry. As the DNR states that no significant impact would occur based on higher pumping I feel that it would be significant. I am hoping the DNR considers denying the application for high capacity wells based on the adverse envirnomental impacts to our waters and placing conditions on the construction or use of wells.
TJ Quinn

Pleasant Lake
Coloma, WI

From: Quinn, Brennan J
To: Greve, Rachel M - DNR
Subject: High Capacity Wells
Date: Sunday, January 06, 2013 4:27:45 PM

Ms. Greve

I am writing this email to express my concern over the proposed high-capacity wells for the Richfield Dairy. I am worried about the impact the wells will have. The wells proposed would impact Little Roche aCri Creek, Fordham Creek, Chaffee Creek, Tagatz Creed and Pleasant lake. The impact to the wetlands NW of the site is also a worry. As the DNR states that no significant impact would occur based on higher pumping I feel that it would be significant. I am hoping the DNR considers denying the application for high capacity wells based on the adverse envirnomental impacts to our waters and placing conditions on the construction or use of wells.
Brennan Quinn
Pleasant Lake
Coloma, WI

From: Chris
To: Greve, Rachel M - DNR
Date: Wednesday, January 09, 2013 6:31:49 PM

I want to express my deep concern regarding the proposed high-capacity wells for the Richfield Dairy. I am specifically concerned with the impact the wells will have on Little Roche a Cri Creek, Fordham Creek, Chaffee Creek, and Tagatz Creek as well as Pleasant Lake. I am troubled by the potential impact to Little Roche a Cri and Fordham Creeks which are both Exceptional Resource Waters, and Chaffee and Tagatz Creeks which are Outstanding Resource Waters. The wells also will have a detrimental effect on Pleasant Lake has already been experiencing very low water levels for several consecutive years most likely as a result of the many high capacity wells in the Central Sands. The impact to the wetlands NW of the site is also of concern. Studies have shown impact to these waters at the original pumping request of 52 MGY and yet the DNR states that no *significant* impact would occur based on a higher amount of 72 MGY. In light of all other evidence, and in combination of the many other wells in the area, *significant* is a matter of interpretation. As an individual property owner who enjoys the use of these waters, these impacts are in fact significant!
While the DNR acknowledges the impact to these areas due to the large number of high capacity wells already in existence, the agency's position of ignoring these cumulative impacts is one of profound disappointment. I urge the DNR to more thoroughly address cumulative impacts; this region is located in the middle of highly intensive irrigated agriculture. Studies have shown that high-capacity wells in the region have led to reductions in water quantity in the Central Sands region of the state. I urge the DNR to deny the application for high capacity well(s) based on probable significant adverse environmental impacts to waters of the state that cannot be avoided by placing conditions on the construction or use of the well(s).

We live about a mile from the site and DO NOT want to have to deal with the smell, impact on my well and pollution. The value of my land and home will go down significantly… Please return to common sense and preserve our area from greedy business owners. Our quality of life is important too…….

Conrad and Christine Wasielewski
W13380 Cty Rd CC
Coloma

From: Henry Meresz
To: Greve, Rachel M - DNR
Subject: Permit for High Capacity Wells for the Richfield Diary
Date: Sunday, January 06, 2013 8:44:11 PM

I write to express my concern regarding the proposed high capacity wells for the Richfield Diary. I am concerned about the impact these wells will have on existing residential wells. I live in the area of Central Sands about 1.25 miles from the proposed Richfield Diary site, and the aquifer here is already highly stressed by substantial number of irrigation wells. Adding additional wells will only aggravate the situation. Adjacent creeks and lakes, specifically, Little Roche aCri Creek, Fordham Creek, Chaffee Creek Tagatz Creek, Pleasant and Wood Lakes may also be affected. I had serious misgivings about the original Environmental Assessment.In my view it was inaccurate as it did not address the concerns of the numerous permanent residents like myself living within about a 1 - 2 mile radius of the proposed site of the Richfield Diary. The Supplemental Environmental Assessment in spite of substantial technical details does not change my mind. In view of the foregoing I urge you to either refuse the permit for these wells or recommend an Environmental Impact Statement.
Very truly yours
Henry Meresz

From:	John D Garnett
To:	Greve, Rachel M - DNR
Subject:	Property owner-residents" oppositional comments to supp. EA (dated 11/12) re Richfield CAFO"s 72.5 HightCapWells permit application
Date:	Monday, January 07, 2013 8:35:38 PM
Importance:	High

Dear Ms Greve:

I am hereby writing, to you to express our extreme dissatisfaction with the DNR's faulty, biased, non-thorough and/or incomplete environmental review process in this supposed supplemental environmental assessment, still to date, continuing after the CAFO's sudden new application, and its pending improper permitting of this detrimental CAFO. This new supplemental EA adds very little additional evidence of review and analysis than the original EA released 5/31/11, which is now moot, due to a Superior Court Judge Markson's over-rule of the original EA found lacking.

We, as long-time Pleasant Lake property owners, share grave concerns (along with MANY other neighbors) over the now, very clearly, scientifically and concretely-documented significant harm and threats to the precious and pristine seepage Pleasant Lake upon which we live and recreate. We have continued to express these concerns and backed them up with scientific proof, but the DNR continues to outright REFUSE to analyze or acknowledge this CAFO's significant negative impact on Pleasant Lake, despite the July 2011 WI Supreme Court ruling in Buelah mandating DNR's duty to consider significant, negative impacts to surface waters by groundwater withdrawals, and despite the DNR itself acknowledging the CAFO's high cap wells' pumping as yet ANOTHER of many negative cumulative causation pumping impacts of over 400 mgy directly within 5 miles of Pleasant Lake. Pleasant Lake has an extremely public groundwater aquifer-dependent water quantity level, which has now been shown, via multiple scientific hydrogeology reports (already sited and submitted to the DNR**, see below), to suffer, in particular, a very large future drawn down by this CAFO's proposed very proximate siting in Richfield, less than 2.5 miles away.

You, the DNR, readily admit in this Supp. EA that: "Modeling by Kraft and Mechenich (2010) shows an average water table drawdown of 1.5 feet at Pleasant Lake;...in last 10 years, ...within 5 miles of the proposed Richfield Dairy,...(alone, you have already freely permitted) SIX...agricultural irrigation wells with pump capacities of 400-1200 gpm; ... it is expected that similar increases in groundwater withdrawal could continue in the future, (and finally, that) the addition of the Richfield Dairy wells, or any additional water withdrawal in the area, will increase existing stresses on the availability of groundwater to supply surface water bodies. However, when DNR determines whether or not to approve an application for a high capacity well, DNR is limited to considering whether the proposed well or wells on the high capacity property may cause significant adverse environmental impacts." (p. 6-7 of Supp. EA) . In addition, your Supp. EA states you actually consider Wade/Krafts cumulative reports "to inform your decision making", yet in the very next paragraph, you claim you CAN'T consider them, that you are "limited" to only analyzing the proposed well(s)/application. Is this because you really know you should be taking into consideration the cumulative reports.

We would like to know where this invoked "limitation" came from, and/or how the DNR,

particularly post-Buelah, via DOJ, has come to assert such BOGUS, politically-motivated "limitation?" For the DNR to outright refuse to consider and review "cumulative impacts" in reviewing high cap well permits, utterly eviscerates ANY ability and DUTY of the DNR to actually do its legal, statutory job, and serve and act as steward of the public trust. In that the majority of ground and surface waters are connected and do not operate in a vacuum of environmental individualism, such unsubstantiated declaration by the DNR that it may "not" consider this CAFO's application in conjunction with actual reality, and the reality of interconnected nearby negative impacts, is absolutely absurd, irrational, and/or a clear and patent abuse of discretion, given the DNR's very clear duty of environmental protection of public trust natural resources. This is especially the case and reality here, of this CAFO's super-groundwater-pumping's significant negative environmental impact on Pleasant Lake that at present only averages, by DNR's own admission, 15 feet in depth. Pleasant Lake is hardly a renewable public water resource, yet the DNR has specifically chosen, via its questionable, disingenuous, self-imposed "limited" internal environmental review policies, to do nothing to protect it, thereby flouting its WI constitutional duties. The DNR's liability is clear, in that it has utterly abused its discretion in pronouncing now, via this deficient supplemental EA, that the CAFO's high cap wells, while still seeking to be permitted at 72.5 mgy, will have no significant negative environmental impact on Pleasant Lake. In that regard, this supp. EA is, yet again, deficient and demonstrates that the DNR continues to choose to disregard public surface waters it is held to protect, failing to act legally, under governing common and statutory law, to properly assess, review and permit high cap wells.

We urge the DNR to do its job fully and properly, re-consider its deficient review, and thoroughly consider its cumulative/associated potentially harmful impacts to protect public waters of the state as is the DNR's duty, according to the recent Lake Buelah Supreme Court precedent, such that it does not abuse its discretion. We join in all comments to date and hereinafter submitted by the PLMD and/or Frances Rowe in relation to any of the Richfield CAFO's applications, in addition to these comments. Further, we also hereby formally bring our concerns to the greater attention of our state legislative representatives, including those in whose districts this CAFO is soliciting to operate (specifically, in the Richfield Township of Adams County), and request that they immediately also take action in terms of ensuring the safeguard of nearby private residential wells and highly threatened, extremely valuable nearby public waters like Pleasant Lake, which generate much tourism economic dollars and recreation opportunities (swimming, boating, fishing, hunting) in their districts which are irreplaceable. It is all of your responsibilities to ensure that local public waters, particularly those most immediately threatened by the proposed CAFO site, like Pleasant Lake, are not harmed.

If you allow Pleasant Lake to be severely drawn down by the illegal permitting of yet another 6K+ cow Milk Source CAFO, much like the other horrible one already operating just 10 miles to the South which has already destroyed the adjacent public surface water of Patrick Lake and local Grand Marsh area, there is no getting Pleasant Lake back. It will be impossible to reverse or turn back the devastation of this CAFO if it is allowed to be improperly sited in Richfield to our detriment. Please address these concerns and respond in writing. We continue NOT to be dissuaded and intend to do whatever is legally necessary to defeat this, yet another, irresponsible, uncaring, mega-corporation, attempting to illegally take over and destroy our precious natural resources and waters without even any financial liability, and only ridiculously being required to pay $125/year for such extreme water use. We will continue to fight to protect Pleasant Lake, but also

the whole surrounding WI Central Sands area from the expanding, irresponsible, deregulated, DNR-rubber stamped, "Open for Business" development which most certainly doesn't benefit WI residential property owners and individuals, but rather only benefits the big corporate farms in question. We will NOT allow these mega-agriculture operations to continue to rape and pillage our precious natural resources like Pleasant Lake for FREE, and even more atrociously, via our public subsidy that they have most definitely stolen from us.

As long-standing resident, tax-paying, law-abiding, property-owning Wisconsin citizens within 2.5 miles of this proposed factory farm CAFO, we are thoroughly disturbed by its ominousness. Our families have long recreated and lived on Pleasant Lake and want, intend and have the RIGHT to do so for many generations to come. We have matured together here, seen our children grow up together swimming, skiing, diving, sailing, fishing and even working (right on the Lake) here, and continue to drink and depend on our clean private well waters to sustain ourselves.
Very unfortunately, we have already witnessed and directly experienced the horrible effects of a severely lowered Pleasant Lake level, not being able to swim off or ski from around our piers because the water is already too shallow now. When I was young, being under five feet, I could not stand whatsoever at the end of our pier; now, I am lucky if the water comes up to my knee, DESPITE having extended our pier much farther out into the Lake many years ago due to the ever lower Lake. Each year we have to keep extending our pier further so that our pontoon boat is not resting on the sand, and we have some water to wade in, at least.

Therefore, this supp. EA is deficient and the DNR must do something MORE to prevent the loss of this precious public water altogether (due to continued, unregulated high cap well permitting and operation which has and continues to lower and dry up lakes and streams), including specifically, reversing its unsubstantiated finding of "no significant adverse impact", performance of an EIS, and the denial of this high cap well permit for this devastating CAFO less than 2.5 miles away. Given the acknowledged average depth of only 15 feet of Pleasant Lake, it is abundantly clear that an average draw down of 1.5 feet, to be caused in heavy part by this CAFO's high cap well permitting, will completely decimate it.

There is no question about the continued lower Pleasant Lake levels to come, that will occur, in grand part, as a result of any permitting of this CAFO, as documented. This means: silt on the beaches from boats stirring up the bottom due to shallow water, disruption of the fishery due to boats running over the sand point in shallow water where bluegills nest, NO Lake whatsoever to look at from our house as we have for years as long as I can remember/every year of my life, no friends visiting/staying as they have at the Lake for years, and sunsets that are no longer over any water. Lowered or absent lake levels mean limited continued swimming ,, no paddleboating, no pontooning with friends, and no further Lake recreating in general, because no motorized crafts nor us as humans, will be able to proceed through low water or water that is not there. This Richfield CAFO EQUALS lowered Pleasant Lake levels, if not the all out drying up of Pleasant Lake, which in turns means total loss of recreation, enjoyment here, not to mention the plummeting of our private property values, which the DNR and Milk Source would be jointly responsible for, and whom we would hold liable. Protection of this immediate public water is the duty of the DNR, and therefore, it can NOT legally permit the high cap well's this CAFO seeks in Richfield. By allowing the CAFO wells to proceed, and this supp. EA to stand as is, the

DNR will directly allow the further devastation of Pleasant Lake's water quantity, not to mention quality, and the all-out ruining of the whole pristine area's clean, rural green space, recreational opportunities in the surrounding 3 mile radius, due to the awful 6000+ cows' manure stench (with nothing preventing 3000+ more cows in future years), heavy load traffic noise and pollution, and overall development that WILL necessarily occur.

I, and my immediate family and neighbors, feel very alienated/ignored, disrespected/disregarded and disturbed/disappointed by the DNR EA's clearly erroneous and unsubstantiated claims of "no harm" and "no impact" to the public waters very close by the proposed CAFO livestock factory (particularly Pleasant Lake, where we live and work). We are also quite abhorred at the incomplete review by the DNR of Milk Source's application, and expect the DNR to (1) DENY its permit application, or in the very least (2) mandate alternate, more natural resource-protecting and responsible re-siting of this CAFO deeper West into Adams County, and/or (3) now complete the EIS which should have begun a long time ago as required (under WEPA/DNR standards of "signifcant impact(s) and/or unique, never before considered conditions/circumstances (i.e. the Central sandy, pourous soil topography of the area).

At present, the DNR's EA is severely lacking in the area of the immediate surrounding waters' quantity and quality protection, evidencing glaring omissions in its summary conclusions. Any and all other additional requirements necessary to achieve and MAINTAIN water quantity protection standards for Pleasant Lake, in particular, under the public trust doctrine, should be analyzed, and in the very least, set as conditions to any permits. The groundwater maps being relied upon in the DNR's analysis are now over 30 years old and a DNR representative him/herself has acknowledged that these maps/modelling can no longer be accurate given the addition of 800+ high capacity wells in Waushara County alone since then, and because of ever-changing groundwater flows and other geological boundaries and drawdowns in the vicinity surrounding the proposed CAFO.

An EIS must be completed/documented to assure that the DNR's environmental cumulative impacts review is reflective and consistent with WEPA as required, including consideration of the "(cumulative) impacts of repeated actions of this same type" because they "can (EASILY) be anticipated" in Adams County with effects extending necessarily to the immediate adjacent Waushara County, particularly 2.5 miles SouthEast into Waushara where Pleasant Lake is located, as the presently proposed CAFO site is located precisely on this county line. NR 150.22(2)a(2). The DNR is required to base its analyses on up-to-date information and accurate, long term modelling, and especially because these have now been provided by respected scientists, they must do so, or their any permitting of this CAFO will be illegal and met with further intense and unflattering litigation.

The DNR is Wisconsin's environmental resource steward and is obligated to protect public waters (especially from big business' pollution and lack of accountability for their destruction). If the DNR refuses to be the steward of natural resources, as is its mission, WHO will be? and WHAT, pray tell, has this State and its supposed "democratic government" come to?? Where is the environmental pre-tax on these corporations that only want to take, and take, and take?? They instead get tax-BREAKS and a free pass because they certainly can't re-fill a Lake now will or can they?

We appreciate your thorough review and incorporation of these oppositional comments in

a timely fashion and your continued improved review process. Ultimately, we request that you DENY this CAFO's permits altogether, or in the very least deny permitting now at this site (and mandate a different one) due to the extreme potential well-documented harms to the immediate public waters of Wisconsin, and complete an EIS before any other permitting can proceed. **We will hold the WI DNR accountable and encourage you, who are supposed to be representing us, to do your jobs and do so as well.** Thank you very much.

John D. and Mary Lou Garnett,
N246 3rd Court
Pleasant Lake, WI
If you do not wish to receive email communications from New York Life, please reply to this email, using the word "Opt out" in the subject line.

Please copy email_optout@newyorklife.com
New York Life Insurance Company, 51 Madison Ave, New York, NY 10010

From: Jamie O"Hearn
To: Greve, Rachel M - DNR
Subject: Proposed High Capacity Wells at Richfield Dairy
Date: Sunday, January 06, 2013 9:35:07 AM

Ms. Greve,

I want to express my deep concern regarding the proposed high-capacity wells for the Richfield Dairy.

I am specifically concerned with the impact the wells will have on Little Roche a Cri Creek, Fordham Creek, Chaffee Creek, and TagatzCreek as well as Pleasant Lake. I am troubled by the potential impact to Little Roche a Cri and Fordham Creeks which are both Exceptional Resource Waters, and Chaffee and Tagatz Creeks which are Outstanding Resource Waters. The wells also will have a detrimental effect on Pleasant Lake which has already been experiencing very low water levels for several consecutive years most likely as a result of the many high capacity wells in the Central Sands. The impact to the wetlands NW of the site is also of concern.

Studies have shown impact to these waters at the original pumping request of 52 MGY and yet the DNR states that no *significant* impact would occur based on a higher amount of 72 MGY. This is not logical. In light of all other evidence, and in combination of the many other wells in the area, *significant* is a matter of interpretation. As an individual who enjoys the use of these waters, these impacts are in fact significant!

While the DNR acknowledges the impact to these areas due to the large number of high capacity wells already in existence, the agency's position of ignoring these cumulative impacts is one of profound disappointment. I urge the DNR to more thoroughly address cumulative impacts; this region is located in the middle of highly intensive irrigated agriculture. Studies have shown that high-capacity wells in the region have led to reductions in water quantity in the Central Sands region of the state.

I urge the DNR to deny the application for high capacity well(s) based on probable significant adverse environmental impacts to waters of the state that cannot be avoided by placing conditions on the construction or use of the well(s).

Sincerely,

James O'Hearn
johearn34@gmail.com
708-638-6323

Richfield Dairy Supplemental Environmental Assessment
Appendix of Comments

Section 1:

Comments of Dana Lynn Hanaman, Esquire.
Comments of Kestrel Management Services, LLC by Thomas P. Kunes, P.E.
Comments of Pleasant Lake Management District by Jean MacCubbin, President
Comments of Ms. Francie Rowe
Comments of Sierra Club—John Muir Chapter by Shahla M. Werner
Comments of Kenneth S. Wade, P.E., P.G..
Comments of Ray J. White, Ph. D..
Comments of McGillivray Westerberg & Bender LLC by Christa Westerberg, Esquire
Comments of George J. Kraft, Ph.D., P.H.
Comments of Michael Best & Friedrich LLP by David A. Crass, Esquire

Section 2:

Additional Comments

Section 3:

Additional Comments

From: Sarah Parker
To: Greve, Rachel M - DNR
Subject: Re: Richfield Dairy Deep Well operation
Date: Sunday, January 06, 2013 6:32:53 AM

Ms. Greve,

There must be a balance between the needs of industry and the capacity that the land has to support those needs. I've grown up visiting the central sands region (30+ years now) every summer and fall and have seen the waters of the lake on which our families' homestead stands recede slowly, but progressively, that entire time. It's to the point now that we have essentially lost the beach we once had at the end of our lake, and several smaller ponds in our area are completely dry. I sympathize with the needs of farmers to obtain water for their crops and livestock, but there must be a balance - or at least an honest recognition by the DNR of the impact these events will have on the waters of the region. To deny such an impact is an insult to the people who live here and see with their own eyes the changes caused by the continual growth of industrial sized farming operations in our area.

As such, I want to express my deep concern regarding the proposed high-capacity wells for the Richfield Dairy.

I am specifically concerned with the impact the wells will have on Little Roche a Cri Creek, Fordham Creek, Chaffee Creek, and Tagatz Creek as well as Pleasant Lake. I am troubled by the potential impact to Little Roche a Cri and Fordham Creeks which are both Exceptional Resource Waters, andChaffee and Tagatz Creeks which are Outstanding Resource Waters. The wells also will have a detrimental effect on Pleasant Lake which has already been experiencing very low water levels for several consecutive years most likely as a result of the many high capacity wells in the Central Sands. The impact to the wetlands NW of the site is also of concern.

Studies have shown impact to these waters at the original pumping request of 52 MGY and yet the DNR states that no ***significant*** impact would occur based on a higher amount of 72 MGY. This is not logical. In light of all other evidence, and in combination of the many other wells in the area, ***significant***is a matter of interpretation. As an individual who enjoys the use of these waters, these impacts are in fact significant!

While the DNR acknowledges the impact to these areas due to the large number of high capacity wells already in existence, the agency's position of ignoring these cumulative impacts is one of profound disappointment. I urge the DNR to more thoroughly address cumulative impacts; this region is located in the middle of highly intensive irrigated agriculture. Studies have shown that high-capacity wells in the region have led to reductions in water quantity in the Central Sands region of the state.

I urge the DNR to deny the application for high capacity well(s) based on probable significant adverse environmental impacts to waters of the state that cannot be avoided by placing conditions on the construction or use of the well(s).

Sincerely,

Sarah Parker, PhD
Post Doctoral Fellow
Division of Cardiology & The Bayview Proteomics Center
Johns Hopkins University
5200 Eastern Av. Mason F Lord building,
Center Tower, Room 607
Baltimore, MD 21224
phone 410-550-8507
fax 410-550-8512

From:	thnderbd88@aol.com
To:	Greve, Rachel M - DNR
Cc:	bclarke113@yahoo.com; njc123@aol.com
Subject:	Richfield CAFO
Date:	Monday, January 07, 2013 3:00:32 PM

Dear Rachel,

I want to express my concern regarding the proposed high-capacity wells for the Richfield Dairy. The wells will have a detrimental effect on Pleasant Lake which has already been experiencing very low water levels for several consecutive years most likely as a result of the many high capacity wells in the Central Sands. The impact to the wetlands NW of the site is also of concern.

Studies have shown that high-capacity wells in the region have led to reductions in water quantity in the Central Sands region of the state. I urge the DNR to deny the application for high capacity well(s) based on probable significant adverse environmental impacts to waters of the state that cannot be avoided by placing conditions on the construction or use of the well(s).

I am troubled that the Wisconsin DNR, who has always been extremely protective of their lakes and waterways, would even consider allowing one of our precious resources to be depleted and dried up. The studies are out there.

Please consider the families, that for decades have come to Wisconsin to enjoy the natural beauty, resources and hospitality. Please consider rejecting pumping permits for Richfield Dairy to save Pleasant Lake and our environment.

Thanks for your consideration in this matter,
Dave Spataro

From: Jessica Parker Garvin
To: Greve, Rachel M - DNR
Subject: Richfield Dairy
Date: Monday, January 07, 2013 6:13:11 AM

I am an annual visitor to the area that will be affected by the Richfield Dairy and I am terribly concerned about the detriment to the ecosystem if it were to go forward. Our area can not withstand such a strain on the water supply.

Thank you.

Jessica Parker Garvin
Descendant of Hannah and Able Parker, original homesteaders of the Fish Lake area

From:	Jenifer Horne
To:	Greve, Rachel M - DNR
Subject:	Richfield Dairy CAFO Comment
Date:	Monday, January 07, 2013 6:06:15 PM

Dear Department of Natural Resources,

I am deeply concerned by the proposed high-capacity wells for the Richfield Dairy. Specifically, I'm concerned with the impact the wells will have on Little Roche aCri, Fordham, Chaffee, and Tagatz Creeks as well as Pleasant Lake. I am seriously troubled by the potential destructive impact to Little Roche a Cri and Fordham Creeks which are both Exceptional Resource Waters, and Chaffee and Tagatz Creeks which are Outstanding Resource Waters. The wells will also have a detrimental effect on Pleasant Lake which has already been experiencing very low water levels for several consecutive years, most likely as a result of the many high capacity wells in the Central Sands.

The impact to the wetlands Northwest of the site is also of grave concern. Studies have shown impact to these waters at the original pumping request of 52 MGY, and yet the DNR states that *no significant impact* would occur based on a higher amount of 72 MGY. In light of all other evidence, and in combination of the many other wells in the area, *significant* is a matter of interpretation. As a loved one of an individual property owner who enjoys the use of these waters, these impacts are in fact significant!

While the DNR acknowledges the impact to these areas due to the large number of high capacity wells already in existence, the agency's position of ignoring these cumulative impacts is profoundly disappointing. I urge the DNR to more thoroughly address cumulative impacts; this region is located in the middle of highly intensive irrigated agriculture. Studies have shown that high-capacity wells in the region have led to reductions in water quantity in the Central Sands region of the state. I urge the DNR to deny the application for high capacity well(s) based on probable significant adverse environmental impacts to waters of the state that cannot be avoided by placing conditions on the construction or use of the well(s).

Thank you for considering my opinion and our wonderful state.

Sincerely,

Jenifer Horne

From:	James Friedrich
To:	Greve, Rachel M - DNR
Cc:	jclarke@furstgroup.com; Scott Froehlke
Subject:	Richfield Dairy CAFO wells
Date:	Sunday, January 06, 2013 9:23:09 AM

I am writing regarding the high-cap wells proposed for the Richfield Dairy CAFO. I worked for WDNR in this area for 16 years and have good grasp of the situation and the resource.

Given the vast pumping already taking place in the Wisconsin central sands area, and that we are currently in serious drought, the ***cumulative impact*** of the Richfield CAFO wells needs to be considered. This how WDNR plans to evaluate the proposed Golden Sands CAFO wells in the Town of Saratoga, and the situation is very similar for the Richfield CAFO. There are already many water resources adversely impacted in the central sands area, and acknowledged experts (such as George Kraft from UW-Stevens Point) recognize the fallacy of studying these wells individually, rather than in total.

For WDNR to ignore the cumulative impact of the combined well pumping defies both science and common sense. The primary mission of WDNR is to protect the resource, not to grease the wheels of ill conceived ag industry.

Jim Friedrich
Retired WDNR Wastewater Specialist/Residuals Regulator
Wisconsin Rapids Service Center

From: Kevin Kratzke
To: Greve, Rachel M - DNR
Subject: Richfield Dairy Comments
Date: Sunday, January 06, 2013 11:06:23 PM

Dear Ms. Greve,

I am writing this e-mail in support of the comments you received requesting monitoring of the land application areas of the wastes generated by Richfield Dairy. On page 87 of the RichfieldDairyComments.pdf (Permit Changes and Response to Comments, Richfield Dairy, WPDES Permit No. WI-0064815-01-0), the following is stated:

> A number of comments requested that if the Department issues the WPDES permit, groundwater monitoring should be required for the production area and/or land application areas. Reasons for requiring the monitoring included (1) the sandy nature of soils in the area that make it susceptible to groundwater contamination, (2) high groundwater, (3) the high quality of water resources in the area and (4) the size of the operation included the large number of acres where manure will be land spread. Requested parameters to be monitored included (1) water table height to ensure the proposed withdrawal is not adversely impacting adjacent surface waters or private wells, (2)bacteria and nutrients to ensure contamination of the groundwater is not occurring as a result of the proposed manure spreading.
>
> **Response:** The Department does not regulate water quantity issues and impacts to private wells as part of the WPDES permit. The Department has not required groundwater monitoring at land application sites due to the complexity and ineffectiveness of requiring such monitoring (e.g., what if a permittee never land applies manure on the field where groundwater monitoring wells have been installed or only applies minimal amounts of manure to the field being monitored?). The Department does not have authority to require groundwater monitoring of private wells. In lieu of groundwater monitoring at land application sites, the permit relies on the implementation of best management practices. Regarding groundwater monitoring within the production area, reference response to comments #2 and #3.

The Department is incorrect to rely on implementation of best management practices in lieu of monitoring to assess compliance with groundwater objectives. Considering the geology of the area, compliance with standard operation methods is not a guarantee that water quality standards will not be exceeded in the application areas. Your department argues "What if a permittee never land applies manure on the field where groundwater monitoring wells have been installed or only applies minimal amounts of manure to the field being monitored?" This assumes monitoring can only consist of monitoring wells and that pre and post monitoring is necessary. An alternative monitoring method is available.

Because the groundwater is shallow and the soil sandy and therefore has a rapid percolation rate in many areas, a reasonable alternative would be to monitoring the groundwater using direct push sampling (Geoprobe or similar) of the fields that receive the highest application rates of manure with comparison with background fields having no or low application rates and of similar geology. Not every field need be tested. A representative selection of fields can be selected annually with the results included in the annual monitoring report. Monitoring parameters would be those as listed in Section 2.1 of the WPDES permit. Different fields can be monitored each year depending on the application rates for the prior year (impacted fields should be retested) and and relative risk pf a given field.

I also believe drug usage should be monitored at the facility. Drugs often pass through to animal excrement and are subsequently disbursed on the ground and in waters of the State via the facility's waste disposal practices.

The larger the CAFO, the more need for frequent drug usage to limit disease at the facility. At a minimum, Richfield Dairy should be required to report all prescription drug usage at the site. In addition, solid and liquid manure should be analyzed for the active ingredients in the drugs to determine the quantity of the drugs that are being passed to the environment.

If the Wisconsin DNR cannot include these requirements in the current permit, they should, at a minimum, be included in the subsequent permit.

Regards,

Kevin Kratzke
Montello, WI

From: Caitlin Keenan
To: Greve, Rachel M - DNR
Subject: Richfield dairy permit IMPORTANT!
Date: Monday, January 07, 2013 12:16:00 PM

Ms. Greve,

I want to express my deep concern regarding the proposed high-capacity wells for the Richfield Dairy.

I am specifically concerned with the impact the wells will have on Little Roche a Cri Creek, Fordham Creek, Chaffee Creek, and Tagatz Creek as well as Pleasant Lake. I am troubled by the potential impact to Little Roche a Cri and Fordham Creeks which are both Exceptional Resource Waters, and Chaffee and Tagatz Creeks which are Outstanding Resource Waters. The wells also will have a detrimental effect on Pleasant Lake which has already been experiencing very low water levels for several consecutive years most likely as a result of the many high capacity wells in the Central Sands. The impact to the wetlands NW of the site is also of concern.

Studies have shown impact to these waters at the original pumping request of 52 MGY and yet the DNR states that no ***significant*** impact would occur based on a higher amount of 72 MGY. This is not logical. In light of all other evidence, and in combination of the many other wells in the area, ***significant*** is a matter of interpretation. As an individual who enjoys the use of these waters, these impacts are in fact significant!

While the DNR acknowledges the impact to these areas due to the large number of high capacity wells already in existence, the agency's position of ignoring these cumulative impacts is one of profound disappointment. I urge the DNR to more thoroughly address cumulative impacts; this region is located in the middle of highly intensive irrigated agriculture. Studies have shown that high-capacity wells in the region have led to reductions in water quantity in the Central Sands region of the state.

I urge the DNR to deny the application for high capacity well(s) based on probable significant adverse environmental impacts to waters of the state that cannot be avoided by placing conditions on the construction or use of the well(s).

Sincerely,

Caitlin Keenan

From: jayne@teamblonde.com
To: Greve, Rachel M - DNR
Subject: Richfield Dairy Permit
Date: Monday, January 07, 2013 8:27:32 AM

Ms. Greve,

I want to express my deep concern regarding the proposed high-capacity wells for the Richfield Dairy.

I am specifically concerned with the impact the wells will have on Little Roche a Cri Creek, Fordham Creek, Chaffee Creek, and Tagatz Creek as well as Pleasant Lake. I am troubled by the potential impact to Little Roche a Cri and Fordham Creeks which are both Exceptional Resource Waters, and Chaffee and Tagatz Creeks which are Outstanding Resource Waters. The wells also will have a detrimental effect on Pleasant Lake which has already been
experiencing very low water levels for several consecutive years most likely as a result of the many high capacity wells in the Central Sands. The impact to the wetlands NW of the site is also of concern.

Studies have shown impact to these waters at the original pumping request of 52 MGY and yet the DNR states that no significant impact would occur based on a higher amount of 72 MGY. This does not make any sense.

While the DNR acknowledges the impact to these areas due to the large number of high capacity wells already in existence, the agency's position of ignoring these cumulative impacts is one of profound disappointment. I urge the DNR to more thoroughly address cumulative impacts; this region is located in the middle of highly intensive irrigated agriculture. Studies have shown that high-capacity wells in the region have led to reductions in
water quantity in the Central Sands region of the state.

I urge the DNR to deny the application for high capacity well(s) based on significant adverse environmental impacts to waters of the state that cannot be avoided by placing conditions on the construction or use of the well(s).

Jayne Ertel

From:	Nance Longley
To:	Greve, Rachel M - DNR
Subject:	Richfield Dairy Permit
Date:	Monday, January 07, 2013 3:34:53 PM

Ms. Greve,

I want to express my deep concern regarding the proposed high-capacity wells for the Richfield Dairy.

I am specifically concerned with the impact the wells will have on Little Roche a Cri Creek, Fordham Creek,Chaffee Creek, and Tagatz Creek as well as Pleasant Lake. I am troubled by the potential impact to Little Roche a Cri and Fordham Creeks which are both Exceptional Resource Waters, and Chaffee and Tagatz Creeks which are Outstanding Resource Waters. The wells also will have a detrimental effect on Pleasant Lake which has already been experiencing very low water levels for several consecutive years most likely as a result of the many high capacity wells in the Central Sands. The impact to the wetlands NW of the site is also of concern.

Studies have shown impact to these waters at the original pumping request of 52 MGY and yet the DNR states that no *significant* impact would occur based on a higher amount of 72 MGY. This is not logical. In light of all other evidence, and in combination of the many other wells in the area, *significant* is a matter of interpretation. As an individual who enjoys the use of these waters, these impacts are in fact significant!

While the DNR acknowledges the impact to these areas due to the large number of high capacity wells already in existence, the agency's position of ignoring these cumulative impacts is one of profound disappointment. I urge the DNR to more thoroughly address cumulative impacts; this region is located in the middle of highly intensive irrigated agriculture. Studies have shown that high-capacity wells in the region have led to reductions in water quantity in the Central Sands region of the state.

I urge the DNR to deny the application for high capacity well(s) based on probable significant adverse environmental impacts to waters of the state that cannot be avoided by placing conditions on the construction or use of the well(s).

Sincerely,

Nance Parker Longley

co-owner of a cottage on Fish Lake, Deerfield Township, on property that my great, great grandparents Abel and Hannah Parker homesteaded in 1848.

From: Russ Clark
To: Greve, Rachel M - DNR
Subject: Richfield Dairy Permit
Date: Sunday, January 06, 2013 8:00:19 AM

Ms. Greve,

I want to express my deep concern regarding the proposed high-capacity wells for the Richfield Dairy.

I am specifically concerned with the impact the wells will have on Little Roche a Cri Creek, Fordham Creek, Chaffee Creek, and Tagatz Creek as well as Pleasant Lake. I am troubled by the potential impact to Little Roche a Cri and Fordham Creeks which are both Exceptional Resource Waters, and Chaffee and Tagatz Creeks which are Outstanding Resource Waters. The wells also will have a detrimental effect on Pleasant Lake which has already been experiencing very low water levels for several consecutive years most likely as a result of the many high capacity wells in the Central Sands. The impact to the wetlands NW of the site is also of concern.

Studies have shown impact to these waters at the original pumping request of 52 MGY and yet the DNR states that no ***significant*** impact would occur based on a higher amount of 72 MGY. This is not logical. In light of all other evidence, and in combination of the many other wells in the area, ***significant*** is a matter of interpretation. As an individual who enjoys the use of these waters, these impacts are in fact significant!

While the DNR acknowledges the impact to these areas due to the large number of high capacity wells already in existence, the agency's position of ignoring these cumulative impacts is one of profound disappointment. I urge the DNR to more thoroughly address cumulative impacts; this region is located in the middle of highly intensive irrigated agriculture. Studies have shown that high-capacity wells in the region have led to reductions in water quantity in the Central Sands region of the state.

I urge the DNR to deny the application for high capacity well(s) based on probable significant adverse environmental impacts to waters of the state that cannot be avoided by placing conditions on the construction or use of the well(s).

Sincerely,

Heidi Vance

From:	steve halvorsen
To:	Greve, Rachel M - DNR
Subject:	Richfield dairy well
Date:	Sunday, January 06, 2013 10:16:27 AM

Please do whatever you can to either deny the permit for this high cap well or place restrictions on its capacity to remove our groundwater. There are already too many of the wells in the Central Sands and coupled with our current drought they are lowering the lake levels in the area and affecting stream flows or drying them up altogether.
Thankyou,
Steve Halvorsen.
Property owner on Pleasant Lake.

From:	Richard Parker
To:	Greve, Rachel M - DNR
Subject:	Richfield Dairy wells
Date:	Sunday, January 06, 2013 12:01:43 PM

Ms. Greve,

I'm a fifth-generation member of a family that homesteaded in central Wisconsin shortly before Wisconsin became a state. I live in Minnesota now, but our extended family still has part of the old Parker farm on the shore of Fish Lake near Hancock in Waushara County. A number of my relatives live in Wisconsin, some of them in newer homes on property near our shore parcel. I've been coming to the lake literally all my life and have watched the level go up and down; it's now alarmingly low after a slide of several years, the lowest I've ever seen it. I'm 70.

Neighboring farmers don't agree with me, but I suspect that the water table in our area is stressed by the high volume of irrigation by the large farms that have increased in number over recent decades. I realize that the area's economy needs a boost, but I don't want that to come at a long-term cost to everyone.

So I'm joining others from the area in passing along the following letter urging the Department of Natural Resources to protect our water resources from commercial activity that would have a harmful effect:

I want to express my deep concern regarding the proposed high-capacity wells for the Richfield Dairy.

I am specifically concerned with the impact the wells will have on Little Roche a Cri Creek, Fordham Creek, Chaffee Creek, and Tagatz Creek as well as Pleasant Lake. I am troubled by the potential impact to Little Roche a Cri and Fordham Creeks which are both Exceptional Resource Waters, and Chaffee and Tagatz Creeks which are Outstanding Resource Waters. The wells also will have a detrimental effect on Pleasant Lake which has already been experiencing very low water levels for several consecutive years most likely as a result of the many high capacity wells in the Central Sands. The impact to the wetlands NW of the site is also of concern.

Studies have shown impact to these waters at the original pumping request of 52 MGY and yet the DNR states that no ***significant*** impact would occur based on a higher amount of 72 MGY. This is not logical. In light of all other evidence, and in combination of the many other wells in the area, ***significant*** is a matter of interpretation. As an individual who enjoys the use of these waters, these impacts are in fact significant!

While the DNR acknowledges the impact to these areas due to the large number of high capacity wells already in existence, the agency's position of ignoring these cumulative impacts is one of profound disappointment. I urge the DNR to more thoroughly address cumulative impacts; this region is located in the middle of highly intensive irrigated agriculture. Studies have shown that high-capacity wells in the region have led to reductions in water quantity in the Central Sands region of the state.

I urge the DNR to deny the application for high capacity well(s) based on probable

significant adverse environmental impacts to waters of the state that cannot be avoided by placing conditions on the construction or use of the well(s).

Sincerely,

Richard Parker
W11803 County GG
Hancock, WI 54943

1358 W. Skillman Ave.
Roseville, MN 55113

From: Jim Schafer
To: Greve, Rachel M - DNR
Subject: Richfield Dairy
Date: Sunday, January 06, 2013 6:22:20 PM

Rachel:

I have been a Pleasant Lake cottage for almost 20 years. It is a beautiful small lake in the middle of Wisconsin. The water is clean and we are working hard to keep it that way. Over the time since we purchased our property, the lake level has dropped over 2 feet when. The deep wells that have been approved by the DNR over the time we have been involved with our lake have contributed greatly to our problem. In the past 10 years, the DNR has approved wells with a pumping capacity greater than 70 gpm. The DNR continues to permit wells in areas surrounding counties that add to our concerns with water table. It has been projected by Hydrologist's that our lake could fall another 2 feet or more.

We used to brag about our lake but now have to answer questions about how low can it go and will you be able to sell your property if the lake level continues to go down. People are worried about their personal water supply and if our wells will go dry. If you can't guarantee us that the level of Pleasant Lake won't drop further and our wells won't go dry, please stop the abuse that your continuing permits are contributing to.

Thank you for listening.

Jim and Barb Schafer
Pleasant Lake Residents

From: David Drengenberg
To: Greve, Rachel M - DNR
Subject: Richfield Dairy
Date: Monday, January 07, 2013 8:37:18 AM

I would like to express my concern regarding the proposed high-capacity wells for the Richfield Dairy. I'm concerned for the Little roche aCri creek, Fordham creek, Chaffee creek, Tagatz creek and Pleasant lake. As has been shown by many studies the high capacity wells will effect all of these bodies of water and once they have been damaged it will be very difficult, if not impossible to reverse the damage. Please consider the at the minimum taking more time to investigate the true effects these high capacity wells will have on the environment. As an individual property owner who enjoys this treasure of Wisconsin environment I hope you will take some time to review the impact of these wells.

Thank you, David and Debra Drengenberg

From: Mandy Brown
To: Greve, Rachel M - DNR
Subject: Richfield Dairy
Date: Monday, January 07, 2013 1:38:31 PM

Ms. Greve,

I want to express my deep concern regarding the proposed high-capacity wells for the Richfield Dairy. I am specifically concerned with the impact the wells will have on Little Roche a Cri Creek, Fordham Creek, Chaffee Creek, and Tagatz Creek as well as Pleasant Lake. I am troubled by the potential impact to Little Roche a Cri and Fordham Creeks which are both Exceptional Resource Waters, and Chaffee and Tagatz Creeks which are Outstanding Resource Waters. The wells also will have a detrimental effect on Pleasant Lake which has already been experiencing very low water levels for several consecutive years most likely as a result of the many high capacity wells in the Central Sands. The impact to the wetlands NW of the site is also of concern. Studies have shown impact to these waters at the original pumping request of 52 MGY and yet the DNR states that no significant impact would occur based on a higher amount of 72 MGY. This is not logical. In light of all other evidence, and in combination of the many other wells in the area, significant is a matter of interpretation. As an individual who enjoys the use of these waters, these impacts are in fact significant! While the DNR acknowledges the impact to these areas due to the large number of high capacity wells already in existence, the agency's position of ignoring these cumulative impacts is one of profound disappointment. I urge the DNR to more thoroughly address cumulative impacts; this region is located in the middle of highly intensive irrigated agriculture. Studies have shown that high-capacity wells in the region have led to reductions in water quantity in the Central Sands region of the state. I urge the DNR to deny the application for high capacity well(s) based on probable significant adverse environmental impacts to waters of the state that cannot be avoided by placing conditions on the construction or use of the well(s).

Sincerely,

Mandy Brown

From: Mary Kay (Noble) Spataro
To: Greve, Rachel M - DNR; bclarke113@yahoo.com
Subject: Richfield Dairy
Date: Monday, January 07, 2013 2:27:41 PM

To Whom It May Concern:
I am writing this letter to you feeling a sense of urgent concern and despair. You really need to "see" with eyes wide open and "listen" to people with ears wide open, to the concerns of so many of us who have enjoyed the proposed Richfield Dairy area through the years with their children and hopefully grandchildren someday. You really need to look at the BIG picture! The streams, lakes and land in the area are beautiful and so many of us want to enjoy them for years to come. As I sit here writing this I am not only troubled but deeply saddend by what you have proposed. I am extremely troubled by the potential impact on our water resources. This will also have a detrimental effect for years to come on Pleasant Lake, which in the past several years or so has already been experiencing low water levels as a result of the many high capacity wells in the Central Sands.
I understand that the DNR acknowledges the impact to these areas due to the huge number of high capacity wells that are already in existence today, however the agency's posistion of purely ignoring these cumulative impacts is one of absolute dissappointment. I ask the DNR to address more thoroughly the cumulative impacts as this area is located where it is highly irrigated. The studies have proved that the high capacity wells within this region have now led to huge reductions in the water quantity in the Central Sands region of Wisconsin. I strongly urge the DNR to deny the application for high capacity well(s) based on probable significant adverse environmental impacts to waters of the state that cannot be avoided by placing conditions on the construction or use of the well(s).
Thank You for your time.
Mary Kay (Noble) Spataro

From: Mary Clark
To: Greve, Rachel M - DNR
Subject: Richfield Dairy
Date: Sunday, January 06, 2013 1:14:37 PM

My husband and I, and our family, are deeply concerned regarding the proposed high-capacity wells for the Richfield Dairy. We fear the potential impact to the already receding lakes and streams in our area and also the impact to the wetlands NW of the site.

We are in our 80's, and will perhaps not feel the impact of this proposed new well on our environment, but our children and grandchildren surely will, and so we urge you to deny this request by the Richfield Dairy to go ahead with their plans for high capacity wells in this area. We are also concerned for the hundreds of permanent residents aned recreational visitors who add to the economic well being of our community!

Thank you for considering our request!

Kelly and Mary Clark
W11777 County Road GG
Hancock, WI 54943

From: Linda Kwiatkowski
To: Greve, Rachel M - DNR
Subject: Richfield Dairy/Milksource High Capacity Wells
Date: Sunday, January 06, 2013 7:05:18 PM

Dear Ms. Greve,

I am compelled to contact you to share my very strong concern regarding the proposed high-capacity wells for the Richfield Dairy. I care deeply and am concerned with the impact the wells will have on Little Roche aCri Creek and other creek, and especially on Pleasant Lake. These have long been clean and wonderful water resources in the Central Sands area. They are Wisconsin treasures and the DNR has NOT properly evaluated the potential cumulative effect the proposed wells will have. In fact, I understand the DNR has stated, contrary to water studies done, that there will be no significant impact. To support such inaccuracy is an injustice. Studies have shown impact to these waters at the original pumping request of 52 MGY and yet the DNR states that no*significant*impact would occur based on a higher amount of 72 MGY. In light of all other evidence, and in combination of the many other wells in the area, *significant* is a matter of interpretation. As an individual property owner who enjoys the use of these waters, these impacts are in fact significant!

There are already way too many high capacity wells in the Central Sands region. The wells have "grown" exponentially in the last 20 years and have already had a detrimental effect on Pleasant Lake's water levels for several consecutive years. While the DNR acknowledges the impact to these areas due to the large number of high capacity wells already in existence, the agency's position of ignoring these cumulative impacts is one of profound disappointment. I implore the DNR to more thoroughly address cumulative impacts as this region is located in the middle of highly intensive irrigated agriculture. Studies have shown that high-capacity wells in the region have led to reductions in water quantity in the Central Sands region of the state. I urge the DNR to deny the application for high capacity wells based on probable significant adverse environmental impacts to waters of the state that cannot be avoided by placing conditions on the construction or use of the wells. The people of Wisconsin will not ignore that a state agency whose mission statement says it will protect our precious resources seems to willfully chose action contrary to the environment.

Thank you for your time and attention.

Linda Kwiatkowski

From: mtews@earthlink.net
To: Greve, Rachel M - DNR
Subject: Richfield High Capacity Wells
Date: Sunday, January 06, 2013 6:00:22 PM

Rachel,

As a cottage-owner on Pleasant Lake in Waushara County, I want to express my deep concern and opposition to the proposed high-capacity wells for the Richfield Dairy. The water levels on Pleasant Lake, as well as other nearby lakes and streams, have been going down for the past several years; most likely because of the many high capacity wells already in this region.

Now the Richfield Dairy is requesting the DNR's approval to pump 72 MGY,
and the DNR states that no significant impacts would occur. Studies have
proven that, in combination with other high-capacity wells in this area,
this would lead to reductions in water quantity in the Central Sands region. No longer would I, or other owners of property on lakes and streams in this area, be able to swim, ski, and fish; and the value of our property would be greatly reduced.

I urge the DNR to deny the application for high capacity wells.

Marilyn Tews

From: carol
To: Greve, Rachel M - DNR
Subject: the proposed high-capacity wells for the Richfield Dairy
Date: Sunday, January 06, 2013 9:35:14 PM

Rachel,

I want to express my deep concern regarding the proposed high-capacity wells for the Richfield Dairy. I am specifically concerned with the impact the wells will have on Little Roche a Cri Creek, Fordham Creek, Chaffee Creek, and Tagatz Creek as well as Pleasant Lake. The wells also will have a detrimental effect on Pleasant Lake has already been experiencing very low water levels for several consecutive years most likely as a result of the many high capacity wells in the Central Sands. The impact to the wetlands NW of the site is also of concern. Studies have shown impact to these waters at the original pumping request of 52 MGY and yet the DNR states that no *significant* impact would occur based on a higher amount of 72 MGY. In light of all other evidence and in combination of the many other wells in the area, *significant* is a matter of interpretation.

While the DNR acknowledges the impact to these areas due to the large number of high capacity wells already in existence, the agency's position of **ignoring these cumulative impacts** is one of profound disappointment. I urge the DNR to more thoroughly address cumulative impacts; this region is located in the middle of highly intensive irrigated agriculture. Studies have shown that high-capacity wells in the region have led to reductions in water quantity in the Central Sands region of the state. I urge the DNR to deny the application for high capacity well(s) based on probable significant adverse environmental impacts to waters of the state that cannot be avoided by placing conditions on the construction or use of the well(s).

It's about time that the DNR do their jobs and protect our natural resources – this is not about big money - this is about protecting our natural resources which we will not be able to re-coop once they are gone – (Little Plover River). We are in the process of trying to stop WYSOCKI Family Farms from implementing their CAFO in Saratoga --- again the soils are permeable, the creeks, rivers and lakes will all be impacted.

It is mind boggling that we even have to be fighting these issues when it is common sense that if you continue to take and do not return (greed) you will have nothing. Why the DNR does not look at the total of high capacity wells as a whole just does not make any sense. Just as it does not make any sense, why the WFF is allowed to implement another CAFO when their existing one has so many violations. The biggest violation is one of the DNR granting them a five year permit to continue with their operation.

WFF is not the only CAFO -- when are they going to have to be responsible for their

actions???? When is the DNR going to step up and put politics aside and fight for the people who live in the areas of these CAFO's???

Thank you for your time,

Regards,

Carol Janik
Protect Wood County Org

From: Cecilia Hardacker
To: Greve, Rachel M - DNR
Subject: URGENT! Re:Richfield Dairy.
Date: Monday, January 07, 2013 9:50:16 AM

Ms. Greve,

I want to express my deep concern regarding the proposed high-capacity wells for the Richfield Dairy.

I am specifically concerned with the impact the wells will have on Little Roche a Cri Creek, Fordham Creek, Chaffee Creek, and Tagatz Creek as well as Pleasant Lake. I am troubled by the potential impact to Little Roche a Cri and Fordham Creeks which are both Exceptional Resource Waters, and Chaffee and Tagatz Creeks which are Outstanding Resource Waters. The wells also will have a detrimental effect on Pleasant Lake which has already been experiencing very low water levels for several consecutive years most likely as a result of the many high capacity wells in the Central Sands. The impact to the wetlands NW of the site is also of concern.

Studies have shown impact to these waters at the original pumping request of 52 MGY and yet the DNR states that no ***significant*** impact would occur based on a higher amount of 72 MGY. This is not logical. In light of all other evidence, and in combination of the many other wells in the area, ***significant*** is a matter of interpretation. As an individual who enjoys the use of these waters, these impacts are in fact significant!

While the DNR acknowledges the impact to these areas due to the large number of high capacity wells already in existence, the agency's position of ignoring these cumulative impacts is one of profound disappointment. I urge the DNR to more thoroughly address cumulative impacts; this region is located in the middle of highly intensive irrigated agriculture. Studies have shown that high-capacity wells in the region have led to reductions in water quantity in the Central Sands region of the state.

I urge the DNR to deny the application for high capacity well(s) based on probable significant adverse environmental impacts to waters of the state that cannot be avoided by placing conditions on the construction or use of the well(s).

Sincerely,

Cecilia T. Hardacker
8142 Cuyler Ave.
Berwyn, IL 60402

From:	Susan Turner
To:	Greve, Rachel M - DNR
Cc:	Bob Clarke; William Iwen
Subject:	Water is not a "free" commodity
Date:	Sunday, January 06, 2013 11:11:55 AM

Dear Rachel Greve,

Because of the drought experiences we have witnessed this past summer and fall, I want to express my deep concern regarding the proposed high-capacity wells for the Richfield Dairy.

Even with the present snow cover, there is still a continuing drought. High capacity wells are just an insult to injury.

I am specifically concerned with the impact the wells will have on Little Roche aCri Creek, Fordham Creek, Chaffee Creek, and Tagatz Creek as well as Pleasant Lake. I am troubled by the potential impact to Little Roche a Cri and FordhamCreeks which are both Exceptional Resource Waters, and Chaffee and TagatzCreeks which are Outstanding Resource Waters. The wells also will have a detrimental effect on Pleasant Lake, which has been experiencing very low water levels for several consecutive years most likely as a result of the many high capacity wells in the Central Sands. The impact to the wetlands NW of the site is also of concern. Studies have shown impact to these waters at the original pumping request of 52 MGY and yet the DNR states that no *significant* impact would occur based on a higher amount of 72 MGY. In light of all other evidence, and in combination of the many other wells in the area, *significant* is a matter of interpretation. As a tourist who enjoys the use of these waters, these impacts are in fact significant!

Water is being used as a bargaining chip to entice big businesses to locate to Wisconsin from other drought riddled states out West. Water is not to be treated as a free commodity, and therefore should be taxed for operations withdrawing 400,000 gallons or more per day. A tax scale can be designed to help offset the expense “others” become burdened with as they re-drill wells that go dry, or dredge lake shores, marinas and beaches that cannot be used for eco-tourism purposes in their present condition. Algae is not to be used as a welcome mat….Tourism= Job Creation.

I urge the DNR to more thoroughly address cumulative impacts; this region is located in the middle of highly intensive irrigated agriculture. Studies have shown that high-capacity wells in the region have led to reductions in water quantity in the Central Sands region of the state. I urge the DNR to deny the application for high capacity well(s) based on probable significant adverse environmental impacts to waters of the state that cannot be avoided by placing conditions on the construction or use of the well(s).

Sincerely,

Susan Turner

415 Park Ave.

Warren, IL. 61087....6 blocks from Wisconsin State Line.

815-745-9013

From:	Scott Froehlke
To:	Greve, Rachel M - DNR
Subject:	WDNR"s Supplemental EA for Richfield Dairy
Date:	Monday, January 07, 2013 9:33:42 AM

January 7, 2013

Dear Ms. Greve:

I am a citizen of Marquette County and helping to coordinate the activities of an organization called the Central Sands Water Action Coalition (CSWAC.) This group was formed in 2012 and consists of 11 groups functioning within the six county area which make up Wisconsin central sand's region. Each of these existing groups are committed to some aspect of natural resource protection or promotion. CSWAC's overall mission to promote sustainable groundwater policies for the Central Sands region consisting of Portage, Wood, Adams, Waupaca, Marquette and Waushara Counties.

CSWAC has reviewed comments offered by the Pleasant Lake Management District (PMLD) and the River Alliance of Wisconsin in response to the Department's Supplemental EA on the proposed high capacity wells for the Richfield Dairy and we support the concerns, criticisms and assertions made in those communications. Specifically, we urge the DNR to engage in a more vigorous assessment of the cumulative impacts that proposed new wells may have on nearby surface waters and wetlands. In offering this request we also want to draw attention to the unanimous 2011 state Supreme Court Lake Buelah decision which requires the DNR to consider the environmental impacts associated with pumping large quantities of groundwater. In order to meet these newly defined responsibilities, we believe the DNR needs to approach its new mandate in a thorough, holistic and reasonable manner. By considering the impacts of only one well, and ignoring the 90 or more additional high capacity wells within 4 miles of the requested new well, the DNR is engaging in an abrogation of its duties under the Public Trust Doctrine.

CSWAC has a second major point of concern that is relevant in this situation and also has an impact on the coalition's broader groundwater agenda for the Central Sands. The EA asserts (we think wrongly) that no significant environmental impacts will result from the permitting of the Dairy's high capacity well request --- but the EA only addresses the Dairy's requested initial pumping rate. Our concern is for the potential impacts of increased pumping rates in the future. In fact, the history of groundwater use in Central Wisconsin suggests increases in pumping rates will be on the horizon, and a thorough assessment of these potential impacts must be addressed. Failing that, a new policy must emerge requiring that a high capacity well cannot increase its pumping rates beyond its originally permitted level..

Thank you, Ms. Greve, for the opportunity to comment. The emergence of CSWAC is only one example of a radically changing perception in Wisconsin that our current high capacity well regulations in Wisconsin are not meeting the high traditions of resource protection in our state. Throughout Central Wisconsin we are seeing a landscape (or more accurately) waterscape that is undergoing radical deleterious changes that are manmade and go beyond natural water fluxuations and impacts of global warming. There is, as they say. water missing from our landscape and citizens are demanding its reclamation and, in the future, a groundwater apportionment strategy that will insure healthy lakes, streams and wetlands.

Sincerely,

Scott Froehlke
CSWAC Coordinator

From:	Marcee Gavula
To:	Greve, Rachel M - DNR
Subject:	Wells / Richfield Dairy
Date:	Sunday, January 06, 2013 11:10:02 PM

Ms. Greve,

I want to express my deep concern regarding the proposed high-capacity wells for the Richfield Dairy.

I am specifically concerned with the impact the wells will have on Little Roche a Cri Creek, Fordham Creek, Chaffee Creek, and Tagatz Creek as well as Pleasant Lake. I am troubled by the potential impact to Little Roche a Cri and Fordham Creeks which are both Exceptional Resource Waters, and Chaffee and Tagatz Creeks which are Outstanding Resource Waters. The wells also will have a detrimental effect on Pleasant Lake which has already been experiencing very low water levels for several consecutive years most likely as a result of the many high capacity wells in the Central Sands. The impact to the wetlands NW of the site is also of concern.

Studies have shown impact to these waters at the original pumping request of 52 MGY and yet the DNR states that no ***significant*** impact would occur based on a higher amount of 72 MGY. This is not logical. In light of all other evidence, and in combination of the many other wells in the area, ***significant*** is a matter of interpretation. As an individual who enjoys the use of these waters, these impacts are in fact significant!

While the DNR acknowledges the impact to these areas due to the large number of high capacity wells already in existence, the agency's position of ignoring these cumulative impacts is one of profound disappointment. I urge the DNR to more thoroughly address cumulative impacts; this region is located in the middle of highly intensive irrigated agriculture. Studies have shown that high-capacity wells in the region have led to reductions in water quantity in the Central Sands region of the state.

I urge the DNR to deny the application for high capacity well(s) based on probable significant adverse environmental impacts to waters of the state that cannot be avoided by placing conditions on the construction or use of the well(s).

Sincerely,

--

Marcee Gavula
1037 Chicago Ave,Oak Park,IL 60302
708-790-1381 (cell)
312-592-6699 (fax)

From: john clarke
To: Greve, Rachel M - DNR
Subject: wells
Date: Sunday, January 06, 2013 7:00:13 AM

Ms. Greve:

I have been watching in frustration the developments in the permitting of the wells for the Richfield Dairy and have several concerns. We have enjoyed many years on Pleasant Lake as our family owns property on the lake. I have seen the long-term effects of continual decline in water levels. I am specifically concerned with the impact the wells will have on Little Roche a Cri Creek, Fordham Creek, Chaffee Creek, and Tagatz Creek as well as Pleasant Lake. I am troubled by the potential impact to Little Roche a Cri and Fordham Creeks which are both Exceptional Resource Waters, and Chaffee and Tagatz Creeks which are Outstanding Resource Waters. The wells also will have a detrimental effect on Pleasant Lake which has already been experiencing very low water levels for several consecutive years most likely as a result of the many high capacity wells in the Central Sands. The impact to the wetlands NW of the site is also of concern. Studies have shown impact to these waters at the original pumping request of 52MGY and yet the DNR states that no *significant* impact would occur based on a higher amount of 72MGY. In light of all other evidence, and in combination of the many other wells in the area, *significant* is a matter of interpretation.

While the DNR acknowledges the impact to these areas due to the large number of high capacity wells already in existence, the agency's position of ignoring these cumulative impacts is one of profound disappointment. I urge the DNR to more thoroughly address cumulative impacts; this region is located in the middle of highly intensive irrigated agriculture. Studies have shown that high-capacity wells in the region have led to reductions in water quantity in the Central Sands region of the state. I urge the DNR to deny the application for high capacity well(s) based on probable significant adverse environmental impacts to waters of the state that cannot be avoided by placing conditions on the construction or use of the well(s).

Thank you for your time and thoughtful consideration.

Sincerely,

John Clarke
Louisburg, KS

From: Sue Pilsl
To: Greve, Rachel M - DNR
Subject: wells-Richford Dairy
Date: Sunday, January 06, 2013 6:01:53 PM

Ms. Greve,

I want to express my deep concern regarding the proposed high-capacity wells for the Richfield Dairy.

I am specifically concerned with the impact the wells will have on Little Roche a Cri Creek, Fordham Creek, Chaffee Creek, and Tagatz Creek as well as Pleasant Lake. I am troubled by the potential impact to Little Roche a Cri and Fordham Creeks which are both Exceptional Resource Waters, and Chaffee and Tagatz Creeks which are Outstanding Resource Waters. The wells also will have a detrimental effect on Pleasant Lake which has already been experiencing very low water levels for several consecutive years most likely as a result of the many high capacity wells in the Central Sands. The impact to the wetlands NW of the site is also of concern.

Studies have shown impact to these waters at the original pumping request of 52 MGY and yet the DNR states that no ***significant*** impact would occur based on a higher amount of 72 MGY. This is not logical. In light of all other evidence, and in combination of the many other wells in the area, ***significant*** is a matter of interpretation. As an individual who enjoys the use of these waters, these impacts are in fact significant!

While the DNR acknowledges the impact to these areas due to the large number of high capacity wells already in existence, the agency's position of ignoring these cumulative impacts is one of profound disappointment. I urge the DNR to more thoroughly address cumulative impacts; this region is located in the middle of highly intensive irrigated agriculture. Studies have shown that high-capacity wells in the region have led to reductions in water quantity in the Central Sands region of the state.

I urge the DNR to deny the application for high capacity well(s) based on probable significant adverse environmental impacts to waters of the state that cannot be avoided by placing conditions on the construction or use of the well(s).

Sincerely,

Al and Sue Pilsl

N4025 7th Lane
Hancock, WI 54943

January 6, 2013

Dear Ms. Greve,

I want to express my very deep concerns regarding the proposed high-capacity wells for the Richfield Dairy in Adams County Wisconsin.

I am mostly concerned about the impact that the wells will have on nearby waters especially Pleasant Lake. The wells, if approved, will add to the already detrimental effect of the very low water levels that we have experiencing for several consecutive years. The impact to the wetlands NW of the site is also of concern.

Studies have shown impact to these waters at the original pumping request of 52 MGY and yet the DNR states that no *significant* impact would occur based on a higher amount of 72 MGY. How can this be a logical conclusion? In light of the evidence previously provided, and in combination of the many other wells in the area, *significant* seems to have different meanings for different people. As an individual who enjoys the use of these waters, these impacts are in fact truly significant!

Why would the DNR who has the obligation to protect the waters of Wisconsin approve new high capacity wells? I urge the DNR to more thoroughly address cumulative impacts in this region and to make the educated decision of denying the application for another high capacity well.

Sincerely,

Lynn Foerstel

N 215 4th Ave., Westfield, WI 53964

foersteldds@aol.com

January 7, 2013

Rachel.Greve@wisconsin.gov

Dear Ms. Greve:

As a property owner on Pleasant Lake, I am writing to protest the high capacity wells for the Richfield Dairy, just west of Pleasant Lake. It is likely that this farm and these wells **will negatively affect the water quantity of the lake**. I know you agree that Wisconsin lakes are some of our greatest resources and should be preserved, managed and protected.

These high-capacity wells and farm will likely exacerbate current issues and could destroy property values:

1. Pleasant Lake is already at its lowest lake level since recorded levels were established in 1964.

2. Another Waushara County lake, Long Lake, experienced a similar issue and is now dry. Per the Milwaukee Journal Sentinel, "water siphoned for high-capacity wells and agriculture irrigation" was a "factor".

3. Pleasant Lake already dramatically feels the effect of droughts and irrigation and adding a nearly limitless high-capacity well would be disasterous.

Please do not approve these high capacity wells. In the event that the wells do have a detrimental effect, we would ask that your agency take the necessary measures to restore the lake to its pre CAFO status.

Sincerely,

Jeff Meyer
Property Owner, Pleasant Lake
jeffcmeyer@charter.net

N151 4th Ave
Coloma, WI

c/o 19 Paget Road
Madison, WI 53704

January 7, 2013

Rachel.Greve@wisconsin.gov

Dear Ms. Greve:

Our natural resources are our greatest gift. It is with this sentiment that I write this letter voicing my concern about the proposed high capacity well at the Richfield Dairy farm in Adams County, 2.7 miles west of Pleasant Lake.

We have had the joy of being a property owner on Pleasant Lake for 8 years. We have watched the ducks, geese and even bald eagles fly overhead. We have enjoyed swimming and boating in the pristine spring-fed waters.

We believe the high capacity wells **will negatively affect** the lake in a dramatic way. The addition of these high capacity wells has the potential to further drop our lake level, which is at the lowest it has been since record-keeping began in 1964. Local farm irrigation and droughts already influence the lake so these high-capacity wells will likely be catastrophic.

Please do not approve the high capacity wells. At a minimum, limits for the well capacity should be set to preserve and protect our lake.

Sincerely,

Heidi Meyer
Property Owner, Pleasant Lake
N151 4th Ave
Coloma WI

hameyer@charter.net

From: Brenner, Willard C.
To: Greve, Rachel M - DNR
Subject: High Capacity Wells - Richfield Dairy
Date: Monday, January 07, 2013 5:37:35 PM
Attachments: Willard C Brenner.vcf

Dear Ms. Greve:

I want to express my deep concern regarding the proposed high-capacity wells for the Richfield Dairy. I am specifically concerned with the impact the wells will have on Little Roche a Cri Creek, Fordham Creek, Chaffee Creek, and Tagatz Creek as well as **Pleasant Lake**. I am troubled by the potential impact to Little Roche a Cri and Fordham Creeks which are both Exceptional Resource Waters, and Chaffee and Tagatz Creeks which are Outstanding Resource Waters. The wells also will have a detrimental effect on Pleasant Lake which has already been experiencing very low water levels for several consecutive years most likely as a result of the many high capacity wells in the Central Sands. The impact to the wetlands NW of the site is also of concern. Studies have shown impact to these waters at the original pumping request of 52 MGY and yet the DNR states that no *significant* impact would occur based on a higher amount of 72 MGY. In light of all other evidence, and in combination of the many other wells in the area, *significant* is a matter of interpretation. As an individual property owner who enjoys the use of these waters, these impacts are in fact significant!

While the DNR acknowledges the impact to these areas due to the large number of high capacity wells already in existence, the agency's position of ignoring these cumulative impacts is one of profound disappointment. I urge the DNR to more thoroughly address cumulative impacts; this region is located in the middle of highly intensive irrigated agriculture. Studies have shown that high-capacity wells in the region have led to reductions in water quantity in the Central Sands region of the state. I urge the DNR to deny the application for high capacity well(s) based on probable significant adverse environmental impacts to waters of the state that cannot be avoided by placing conditions on the construction or use of the well(s).

In closing, I would like to share with you my displeasure of the stance the DNR has taken on this issue. As a property owner on Pleasant Lake, I assumed that your organization would PROTECT the natural resources (ie. lakes, streams, etc.) of the state of Wisconsin. I have not read your mission statement but surely it does not include the DESTRUCTION OF NATURAL RESOURCES. It is simply appalling that you do not take into consideration the WHOLE EFFECT of the many wells in this area! What other way could you possibly use to access the impact it will have?

Best Regards,

Willard C. Brenner
Vice Chairman

(815) 637-7020 Office
(815) 540-7649 Cell

wbrenner@riversidecommunity.com

6855 E. Riverside Blvd.
Rockford, IL 61114

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PLEASE CONSIDER THE ENVIRONMENT BEFORE PRINTING THIS EMAIL

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From:	heidi@teamblonde.com
To:	Greve, Rachel M - DNR
Subject:	Richfield dairy permit
Date:	Monday, January 07, 2013 8:17:18 AM
Attachments:	winmail.dat

Ms. Greve,

I want to express my deep concern regarding the proposed high-capacity wells for the Richfield Dairy.

I am specifically concerned with the impact the wells will have on Little Roche a Cri Creek, Fordham Creek, Chaffee Creek, and Tagatz Creek as well as Pleasant Lake. I am troubled by the potential impact to Little Roche a Cri and Fordham Creeks which are both Exceptional Resource Waters, and Chaffee and Tagatz Creeks which are Outstanding Resource Waters. The wells also will have a detrimental effect on Pleasant Lake which has already been
experiencing very low water levels for several consecutive years most likely as a result of the many high capacity wells in the Central Sands. The impact to the wetlands NW of the site is also of concern.

Studies have shown impact to these waters at the original pumping request of 52 MGY and yet the DNR states that no significant impact would occur based on a higher amount of 72 MGY. This is not logical.

While the DNR acknowledges the impact to these areas due to the large number of high capacity wells already in existence, the agency's position of ignoring these cumulative impacts is one of profound disappointment. I urge the DNR to more thoroughly address cumulative impacts; this region is located in the middle of highly intensive irrigated agriculture. Studies have shown that high-capacity wells in the region have led to reductions in
water quantity in the Central Sands region of the state.

I urge the DNR to deny the application for high capacity well(s) based on significant adverse environmental impacts to waters of the state that cannot be avoided by placing conditions on the construction or use of the well(s).

Sincerely,
Heidi Vance

ENVIRONMENTAL ANALYSIS AND DECISION ON THE NEED
FOR AN ENVIRONMENTAL IMPACT STATEMENT (EIS)
Form 1600-8

Department of Natural Resources (DNR)

Region or Bureau
West Central Region
Type List Designation
Type II

NOTE TO REVIEWERS: This document is a DNR environmental analysis that evaluates probable environmental effects and decides on the need for an EIS. The attached analysis includes a description of the proposal and the affected environment. The DNR has reviewed the attachments and, upon certification, accepts responsibility for their scope and content to fulfill requirements in s. NR 150.22, Wis. Adm. Code. Your comments should address completeness, accuracy or the EIS decision. For your comments to be considered, they must be received by the contact person before 4:30 p.m.,

(date)

Contact Person
Terence Kafka
Title
Agricultural Runoff Management Specialist
Address
5301 Rib Mountain Drive Wausau, WI 54401
Telephone Number
(715) 355-1363

Applicant: Milk Source Holdings, Inc (operator) for Richfield Dairy, LLC

Address: N3569 Vanden Bosch Road, Kaukauna, WI 54130

Title of Proposal: New Concentrated Animal Feeding Operation, Application for WPDES Permit

Location
County: Adams City/Town/Village: Town of Richfield

Township: 18N Range: 7E Section(s): 25 Quarter: NE¼

PROJECT SUMMARY – DNR Review Information Based on:

1. General Project Description

This environmental analysis (EA) is associated with Wisconsin Pollutant Discharge Elimination System (WPDES) permitting and approval actions for a proposed new dairy facility named Richfield Dairy and operated by Milk Source Holdings, Inc. The proposed dairy facility would house 4300 milking / dry cows and 250 steers for a total of 6270 animal units (AU), where one milking/dry cow is equivalent to 1.4 animal units – or a 1,400 pound animal. Proposed facility structures include a sand-bedded cross-ventilated freestall barn (416'x1232'), 80 stall milking parlor (106'x164'), livestock holding area (74'x194'), concrete feed storage pad (680'x765'), vegetated treatment area for precipitation runoff after collection of first flush (932'x348'), sweet corn silage bunker (658'x221'x12'height), High Density Polyethylene (HDPE) lined sweet corn silage attenuation basin (23,500 sq. ft.), manure processing building (92'x210'), concrete lined manure solids storage area (202'x384'x12'height), animal mortality storage facility (14'x24'), concrete lined waste storage pond (WSP) with cover (480'x400'x28'deep), uncovered concrete lined waste storage pond (480'x250'x15'deep), commodity shed (120'x300'), shop (60'x120'), two high capacity water wells, four

storm water management ponds, five infiltration basins, Fuel Depot (24'x70'), weigh scale (12'x75'), potable water supply system, a domestic waste sewerage system and other lesser facilities. The proposed Richfield Dairy facility would be located is the southeast corner of the intersection of 1rst Drive and Cypress Avenue. Primary access to the facility would be from 1rst Drive. Total site disturbance entails the conversion of 115 acres of existing cropland to farm buildings, production area and ancillary area.

All livestock would be housed within a cross-ventilated and sand-bedded freestall barn. The combined annual estimated quantity of manure and process wastewater (including precipitation runoff) is 55.3 million gallons, plus an additional 8,552 tons of separated manure solids. Waste storage ponds (WSP #1 & #2), will have a combined design capacity of 33.2 million gallons (excluding freeboard), which represents approximately 205 days of storage for the proposed wastewater stream. WSP #1 will have a 6" thick concrete base with underlying 8" compacted clay liner which provides a secondary liner in the event of a concrete failure. An 8" clay liner will also be placed under the feed storage pad and manure solids storage area. WSP #2 includes a loading station for containment of any liquid spills while wastewater is being pumped to tanker trucks. After loaded, tanker trucks will then landspread on area farm fields in accordance with the DNR approved Nutrient Management Plan (NMP). Richfield Dairy owns or has agreements for landspreading manure and process wastewater on ~16,429 acres, which are generally located within a five mile radius of the farm site.

Storm water runoff from the production area of the proposed Richfield Dairy facility will be handled by a series of culverts, swales and diversions directing flow to the storm water detention ponds (the largest of which is sized to retain runoff from a 100-year storm event).

Richfield Dairy is required to submit a high capacity well permit application to the DNR to construct two high capacity wells and abandon one existing high capacity well which was previously utilized for crop irrigation. A preliminary review has been completed by the Department's Water Supply Section. Engineering details such as well depth will be determined after Richfield Dairy submits the high capacity well application. The proposed wells would be drilled to a depth of ~150'. Based upon 2010 soil borings, the static groundwater level at the proposed site is no less than 32 feet from the ground surface. Water usage at the facility is estimated to be about 52.5 million gallons per year, which includes 44 million gallons for animal watering / cleaning and 8.5 million gallons for evaporative cooling of the barn during hot weather. The applicant notes that the 52.5 million gallons per year is less water than what has been historically utilized for crop irrigation at the site.

The proposed construction start date for the Richfield Dairy facility is March, 2012. The facility anticipates reaching the 6,270 animal unit threshold by 2013. The project cost is estimated at $35 million. The facility expects to employ ~ 40 staff with an estimated annual payroll of $1.5 million. The applicant owns and operates four other permitted confined animal feeding operations in Wisconsin: Tidy View Dairy (7000 dairy cows/9400 animal units, Outagamie County), Omro Dairy (2500 dairy cows/3500 animal units, Winnebago County), Rosendale Dairy (8000 dairy cows/11,500 animal units, Fond du Lac County) and the recently permitted New Chester Dairy (4300 dairy cows, 250 steers/6270 animal units).

The Department of Natural Resources has the following authorities regarding this operation:

- WPDES Permits for Concentrated Animal Feeding Operations (CAFO), those operations with 1,000 animal units or more
- Odor control requirements may be imposed by order of the Department of Natural Resources (Department), if the Department determines that an objectionable odor is determined to exist per s. NR 429.03 – Malodorous Emissions, Wis. Adm. Code
- 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

- Potentially applicable permitting thresholds contained in s. NR 406.04(2)(c), Wis. Adm. Code (construction permits); s. NR 407.02(4), Wis. Adm. Code (operation permits), and s. NR 405.02(22)(a)2, Wis. Adm. Code (prevention of significant deterioration).
- Chs. NR 406, 407, and 445, Wis. Adm. Code, contain provisions that allow a source to exclude emissions of hazardous air contaminants (ammonia and hydrogen sulfide) associated with agricultural waste in determining the need for an air permit until July 31, 2011. These provisions apply to hazardous air contaminants only and do not apply for criteria pollutants such as PM or VOCs or to PSD major source permitting thresholds contained in Ch. NR 405, Wis. Adm. Code.
- Emissions reporting requirements contained in Ch. NR 438, Wis. Adm. Code.
- High capacity well approval for operations using 70 gallons/minute or more from operator-owned wells, or temporary dewatering approval for operations pumping 70 gallons/minute during construction only
- WPDES Permits for Land Disturbing Construction Activities affecting one or more acres (WI-0067831)
- Review and approval authority of manure storage facilities and runoff control systems
- NMP review and approval
- Ch. NR 140 Wis. Adm. Code Groundwater Quality

The development site is zoned as exclusive agriculture and will not change.

2. <u>List documents, plans, studies or memos referred to and provide a brief overview</u>

The following documents have been used in conducting this environmental analysis:

- WPDES Permit application
- EA Questionnaire for Livestock Operations completed by Conestoga-Rovers & Associates
- Plans and specifications for proposed manure storage facility completed by Conestoga-Rovers & Associates
- NMP prepared by Polenske Agronomic Consulting
- Soil survey maps, topographic maps, wetland maps and aerial photographs
- Internal Department correspondence regarding possible environmental impacts associated with the operation

Copies of application materials, design plans and EAQ are available from the DNR contact listed on page 1.

DNR EVALUATION OF PROJECT SIGNIFICANCE (complete each item)

1. <u>Environmental Effects and Their Significance</u>

Discuss the short-term and long-term environmental effects of the proposed project, including secondary effects, particularly to geographically scarce resources such as historic or cultural resources, scenic and recreational resources, prime agricultural lands, threatened or endangered species or ecologically sensitive areas, and the significance of these effects. (The reversibility of an action affects the extent or degree of impact.)

<u>Physical</u>

Long-term physical impacts entail the conversion of ~ 115 acres of cropland into a dairy production and ancillary area. Farm construction and operations will significantly increase vehicular traffic when compared to existing use as cropland. Visual and noise impacts will result. Building materials will be delivered and construction equipment will operate while the site is being constructed. Following construction and population of the proposed Richfield Dairy facility, long-term traffic increases would occur primarily during daylight hours. Estimated annual increases in traffic volumes include 3,500 loads of haylage / corn silage and 2,200 loads of sweet corn silage. Annual levels of Traffic departing the facility include 7,000 loads of manure and 2,190 loads of milk. Traffic would be particularly prominent during the spring season as the operation will land apply most of the manure and process wastewater during this timeframe. Road access to 1st Drive will be paved following construction to minimize dust dispersion. All vendors will be instructed to follow standards related to truck routes and engine breaking. Richfield Dairy will also install

‘courtesy to neighbors’ signs at all the property exits to remind truckers to be courteous and considerate to neighbors of the dairy.

Short-term physical impacts are primarily associated with construction activities at the site. These impacts include noise and dust from machinery and construction equipment. Site grading accounts for a significant portion of the work required for the construction of the proposed Richfield Dairy facility. The applicant estimates that approximately 315,992 cubic yards of soil excavation is needed to prepare the site for construction, with an additional 125,324 cubic yards of excavated top soil. Excess fill from the construction of the waste storage facilities and freestall barn complex will be used to level slopes around the proposed components and fill around the sweet corn silage bunkers.

Since the project will result in a total soil disturbance in excess of one-acre, the operation must obtain coverage under the storm water construction site general permit (WI-0067831-1), which requires the operation to implement Best Management Practices (BMP's) to address impacts from storm water runoff. These protections will minimize siltation and sediment delivery to surface waters to the most practical extent. If properly controlled, impacts associated with construction activities would be negligible. Storm water runoff controls must be in place to control any leachate from feed storage sites. If the Department discovers a water quality problem related to storm water runoff, the operation will be required to implement a management plan and install any necessary best management practices.

Residents located in general proximity to the proposed Richfield Dairy site include both year round residents and absentee landowners. Currently, there are 5 single family residences located within one mile of the development site. Businesses located within one-mile include warehouses owned by Coloma Farms, Inc., Spur & Slider, LLC, Opitz Custom Heifer – a WPDES permitted CAFO facility and a power substation maintained by Waushara Electric Cooperative. While the use of the site will remain agricultural, increased traffic and visual impacts will be noticeable to neighbors.

Air Quality:
Animal agricultural operations generate odors and air pollutants. When localized and insignificant, these odors and air pollutants pose few problems. If enough animals are concentrated together in a small area, air emissions may cause human health and environmental concerns.

Airborne contaminant emissions emitted from CAFO’s or other types of animal agricultural operations, include gases and particles. Air quality concerns have focused primarily on ammonia (NH_3), hydrogen sulfide (H_2S), two toxic air pollutants, as well as odors, particulate matter (PM), volatile organic compounds (VOC), and greenhouse gases (GHG). Diesel exhaust PM emissions from semi-trucks, manure spreading, and other miscellaneous farm operations could also be associated with animal agricultural operations.

Emergency generators, other stationary diesel or biogas engines and other combustion sources, such as dryers, will emit pollutants, too. Criteria pollutants (oxides of nitrogen (NOx); carbon monoxide (CO); and sulfur dioxide (SO2)) and incomplete products of combustion are also emitted and formed from the combustion of diesel, biogas or other fuels.

In addition to primary emissions, certain air pollutants are formed through chemical processes in the atmosphere known as secondary formation processes. The secondary pollutants have significant effects. Ammonia reacts with SO2 and nitrogen oxides (NOx) to form PM2.5. VOC and NOx react to form ozone. Nitrogen containing compounds such as ammonia and NOx result in increased nutrient loading and acidification of soils and waters.

Both quantity and the types of air contaminant emissions from animal agricultural operations are challenging to estimate, making off-site air quality impacts difficult to predict. This is due to diurnal and seasonal temperature variation, varying number and type of animal species present (which may change over time), type of housing and manure handling system, feed type, and chosen management practices.

Large amounts of nitrogen are excreted in the production of all animal feces, including dairy, and most excess nitrogen

is in a form that is easily transformed into ammonia. Most ammonia is produced when the urea contained in urine comes in contact with the urease enzyme contained in feces (also on barn floors and in soil). Much smaller amounts of ammonia are produced during the decomposition of feces. Nitrogen occurs as both unabsorbed nutrients in animal feces and as either urea (mammals) or uric acid (poultry) in urine.

After contaminants are generated, they can be emitted through animal housing ventilation systems (if used) or emitted from any number of sources including animal housing and production areas, feed preparation and storage, manure management/storage facilities, mortality composting, land application sites and dispersed by atmospheric processes. Air contaminant travel distance varies due to size of particles, weather conditions and surrounding topography and vegetation. These variations make it challenging to form a clear picture of the expected emissions and emission-related effects from animal agricultural operations.

Regulatory dispersion modeling is predicated on the steady-state nature of the release. Gaussian plume models have been developed to replicate monitored concentrations attributed to industrial or commercial operations, for example a large industrial boiler for generating steam and/or electricity. The release of farm emissions comes from locations (i.e. barns, lagoons) that are unlike a smoke stack. These "fugitive" emissions are able to be modeled, but there is more uncertainty associated with establishing release parameters. The time-varying nature of farm emissions is even more difficult to model. Regulatory models generally assume steady-state emission generation. This implies that over the course of one hour, the emission rate will not significantly change, and that any changes from hour-to-hour are under the control of the operator. Farm emissions vary between hours, within a given hour, and more importantly this variation is chaotic and unpredictable.

Despite the variability of emissions from animal agricultural operations, the nitrogen balance (and ammonia as a part of the balance) has been studied extensively in dairy operations which have integrated cropping systems. Nitrogen excretion from animals varies based on nitrogen feed rates, the nutritional needs of the dry or lactating cows, and how much nitrogen ends up in milk. In Wisconsin and elsewhere, research points to an average annualized total nitrogen loss of 15 percent from freestall housing and losses of incoming nitrogen into uncovered manure storage from 10 to 30 percent loss of nitrogen as ammonia. Estimates based on farm component ammonia losses are presented in the table below. Wisconsin DNR is currently working with an agricultural waste advisory group to examine and recommend beneficial practices that reduce ammonia and hydrogen sulfide air emissions and will work for Wisconsin farms.

The facility is proposing practices which are expected to mitigate air emissions. This includes a floating geomembrane waste facility storage cover combined with a biofilter treating exhaust air from under the cover. Covering the waste facility storage with a properly designed geomembrane cover may reduce air emissions and odors by 90% from the waste storage facility. Appropriate land application techniques should be combined with waste facility storage covers to ensure that air contaminants (and beneficial nutrients) which are prevented from volatizing with waste facility covers are not lost during the land application process.

Air Quality Regulations Overview

Richland Dairy, as with any source of air pollution, is required to evaluate existing information, determine its air emissions, and comply with any air regulatory requirements that apply.

Federal air permit requirements are incorporated into state air permit rules in chs. NR 405, 406, and 407. In addition, chs. NR 406 and 407 also include air permit requirements for minor sources. Emissions associated with animal feeding operations are not, categorically, exempt from these requirements. However, the revisions to chs. NR 406 and 407 published in July 2004 established an exemption period ending in July 2007 for sources of hazardous air contaminant emissions from agricultural waste. The exemption period was extended, again, in February 2008 for chs. NR 406 and 407 and how they relate to NR 445.

Chapter NR 445 establishes ambient air concentrations for ammonia and hydrogen sulfide, two pollutants associated with agricultural waste from animal feeding operations. These concentrations are 418 and 335 micrograms per cubic

meter, respectively, on a 24-hour average basis.

Similar to federal reporting requirements, state reporting requirements include the air reporting requirements in ch. NR 445 and the annual air emission reporting requirements of ch. NR 438. Air emissions from animal feeding operations are not categorically exempt from these reporting requirements.

Odors are addressed in ch. NR 429 (Malodorous Emissions), yet odor control practices contained in ch. ATCP 51 (Livestock Facility Siting) may be included with the proposed project.

Richland Dairy Specific Impacts

Using a variety of emission estimates, the total estimated emissions from Richland Dairy is listed.

	Dairy Operations Liquid manure systems (4300 Milkers, 250 Beef)
PM_{10}	9 tons/year[1]
VOC (volatile organic compounds)	> 140 tons/year[2]
NH_3 (ammonia)	299 tons/year freestall + top-loaded manure storage[3] 185 tons/year freestall + bottom-loaded manure storage > 191 tons/year freestall + covered manure storage + land application Other ammonia sources such as solids separation and solids storage not included
H_2S (hydrogen sulfide)	22 tons/year[4] Other hydrogen sulfide sources such as solids separation and solids storage are not included
CH_4 (methane)	1,200 tons/year (including enteric)[5]
N_2O (nitrous oxide)[6]	7 tons/year[7]
Acetaldehyde	> 9 tons/year[8]

Even with the proposed (and unspecified "additional") measures in place, the new facility and the large quantity of animals housed and manure generated may produce occasional or more frequent odors that may be objectionable to some neighbors. Other potentially affected odor receptors include the Village of Coloma (~3 miles northeast) and

[1] Oregon Technical Support Document (Table 6) to the Oregon Dairy Air Quality Task Force, July 1, 2008

[2] Based on National Air Emissions Monitoring Study (NAEMS) data (mean VOC and VOC speciation values) from "Emissions Data Two Freestall Dairy Barns in Wisconsin, July 22, 2010." This data was for two monitored dairy freestall barns located in St. Croix County, Wisconsin. This estimate does not include emissions from other farm components such as manure storage, manure processing, and land application. Data made public January 13, 2011.

[3] Based on ASAE excretion standard of 0.83 lbs N for a 1,400-lb cow producing 70 lb milk; Rotz 2004; Wisconsin – based research on nitrogen losses from freestall housing; Rotz 2004 for manure storage (top, bottom and covered loaded basins) and land application (rapid incorporation). Only dairy cows (including dry) included with these estimates.

[4] University of Wisconsin Extension average (Erb/Holmes et al, 2009)

[5] Calculated using Tier 2 IPCC calculator with VS = 11.55 lb/hd-day, Bo=0.24, weighted MCF of 0.37 and IPCC Tier 1 enteric estimates (128 kg CH4/hd-yr)

[6] Does not consider the effect of limited semi-solid manure composting

[7] Oregon Technical Support Document (Table 6) to the Oregon Dairy Air Quality Task Force, July 1, 2008

[8] Based on National Air Emissions Monitoring Study (NAEMS) data (mean VOC and VOC speciation values) from "Emissions Data Two Freestall Dairy Barns in Wisconsin, July 22, 2010." This data was for two monitored dairy freestall barns located in St. Croix County, Wisconsin. This estimate does not include emissions from other farm components such as manure storage, manure processing, and land application. Data made public January 13, 2011.

Pleasant Lake residents (~2 miles southeast).

Surface & Ground Water

The proposed Richfield Dairy facility and wells are located approximately 1.1 miles west of the Mississippi River / Lake Michigan Surface water drainage divide and approximately 0.4 miles East of the Mississippi River / Lake Michigan groundwater divide. Surface water flows in a southwesterly direction and groundwater flows in a southeasterly direction. The area geology consists of sand over 300 feet of sandstone which is located at an approximated depth of 150-200 feet.

Groundwater quality in the area is considered between fair to good. Samples taken within the township of Richfield had detectable levels of atrazine and other pesticides. Nitrate levels are high in many wells with 24% exceeding the Enforcement Standard threshold of 10 mg/l (ppm).

The proposed project is located within an area that has a relatively high water table, a high groundwater infiltration rate and a low surface water runoff rate. Based upon soil borings taken in May 2010, no groundwater was encountered at depths up to 32 feet below the ground surface.

Total water usage for Richfield Dairy has been estimated at ~52.5 million gallons / year, 143,846 gallons / day or 99.9 gallons / minute. Animal watering and cleaning accounts for 44 million gallons/year, with evaporative cooling of the livestock facility during hot weather accounting for the remaining 8.5 million gallons/year. To meet the water supply demand, Richfield Dairy will submit a high capacity well permit application to the DNR to construct two wells at a depth of ~150 feet. A high capacity well permit falls under the provisions within Ch. NR 820, Wis. Adm. Code, to assess potential impacts to trout streams, outstanding resource waters (ORW), exceptional resource waters (ORW) and springs. DNR Water Supply staff will assess the proposal to determine if the proposed wells would adversely affect any of these water resources.

There is a concern about nitrate contamination already present in the area. The applicant will be required to follow an approved NMP on all of the 16,429 acres under contract for manure application, which reduces the risk of over application and nitrate leaching. The NMP will limit nutrient application to crop need where there were no limits in the past. There is a reduced risk of nitrate leaching from manure then from commercial fertilizer. Unlike commercial fertilizer where all nitrogen components are immediately available, manure contains a significant amount of organic nitrogen which is neither available to plants nor mobile in the environment until converted to plant available ammonium, nitrite or nitrate by soil microbes. Among other requirements (see next section – Biological), the NMP must incorporate best management practices (BMP's), such as nitrogen inhibitors, changed crop rotation, etc. to reduce risk of increased nitrate leaching to groundwater. Changed crop rotation will include perennial forage crops such as grass, hay and alfalfa on at least 25% of the acres. The forage crops have greater rooting depth and can remove more nitrogen than most annual crops.

In addition, Department water supply staff is working with the applicant to assess the nitrate situation and some possible well construction modifications, such as completing the wells deeper in the sand aquifer or maybe into the sandstone bedrock aquifer.

Proposed private sewage and water supply systems designed at the site for all the human waste, office and employee water usage will have to comply with applicable siting, design and monitoring regulations.

<u>Biological</u>

A review of the Natural Heritage Inventory records indicate no endangered and threatened species, natural areas or other sensitive biological resources are present or depend on the development site or within a one mile radius. A site

visit will be conducted by Department staff to determine if lupine is present on the property. If lupine is present, it will be referred to the regional ecologist for further evaluation. The immediate project area and proposed land spreading sites are existing cropland and would be expected to provide habitat primarily for common animal species acclimated to farm operations. Occasional visits/use by mobile rare species such as whooping crane or bald eagle may occur but will not be negatively impacted by such use.

Provided manure land-spreading is limited to existing croplands and application practices avoid increased nutrient loading to surface waters (see later discussion in this section), no serious threat to sensitive resources in the vicinity would be expected. Therefore, long-term significant impacts on terrestrial animals and vegetation are not expected.

No waterways, wetlands or other aquatic resources are present at the immediate farm site. Therefore, no ORW or ERW resource waters will be affected. An unnamed tributary to the Little Roche Cri Creek is located ~2.5 miles Northwest of the proposed Richfield Dairy facility and is the closest navigable water. The Little Roche Cri Creek is located within the Central Wisconsin River Basin. Pleasant Lake is located ~2.7 miles to the Southeast and is located in the upper reaches of Upper Fox River Basin and subject to seasonal fluctuations of water levels. This is mainly a result of natural influences due to its location rather than groundwater withdrawal from pumping. Pumping closer to the lake may have an effect; however, the groundwater use by the proposed dairy should not have any noticeable effects on Pleasant Lake's water elevations. Fordham Creek is ~4.7 miles to the Southwest and Little Roche Cri Creek is located 5.6 miles to the Northwest of the proposed Richfield Dairy site, both are trout streams and designation as ERW. The quantity of water flow in these streams is subject to similar influences that impact Pleasant Lake. The proposed groundwater pumping is not a major threat to flow. The greatest threat to these streams would be additional nutrients if permit-required BMP's are not implemented or maintained.

The most significant possible long-term biological impact is associated with the production of manure at the site. It is anticipated that approximately 59.3 million gallons of liquid manure / process wastewater and 8,552 tons of solid manure will need to be stored and land applied on an annual basis. Nutrients associated with manure can have detrimental impacts on groundwater (nitrogen) and surface waters (nitrogen and phosphorus) if not properly land applied. Biochemical oxygen demand associated with manure can reduce dissolved oxygen levels in surface waters. In addition, ammonia in the manure can be toxic to fish and aquatic life.

Livestock at the proposed Richfield Dairy facility will be confined within roofed buildings. Manure generated within these buildings will be transferred to a storage facility, long-term nutrient impacts on wetlands and surface waters from the cattle housing area are not expected. The two planned manure storage facilities will be designed to meet appropriate USDA-Natural Resources Conservation Service (NRCS) design standards to ensure that groundwater impacts do not occur, and the proposed facility will have to meet these guidelines as well.

The land application of manure on area cropland poses the greatest risk of environmental impact if it is not done properly. Impacts from nutrient loadings, biochemical oxygen demand and ammonia are water quality concerns with surface waters. Since this operation will require coverage under a WPDES permit due to its size, landspreading of its manure is regulated in accordance with a Department approved NMP. The NMP can be an effective tool to proactively address possible problems that would otherwise be associated with poor manure landspreading activities. Following conditions in the NMP for setback distances, appropriate application rates, timing and record keeping should result in direct benefits to the environment.

The draft permit includes injection and incorporation requirements based on proximity to surface waters which are intended to ensure that manure does not runoff to surface waters and cause short- or long-term impacts associated with biochemical oxygen demand and ammonia.

Under normal circumstances, manure application rates are based on the nitrogen needs of the crop. Crops utilize more nitrogen than phosphorus and if manure is applied to meet nitrogen needs, phosphorus soil levels will become elevated over time. In order to protect against increased phosphorus loadings to area surface waters, the WPDES permit, if

issued, would require that the operation's NMP address phosphorus loadings from fields where the operation landspreads manure. While phosphorus is a critical component of ensuring healthy crop growth, excessive phosphorus that is applied on land can make its way to surface waters where it contributes to excessive algal growth. Excessive algal growth contributes to such problems as low dissolved oxygen in surface waters. The permittee will need to implement field specific restrictions and practices as part of their NMP submitted to the Department for review and approval. These restriction and practices will need to take into account existing soil nutrient levels, buffers, crop rotations, and other relevant factors. Specific restrictions would also be placed in the WPDES permit to address phosphorus impacts associated with the operation's landspread manure.

Once approved by the Department, all landspreading activities must be completed in accordance with the NMP. A certified crop consultant must develop and sign-off on the plan.

Landspreading manure in accordance with an acceptable NMP is advantageous to both the farmer and the environment. The nitrogen and phosphorus from the manure provides nutrients for crop growth and lowers the need for commercial fertilizer application. In many instances, the net nutrient application will not change, only the type of fertilizer. When manure is spread in suitable amounts and promptly tilled into the soil, the potential of runoff causing off-site problems is minimized. The proposed WPDES permit will regulate the application rates, applied acreage, spreading techniques and other specifications through the NMP. The operation will also be required to conduct manure and soil sampling to determine appropriate application rates, depending on soil and crop types.

If the operation conducts landspreading in accordance with an approved NMP, maintains an adequate land base for landspreading, and properly inspects and maintains manure storage facilities and runoff control systems, the threat to groundwater and surface water should be minimal under normal operating and climatic conditions.

Cultural

No historical, archeological or other cultural resources are known to be present at the farm site or expected to be impacted. No zoning changes (currently A-1 agricultural) will be required for the new farm and operation. Since the farm and landspreading sites are currently used for agriculture the proposed land use will not change significantly as a result of the issuance of the WPDES permit. The physical appearance of the site will change and activity level, noise, traffic, etc. at the farm and surroundings (roads, etc.) will be greater. The applicant does not expect the project to impact neighboring property values, but acknowledges there is no reliable data to accurately predict such impacts. DNR has not done a study to examine if or how property values may have changed after confined animal feeding operation permits have been issued elsewhere.

The proposed operation construction will also have indirect effects. The area's economy will change through an estimated 40 jobs created (projected $1.5M annual payroll) and an increase in the area's tax base from farm improvements. It is also estimated that $16M will annually enter the local economy as a result of added business such as the purchase of services, equipment and feed.

2. Significance of Cumulative Effects

Discuss the significance of reasonably anticipated cumulative effects on the environment (and energy usage, if applicable). Consider cumulative effects from repeated projects of the same type. Would the cumulative effects be more severe or substantially change the quality of the environment? Include other activities planned or proposed in the area that would compound effects on the environment.

There is a trend in the livestock industry towards larger-scale facilities of this kind. Large scale 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, primarily with respect to costs associated with hauling manure long distances for landspreading. There are currently two other WPDES permitted CAFO facilities located within a twelve-mile radius of the proposed Richfield Dairy Facility. Opitz Custom Heifers is located ~1 mile South of the proposed Richfield Dairy site and New Chester Dairy is located ~12 miles to the Southwest. Nutrient Management plans submitted to the DNR by each of these facilities demonstrate that there is currently an adequate land base available for land application of all of the manure and process wastewater that is to be generated by these operations. The Department is not aware of additional projects of this type in the vicinity in which the availability of land for manure application would be inadequate.

Any proposed future projects will be examined at the appropriate time. With each new operation or expansion proposed, cumulative effects such as impacts from manure landspreading activities are considered. Unless these facilities are poorly sited or concentrated in a small area, the cumulative impacts to the environment should not be significant.

3a. <u>Significance of Risk</u>

Explain the significance of any unknowns which create substantial uncertainty in predicting effects on the quality of the environment. What additional studies or analysis would eliminate or reduce these unknowns?

Current regulations require that there be no discharge of pollutants from any manure storage facilities, outdoor animal lots, composting and leachate containment systems, milking center wastewater treatment/containment systems, raw material storage areas, or other area of the operation to navigable waters, except in the event of a 25-year, 24-hour rainfall event, or chronic rainfall event. In addition, current regulations prohibit (1) overflow of manure storage facilities, (2) direct runoff from a feedlot or stored manure to waters of the state, (3) unconfined manure piles/stacks in water quality management areas, and (4) unlimited access by livestock to waters of the state in locations where high concentrations of animals prevent maintenance of adequate sod cover.

Proposed manure storage and runoff control facilities at the proposed operation must be built in accordance with currently accepted engineering standards to minimize the risks of ground and surface water contamination. Plans and specifications for proposed facilities must be reviewed and approved by Department staff prior to construction.

The operation must comply with its WPDES permit and associated Nutrient Management Plan. Consequently, the landspreading of manure should not yield any substantial increase in risk to the environment. The NMP will include acres that may not have previously been managed in accordance with a NMP, which could mean environmental benefits compared to existing manure application practices.

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. If a WPDES permit is issued for this operation it will require manure and soil testing to ensure this does not occur.

As previously noted, the two proposed Waste Storage Ponds, feed storage pad and separated manure solids stacking area, will have an 8" compacted clay liner in addition to a concrete base. The sweet corn feed pad consists of a 24" compacted clay liner under an 8" drainage layer which is under 8-inches of concrete. The applicant has not yet determined where the estimated ~32,000 cubic yards of clay needed for these structures will be acquired. Richfield Dairy will follow any natural resource laws that may pertain to how and where the clay is obtained.

3b. Explain the environmental significance of reasonably anticipated operating problems such as malfunctions, spills, fires or other hazards (particularly those relating to health or safety). Consider reasonable detection and emergency response, and discuss the potential for these hazards.

Possible operating problems that could impact the environment include failure of manure handling and storage facilities, poor manure land application practices that lead to nutrient runoff to surface waters or leaching of nutrients to groundwater.

Department review of any proposed manure storage facilities (for example, berm slopes and storage volume) makes the probability of failure of storage facilities highly unlikely. In addition, the operation will need to address small-scale manure spills as part of their operation and maintenance plan (as part of the review process of manure storage facilities or as part of the proposed WPDES permit). This plan typically addresses spills associated with general operation and maintenance of the operation. These small "spills" may not represent an immediate environmental impact but may need to be addressed by the operation (e.g., scraping areas where small amounts of "spilled" manure have collected, changing operating procedures to avoid small "spills") to ensure that impacts to waters of the state, primarily through runoff resulting from storm events, do not occur. Massive failure of the manure storage facility 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. A requirement to follow Ch. NR 706 would be included if a WPDES permit is issued. 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 to serve to evaluate whether the operation is properly addressing minor "spills." In addition, the operation will be required to conduct inspections of storage facilities to ensure that more significant problems are addressed prior to any sort of massive facility failure.

Manure will be landspread in accordance with a Department approved Nutrient Management Plan, which will not allow poor land application practices; thus, operating practices should have minimal impacts on the environment.

4. Significance of Precedent

Would a decision on this proposal influence future decisions or foreclose options that may additionally affect the quality of the environment? Describe any conflicts the proposal has with plans or policy of local, state or federal agencies. Explain the significance of each.

No. All future projects will be evaluated by their own specific adverse and beneficial impacts. There are other similarly sized operations in Wisconsin. Each individual project is considered separately based on its own merits. In fact, permitting CAFO's has become a fairly common practice, that the Department has prepared EAs that will be signed in April to place certain sized CAFO's in the general permit realm. Thus reducing the number of EAs prepared for CAFO's. A map is attached showing the number of CAFO's in the state.

The Department primarily considered issues that fall under its regulatory authority as part of this analysis. The project is not known to conflict with plans or policy of local, state, or federal agencies. The operation will need to apply for and receive the appropriate approvals from all involved agencies prior to operating. Permitting this operation would not foreclose future options for taking necessary actions to protect the environment (i.e., revocation, modification of the permit). In actuality, through enforcement of the WPDES permit, the Department has a means to avoid or address possible environmental impacts associated with the operation.

5. Significance of Controversy Over Environmental Effects

Discuss the effects on the quality of the environment, including socio-economic effects, that are (or are likely to

be) highly controversial, and summarize the controversy.

There is the possibility that public controversy may be generated as a result of the permitting of this operation. State and local area residents may express concerns about the environment such as possible air and water quantity/quality issues. The Department has some authority under NR 429, Wis. Administrative Code to address odor complaints, should they arise. The Department is starting a process to study and address odor and air toxics issues from livestock operations on a statewide basis. This study is expected to develop standards and voluntary best management practices to reduce or minimize potential problems from CAFOs. Water quantity issues can be addressed under the high capacity well approval. However, neither of these issues is addressed by the issuance of the proposed WPDES permit, which is strictly intended to address the water quality concerns.

There may also be socio-economic concerns such as animal treatment 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 following is taken from the Large Dairy CAFO EA.

Economics

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

The tax base in local areas may go up in response to the increase in property values and improvements at production sites. Property values may also go up for parcels used for growing crops and application of manure. The value of nearby residential properties may go down due to the close proximity of CAFO's. On a large scale there may be little or no change in the tax base due to the presence of CAFO's (Purdue Extension Guide AY-318-W http://www.ansc.purdue.edu/cafo/).

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 a 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 Guide AY-318-W http://www.ansc.purdue.edu/cafo/).

The value of housing is based on both the value of the land and the value of the buildings and other improvements to the land. Between 1940 and 2000, median home values in Wisconsin increased from $33,600 to $112,000. Generally, Wisconsin housing values have been consistent with national trends. Land values have gone up primarily due to general demand, but also due to the demand for vacation property. Residential improvements have also increased in value because of increasing house sizes and building quality, both for new houses and for renovations. (Housing Megatrends, UW Extension)

A 2003 study of property values in Berks County, Pennsylvania sheds some light on the effects of CAFOs on nearby residential properties. The following summary is from the executive summary of the report (Ready and Abdalla, 2003, *The Impact of Open Space and Potential Local Disamenities on Residential Property Values in Berks County, Pennsylvania.* Department of Agricultural Economics and Rural Sociology, The Pennsylvania State University. See: http://landuse.aers.psu.edu/study/BerksLandUseShort.pdf).

Several potential local disamenities were found to have a negative impact on nearby house prices. Of the potential local disamenities investigated, the impact of landfills on house price was largest, and extended the farthest (up to 3200 meters). A landfill located 800 meters from a house decreases that house's sale price by an estimated 6.9%. The impact of a large-scale animal production facility (over 200 animal equivalent units or aeu's) on house price was about one half to two thirds as large as that from a landfill (4.1% at 800 meters), and did not extend as far (up to 1600 meters).

The impacts on house price from mushroom production and from the regional airport were much less (0.4% and 0.2%, respectively, at 800 meters). The impact from high traffic roads was small, and extended only a short distance. No significant impact was found for sewage treatment plants.

Additional analysis attempted to investigate whether different types of animal production facilities had different impact on nearby house prices. Differences in the impact due to differences in the size of the operation (number of aeu's) were not statistically significant. Further, medium-sized production facilities (200 to 300 aeu's) were found to have a statistically significant negative effect on house prices when considered apart from larger facilities. Similarly, the impact did not vary significantly by species (poultry, swine, and beef/dairy). An analysis of proximity of animal production facilities and residential properties showed that the density of single family homes around animal production facilities was lower than the average for rural parts of the county. An implication is that some potential for conflicts is avoided due to the way in which these land uses are located on the land.

The total impact on surrounding house prices was calculated for a landfill, the regional airport, and an animal production facility. The average impact on the value of 3342 houses located within 3200 meters was $2442 (all values are in 2002 dollars). The total impact on all houses was $8,162,000, which is 2.6% of the assessed value of the affected properties. The average impact of the regional airport on 2256 houses located within 1600 meters of the airport runway and its flight paths was $104, and the total impact on the value of these properties was $235,000, or 0.1% of the assessed value of the affected properties. This calculation does not include 2391 properties located near the airport within the City of Reading. The average impact of a single animal production facility on 119 single family residences located within 1600 meters of the facility $1,803. The total impact on all 119 houses is $215,000, or 1.7% of the assessed value of the affected houses. These figures are intended as illustrations, and should not be considered averages for similar facilities. The impact from any given landfill, airport, or animal production facility will depend on the number of houses located near the site, and on the market value of those houses absent the facility."

There are typically positive short-term economic effects to contractors and vendors during the construction phase of CAFOs.

Long-term positive effects are also generated by wages and additional economic activity with vendors, suppliers, and maintenance contractors over the length of CAFO operations.

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 large dairies may add significantly to the economy in Wisconsin, there may be little or no positive impact on local economies other then those resulting from wages and field crops.

A recent CAFO 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 (Rosendale Dairy WPDES permit application).

The tendency for dairy farming operations to become larger (and some to enlarge to the point they must be permitted as CAFOs) in order to remain economically viable, may help to maintain the dairy-based economies of the state."

ALTERNATIVES

Briefly describe the impacts of no action and of alternatives that would decrease or eliminate adverse

environmental effects. (Refer to any appropriate alternatives from the applicant or anyone else.)

APPLICANT ALTERNATIVES

Three alternatives were considered by the applicant:
1) No build. The "no build" alternative does not meet the applicants' economic development goals.
2) Expand at one of their other existing dairy facilities. With current manure handling technologies and the need to secure additional cropland, expansion at other facilities was not considered feasible.
3) Construct at a new site. The applicant indicated that they have investigated sites in both northeast and north central Wisconsin. Other sites were eliminated due to presence of other large dairies, lack of available cropland for feed production or manure application, topography or other reasons.

DNR ALTERNATIVES

REVIEW OF NEW FACILITIES
The Department's alternatives for review of proposed runoff control and/or manure storage facilities either as part of processing a permit or the permit itself are:

- 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 selected alternative will be based on the information collected as part of this environmental analysis and further Department review.

REVIEW OF WPDES PERMIT
Within the constraints of the Department's existing permitting authority for CAFOs, the Department has limited alternatives to the issuance of a WPDES permit for the operation. Based on the information available, the Department cannot justify denial of the proposed WPDES permit for the operation since it is expected that the operation will be able to comply with the conditions of the proposed permit and not cause an exceedance of water quality standards. The Department could require more stringent conditions in the permit if it determined such conditions were necessary to protect water quality. The Department will use the information collected as part of the environmental analysis as well as part of the public comment period associated with the issuance process of a WPDES permit to makes its final determination on issuance of the permit and to determine if additional restrictions in the permit are necessary.

SUMMARY OF ISSUE IDENTIFICATION ACTIVITIES

List agencies, citizen groups and individuals contacted regarding the project (include DNR personnel and title) and summarize public contacts, completed or proposed.

Various discussions occurred between DNR staff and the Applicant, its operations staff and it's consultants regarding application materials, facility design, nutrient management plan, etc.:

Applicant/Operator: James Ostrom, New Chester Dairy and Milk Source Holdings, Inc.
Primary Consultants: multiple contacts within Conestoga-Rovers & Associates (application, design) and Polenske Agronomic Consulting (nutrient management plan)

Adams County Land and Water Conservation Department, Chris Murphy, county stormwater and animal waste storage

ordinance/regulations

Adams County Planning/Zoning Department conditional use permit for operation with 500 or more animal units (DATCP Livestock Siting Rule, per ATCP 51). County is required to hold a public hearing on the conditional use permit. Phil McLaughlin, Adams County P&Z Director.

Adams County Planning/Zoning Department Sanitary Permit, Phil McLaughlin, Adams County P&Z Director.

Town of Richfield building permit and culvert permits, Margaret Burrows, Town Chair.

DNR staff:
Regional CAFO Contact: Terence Kafka, Wastewater Specialist, Wausau
WPDES CAFO Permit Coordinator: Tom Bauman, Water Resource Engineer, Madison
Nutrient Management Plan: Andrew Craig, Water Resources Management Specialist, Madison
Facilities Plan Review: Jeff Kreider, Water Resources Engineer, Madison
Air Management: Jeff Johnson, Air Engineer, Eau Claire; Dave Panofsky, Air Engineer, Madison
High Capacity Well Permit: Paul Kozol, Water Supply Engineer; Rachel Greve, Hydrogeologist, Madison
Water Supply: Steve Janowiak, Peggy Norris, Wisconsin Rapids
Stormwater permit: Brad Johnson, Wastewater Specialist, Wausau
Environmental Analysis & Review: Russ Anderson, Supervisor, Fitchburg; Tony Fischer, Wisconsin Rapids
Hydrogeologist: Jim Boettcher, Eau Claire
Regional Water Management and General Water Issues: Scott Watson (Wausau), Bob Baczynski (Baldwin)
Wildlife: Paul Samerdyke, Wautoma
Water Quality Biologist, Scott Provost, Wisconsin Rapids

DECISION (This decision is not final until certified by the appropriate authority)

In accordance with s. 1.11, Stats., and Ch. NR 150, Adm. Code, the Department is authorized and required to determine whether it has complied with s. 1.11, Stats., and Ch. NR 150, Wis. Adm. Code.

Complete either A or B below:

A. EIS Process Not Required X

The attached analysis of the expected impacts of this proposal is of sufficient scope and detail to conclude that this is not a major action which would significantly affect the quality of the human environment. In my opinion, therefore, an environmental impact statement is not required prior to final action by the Department on this project.

B. Major Action Requiring the Full EIS Process _____

The proposal is of such magnitude and complexity with such considerable and important impacts on the quality of the human environment that it constitutes a major action significantly affecting the quality of the human environment.

Signature of Evaluator	Date Signed May 11, 2011
Noted: Regional Staff Specialist or Bureau Director	Date Signed

Number of responses to news release or other notice:

CERTIFIED TO BE IN COMPLIANCE WITH WEPA	
Regional Director or Director of BISS (or designee)	Date Signed

NOTICE OF APPEAL RIGHTS

If you believe you have a right to challenge this decision made by the Department, you should know that Wisconsin statutes, administrative codes and case law establish time periods and requirements for reviewing Department decisions.

To seek judicial review of the Department's decision, sections 227.52 and 227.53, Stats., establish criteria for filing a petition for judicial review. Such a petition shall be filed with the appropriate circuit court and shall be served on the Department. The petition shall name the Department of Natural Resources as the respondent.

STATE OF WISCONSIN DEPARTMENT OF NATURAL RESOURCES

PUBLIC NOTICE OF INTENT TO ISSUE A WISCONSIN POLLUTANT DISCHARGE ELIMINATION SYSTEM (WPDES) PERMIT No.WI-0064815-01-0

Permittee: Richfield Dairy LLC, N3569 Vanden Bosch Rd, Kaukauna, WI, 54130

Facility Where Discharge Occurs: Richfield Dairy LLC, `

Receiving Water and Location: Fordham & Little Roche Cri Creeks of the Central Wisconsin River Basin, Adams County

Brief Facility Description: Richfield Dairy is a proposed new dairy facility owned and operated by Milk Source Holdings, Inc. The proposed dairy facility would house 4300 milking / dry cows and 250 steers for a total of 6270 animal units. Proposed facility structures include a sand-bedded cross-ventilated freestall barn (416'x1232'), 80 stall milking parlor (106'x164'), livestock holding area (74'x194'), concrete feed storage pad (680'x765'), vegetated treatment area for precipitation runoff after collection of first flush (932'x348'), sweet corn silage bunker (658'x221'x12'height), HDPE lined sweet corn silage attenuation basin (23,500 sq. ft.), manure processing building (92'x210'), concrete lined separated manure solids storage area (202'x384'x12'height), animal mortality storage facility (14'x24'), covered concrete lined waste storage pond (480'x400'x28'deep), uncovered concrete lined waste storage pond (480'x250'x15'deep), commodity shed (120'x300'), shop (60'x120'), two high capacity water wells, four stormwater management ponds, Fuel Depot (24'x70'), weigh scale (12'x75'), potable water supply system, a domestic waste sewerage system and other lesser facilities. The proposed Richfield Dairy facility would be located is the southeast corner of the intersection of 1rst Drive and Cypress Avenue. Primary access to the facility would be from 1rst Drive. Total site disturbance entails the conversion of 115 acres of existing cropland to farm buildings, production area and ancillary area.

All livestock will be housed within a cross-ventilated and sand-bedded freestall barn. The combined annual estimated quantity of manure and process wastewater (including precipitation runoff) is 55.3 million gallons, plus an additional 8,552 tons of separated manure solids. Waste storage ponds (WSP #1 & #2), will have a combined design capacity of 33.2 million gallons (excluding freeboard), which represents approximately 205 days of storage for the proposed wastewater stream. The applicant owns or has agreements to land spread on 16,429 acres, with all cropland generally located within a five-mile radius of the facility.

Richfield Dairy is required to submit a high capacity well permit application to the DNR. Water usage at the facility is estimated to be about 52.5 million gallons per year, which includes 44 million gallons for animal watering / cleaning and 8.5 million gallons for evaporative cooling of the barn during hot weather.

Construction of the proposed facility is tentatively scheduled to begin in March, 2012. The facility anticipates reaching the 6,270 animal unit threshold by 2013. The project cost is estimated at $35 million. The facility expects to employ ~ 40 staff with an estimated annual payroll of $1.5 million. The applicant owns and operates four other permitted confined animal feeding operations in Wisconsin: Tidy View Dairy (7000 dairy cows/9400 animal units, Outagamie County), Omro Dairy (2500 dairy cows/3500 animal units, Winnebago County), Rosendale Dairy (8000 dairy cows/11,500 animal units, Fond du Lac County) and the recently permitted New Chester Dairy (4300 dairy cows, 250 steers/6270 animal units).

Permit Drafter's Name, Address, Phone and Email: Terence Kafka, DNR, 5301 Rib Mountain Drive, Wausau, WI, 54401, (715) 355-1363, Terence.Kafka@Wisconsin.gov

The Department has tentatively decided that the above specified WPDES permit should be issued for this new discharge.

The Department has completed an Environmental Assessment (EA) as progress toward the Department's compliance with the Wisconsin Environmental Policy Act (WEPA), s. 1.11, Wis. Stats., and ch. NR 150, Wis. Adm. Code, as part of the permit issuance process.

Persons wishing to comment on or object to the proposed permit action, or to request a public hearing, may write to the Department of Natural Resources at the above named permit drafter's address. All comments or suggestions received no later than 30 days after the publication date of this public notice will be considered along with other information on file in making a final decision regarding the permit. Anyone providing comments in response to this public notice will receive a notification of the Department's final decision when the permit is issued. Where designated as a reviewable surface water discharge permit, the U.S. Environmental Protection Agency is allowed up to 90 days to submit comments or objections regarding this permit determination. If no comments are received on the proposed permit from anyone, including U.S. EPA, the permit will be issued as proposed.

The Department may schedule a public informational hearing if requested by any person and shall schedule a public informational hearing if a petition requesting a hearing is received from 5 or more persons or if response to this notice indicates significant public interest pursuant to s. 283.49, Stats. Requests for a public informational hearing

shall state the following: the name and address of the person(s) requesting the hearing; the interest in the proposed permit of the person(s) requesting the hearing; the reasons for the request; and the issues proposed to be considered at the hearing.

Information on file for this permit action, including the draft permit, fact sheet (if required) and Environmental Assessment, may be inspected and copied at either the above named permit drafter's office or the above named basin engineer's office, Monday through Friday (except holidays), between 9:00 a.m. and 3:30 p.m. Please call the permit drafter or basin engineer for directions to their office location, if necessary. Information on this permit action may also be obtained by calling the permit drafter at (715) 355-1363 or by writing to the Department. Reasonable costs (usually 20 cents per page) will be charged for copies of information in the file other than the public notice and fact sheet. Permit information is also available for downloading from the internet using a world wide web browser at: http://www.dnr.state.wi.us/org/water/wm/ww/drafts/pubnot.htm. Pursuant to the Americans with Disabilities Act, reasonable accommodation, including the provision of informational material in an alternative format, will be made to qualified individuals upon request.

NAME OF PUBLISHING NEWSPAPER:**Enter Name of Publishing Newspaper**

ADDRESS OF PUBLISHING NEWSPAPER: **Enter Address of Publishing Newspaper**

Date Notice Issued: 05/24/2011

State of Wisconsin
DEPARTMENT OF NATURAL RESOURCES
West Central Region Headquarters
PO Box 4001
Eau Claire WI 54702-4001

Scott Walker, Governor
Cathy Stepp, Secretary
Scott Humrickhouse, Regional Director
Telephone 715-839-3700
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WISCONSIN
DEPT. OF NATURAL RESOURCES

November 1, 2011

To whom it may concern

Subject: Addendum to Richfield Dairy EA

Dear Concerned Parties:

The Department thanks all persons and parties who submitted comments regarding the environmental assessment for Richfield Dairy. Due to the volume of comments and the need to go into greater depth on some of the comments, it has taken some time for responses to be prepared. The attachments serve as an addendum to the EA.

There were several comments requesting that an environmental impact statement (EIS) be prepared. While many comments pointed out the potential for impacts, the EA adequately details potential environmental consequences. As you read our responses, keep in mind there is no difference in content between an EA and an EIS prepared by the Department. The difference is in process only. However, in this case the Department increased the comment period from 14 to 30 days, and with the public hearing held for the WPDES permit and EA, there is no demonstrable difference between an EIS process and the EA process used for this project. The EA and addendum can be found at the following website: http://dnr.wi.gov/org/es/science/eis/eis.htm

Finally, there were comments that stated or requested that the permits should be denied. The purpose of the EA is to inform the decision-makers of the potential environmental impacts of the proposal. The EA is not the decision on the various permits and approvals.

Thank you again for your comments. They have provided for better clarification on several issues, thereby making the EA a better document that is more informative.

Sincerely,

Russell A. Anderson
Environmental Analysis & Review Program Supervisor
Western Region EA Program
3911 Fish Hatchery Road
Fitchburg, WI 53711
(608) 275-3467

Cc: Terry Kafka, DNR, WCR, Wausau
Scott Humrickhouse, DNR, WCR, Eau Claire
Dave Siebert, DNR, OEEA/7
Tom Bauman, DNR, WT/3
Robert Baczynski, DNR, WCR, Baldwin
Judy Ohm, DNR, LE/8
Deb Johnson, DNR, LE/8
Mary Anne Lowndes, DNR, WT/3
Nick Schaff, DNR, WCR, Eau Claire
Dan Baumann, DNR, WCR, Eau Claire
Eric Ebersberger, DNR, DG/5
Jim Pardee, DNR, OEEA/7
Robin Nyffeler, DNR, LE/8

Environmental Assessment Comment Summary and Response
Richfield Dairy
WPDES Permit WI-0064815-01-0

Modifications to be made within the Environmental Assessment

Deleted the Pumping Withdrawal statement within EA (general project summary, paragraph 4) stating that the "applicant notes that this is less water than has historically been used for irrigating crops at the site." Replaced with the following statement……. "

Richfield Dairy is required to submit a high capacity well permit application to the DNR to construct two high capacity wells and abandon one existing high capacity well which was previously utilized for crop irrigation. The Department's Water Use Section has reviewed the application. The proposed wells would be drilled to a depth of ~350 feet. Based upon soil borings in the area, the static groundwater level at the proposed site is no less than 32 feet from the ground surface. The high capacity well application requests an average daily water use of 600,000 gallons and a maximum daily water use of 720,000 gallons for each of the two proposed wells. The dairy states that these amounts represent peak-day summer water usage. Average annual water usage at the facility is estimated to be about 52.5 million gallons per year, which includes 44 million gallons for animal watering / cleaning and 8.5 million gallons for evaporative cooling of the barn during hot weather. Based upon withdrawal history available for the site's existing irrigation well, DNR Water Use staff have concluded that the proposed Richfield Dairy pumping rate exceeds recent withdrawal rates (2007-2010) by 40%, and exceeds withdrawal rates for all years on record (1978-1989 and 2007-2010) by 65%.

The Department received approximately 106 written comments on the Richfield Dairy WPDES permit and associated Environmental Assessment; with 25 expressing support for the proposed permit and 81 expressing opposition.

The Department also held an informational session and public hearing on July 18, 2011, 12:00 p.m., at the Adams County Community Center, 569 North Cedar Street, Adams, WI 53910. Department staff estimated that there were approximately 340 individuals in attendance at the Richfield Dairy public hearing. Of the 247 hearing appearance forms submitted at the hearing, 141 individuals registered in support of Richfield Dairy, 88 registered in opposition of Richfield Dairy, and 19 did not indicate a position. Of the 79 people who provided oral testimony, 43 individuals spoke in favor of the Richfield Dairy project, 35 individuals spoke in opposition of the project and one individual did not identify a position in support or opposition.

Comment #1: There were a significant number of comments asking/stating that the DNR complete an EIS for Richfield Dairy Project. Comments on this topic included:

- The environmental analysis (EA) was incomplete and was not of sufficient scope and detail to conclude that this is not a major action, which would significantly affect the

- The definitions/differences of the EA and the EIS are quite significant. An EIS is a more definite vs. the EA which is probable.
- Too many things have been done in the past for the sake of a few jobs or businesses that are catastrophic for our world.
- The DNR has the responsibility through the EIS process to examine potential “acts of God” and how these events would impact natural resources. These resources are simply too valuable to not carry out a full EIS. The risks associated with the proposed Richfield CAFO warrant the full EIS process.
- An EIS *and* at least appropriate delay and re-draft of this Permit is also required because the EA fails to recognize and sufficiently consider the increased nutrient loading to waters within Adams and extending to Waushara Counties given the 17,000 acres of manure spreading and unavoidable associated run-off.
- Associated externalized environmental costs of CAFOs, and therefore, these costs also apply to and support the "significance" of this CAFO action demanding an EIS.
- We urge the DNR to provide a rigorous cumulative effects analysis as part of an EIS for this CAFO, already, now, the fifth CAFO to be operated by this same applicant Milk Source Holdings in the state, especially because this company has already been cited and/or received numerous complaints in regards to its other CAFO dairies (esp. the recently permitted Rosendale Dairy) for which you did do an EIS.
- There are well-documented and commented potential (site-related and cumulative) *significant* impacts on the delicate and pristine human environment at the facility and beyond in at least a 10 mile radius
- This CAFO is proposed to be sited in a unique area (sandy soil, high water table, precious surface waters nearby, privately contaminated wells) for which an EIS has not previously been done regarding potential impacts.
- The EA is insufficient, has not evidenced proper consideration of cumulative impacts and alternatives in scope/phase consolidation/limitation/type, nutrient management, site, and pollutant discharge (such as wastewater and manure spreading) requirements, as required under WEPA and Wis. Adm. Code NR 150.22.
- Any Phase breakdown that necessarily precludes actual consideration of full environmental impacts, and should not be allowed. This is a standard ploy of Milk Source Holdings and other CAFO permittee applicants in order to minimize environmental review required, and the DNR as the public environmental steward, has an obligation under the public trust doctrine, to stop such allowances and minimal classifications.
- I am concerned about how chemicals in the water and air may adversely affect my health. I live across from Chaffee Creek. My kids and I have done water testing science in that creek. We know the abundance of biodiversity in that creek and

Response: Issuance of an individual WPDES permit for a new CAFO of this size is a Type 2 action requiring the EA process under chapter NR 150.03(8)(i)2a, Wis. Adm. Code. Chapter NR 150.22(2), Wis. Adm. Code determines the required content of EAs and EISs for the Department of Natural Resources. There is no difference in the content requirements for EAs and EISs under this chapter. The only difference is procedural. The Public Trust Doctrine does not place requirements on the Department's WEPA compliance. The Richfield Dairy EA, as amended, adequately covers the content requirements of NR 150.22(2), and did not find significant impacts that would otherwise require the EIS process under NR 150.20(1)(c)3.

The EA includes an analysis of cumulative effects by relying on the nutrient management plans of this proposed project, and other CAFOs in the project area. Neither an EA nor an EIS provides authority to alter the permit decision.

The DNR has issued approximately 230 CAFO permits. Catastrophic environmental impacts have not been known to have occurred.

The EA references the nutrient management plan which addresses all manure spreading acreages, and requires application measures to minimize the risk of runoff. The EA adequately includes an analysis of cumulative effects by relying on the nutrient management plans of this proposed project, and other CAFOs in the project area. Neither an EA nor an EIS provides authority to alter the permit decision.

The EA did consider other CAFOs in the project area. There is no known project segmentation in this case.

The Department believes it has adequately outlined alternatives. In addition, outlining alternatives does not create additional authority to require that alternatives are followed.

Comment #2: The addition of CAFO agriculture to the Central Sands is a major action significantly affecting the human environment and an EIS must be done before any permits are issued. Reasons to conduct an EIS include:

- It is incorrect to claim there will be no effect regarding groundwater pumping (see Kraft and Mechenich, 2010, report to the DNR).
- To claim that the proposed NMP will guarantee no groundwater pollution has no basis in fact or data collected and analyzed at this time. Where are the peer reviewed documents that support the claims in the EA?
- It is unknown how E. coli will act when spread in large quantities in the Central Sands. Also refer to comment response #83.
- The only EIS completed for a Wisconsin CAFO was not in the central sands, which is very different from other area of the state.

- The CAFO will have a large regional impact that has not been evaluated before (16,000 acres will be changed).

Response: The Department does not claim that the requirements of a WPDES permit, including the requirement to develop and implement an NMP, will guarantee that water quality will not be impacted. The proposed designs of the facilities and systems exceed minimum design standards and are expected to protect groundwater and surface water to the extent required by law, meaning the production site is not expected to cause exceedance of groundwater water or surface water standards. While it is still possible such an event could occur, the DNR acknowledges the need to balance the level of protection with what is deemed likely and reasonable. Only limited data exists on failure rates of manure storage impoundment liners, but the data indicates some level of protection above the minimum is appropriate for higher risk sites, such as this one. The DNR believes an appropriate level of additional protection is provided by the proposed designs. In addition, the Department has added a requirement for the permittee to conduct leak detection and groundwater monitoring as part of the WPDES permit.

There are a number of existing WPDES permitted facilities located within the Central Sands. The Department evaluated the compliance record of three existing CAFO permitted farms (Central Sands, Gordondale Farms and Ostrowski Farms) who have repeatedly applied liquid manure, over multiple years, to fields with sandy, highly permeable soils. We found no direct or circumstantial evidence that these three farms have caused any nitrate and bacterial contamination of drinking water wells, groundwater or lakes or streams from repeatedly applying manure to fields with sand soils over the multiple years they have applied manure to sand soils.

Refer to EA – Water Quantity section of this document.

Comment #3: A number of comments were received in support of Richfield Dairy. Comments included:

- Support for the current regulatory system.
- Better management in operating a dairy such as Richfield Dairy over having many smaller farms.
- The Environmental Assessment DNR generated for the proposed Richfield Dairy WPDES permit is adequate. It properly evaluates potential impacts of the proposed project and satisfies the Wisconsin Environmental Policy Act.
- Milk Source is investing millions of dollars to build a dairy in Adams County to add 4,300 new cows to Wisconsin's dairy herd and has applied for all of the necessary local and state permits including the WPDES discharge permit.
- This proposed dairy will actually increase environmental protection in Adams County while adding dollars to the local and state economy and creating jobs in the area.
- The project will add jobs to the area.
- All permitted dairies in Wisconsin have a very good track record of compliance with the regulations and the reporting requirements of the law.
- The Wisconsin DNR has a track record of enforcing these rules to protect the diverse land forms and water resources found within the state.

- Milk Source, the owner of Richfield Dairy, has been awarded WPDES permits for its other dairies located near Kaukauna, Omro, Rosendale and De Pere. They have successfully implemented sound nutrient management plans and environmental procedures at those farms.

Response: Comments noted.

Comment #4: Dumping manure on farm fields is basically a temporary landfill and produces methane gas. This is a safety issue and requires the EIS.
Response: The Department does not agree with this comment. When applied properly, manure is a valuable nutrient and soil conditioner that promotes crop growth and not considered a temporary landfill. The Department completed an EA and determined that an EIS was not necessary..

Comment #5: Information on the EA must be made available on-line and include the nutrient management plan.
Response: There is no requirement that the EA be made available on-line. The EA, WPDES permit and nutrient management plan were public noticed and made available for public comment. Copies of these documents were provided to members of the public that requested copies. The document, however, is now located at the following web address: http://dnr.wi.gov/org/es/science/eis/eis.htm

Comment #6: The Department received a number of comments stating that the Environmental Assessment prepared by the DNR to evaluate the proposed Richfield Dairy was more than adequate.
Response: Comments are noted.

Comment #7: Much of the data used to complete the permit process and to my understanding the EA was generated by Milk Source. A little, like letting the fox guard the henhouse, wouldn't you say?
Response: The Department acknowledges the perceived conflict of interest. However, the EA and the permit documents/approvals are ultimately Department documents that have been drafted and reviewed by Department staff. If there are deficiencies that are identified via public comment, they are addressed in our responses to the public.

The Milk Source submittal included plans / specifications for reviewable facilities, a nutrient management plan, the WPDES Permit application, a completed Environmental Analysis Questionnaire, Animal Unit Calculation worksheet, manure quantity estimates, soil maps, topographic maps, aerial photographs and a detailed narrative containing background information about the proposed operation and how it will function after construction. This information is required by all facilities that are applying for WPDES permit issuance and provides Department staff with the information necessary to properly evaluate the proposal.

The environmental assessment was drafted by Department staff in a collaborative effort between programs and disciplines. Chapter NR 150.22(1)(a)1 specifically allows information from an applicant to be used in an environmental assessment.

Comment #8: The Department received the following question related to the general project description within the environmental assessment regarding the plan and specification design for the proposed feed storage pad and manure solids storage area. "Do these areas have secondary liners?"
Response: The proposed feed storage pad and manure solids storage area each have a surface to be constructed of concrete with water-stop installed at all joints, in addition to a soil liner component to be located immediately below (and in contact with) the concrete. There is no codified definition of "secondary liner" for manure storage facilities, but the term commonly refers to a second liner that is separated from the primary liner, with a leak detection / collection system located between the liners. The term "composite liner" commonly refers to a system of two or more liner components in direct contact with each other.

Comment #9: Once again industrial ag has launched an attack on the environment and a small community; amazing what money and political clout can do. I already live near the Rosendale Dairy and it is not fun. The stench, the traffic, the noise, the worry over ground water and well water as well as air quality. Why do private citizens have no rights compared to corporations? I know the answer to that one but it does not make it any easier to live with. All owners of CAFOs should have to live on them.
Response: The Department issues water quality protection permits based on the requirements in state statutes and regulations and does not give preferential treatment to CAFO over citizens. Siting and expansion of large livestock operations is also allowed under the livestock siting law administered by DATCP and local units of government.

Comment #10: There were a number of comments which expressed concerns about the potential for Richfield Dairy to expand beyond current numbers and potentially doubling the herd size. They expressed concerns that existing large livestock operations already in the area pose more than the sand soil environment can handle. Comments expressed concern that the dairy farm will surely contaminate our environment, and significantly harm our health and quality of life.
Response: WPDES permittees are provided a certain level of flexibility in regard to increasing livestock numbers. The revisions to NR 243 provide significant reductions in actual and potential discharges from CAFOs by placing more stringent requirements on the storage and land application of CAFO manure than under the previous version of the code. The primary factors which limit a permitted facility from increasing livestock numbers is the requirement to maintain a minimum of 180-days of manure storage and the need to maintain an adequate land base to apply the manure in accordance with NR 243.14, Wis. Adm. Code. The Department's plan approval for the construction of reviewable facilities at Richfield Dairy included manure storage structures with an available capacity of approximately 205 days of storage. If Richfield Dairy were to significantly increase animal units at some future date to the point that additional storage was needed, the facility would first need to undertake a construction project, which would require DNR plan approval.

Milk Source currently has land contracts on the majority of the 16,429 acres of land base that is identified within the DNR approved nutrient management plan. The Department views the additional purchase of cropland as a positive management decision. Cropland ownership provides a facility with more flexibility in planning cropland rotations while also allowing for better management of future nutrient applications.

Comment #11: Several comments noted concerns related to increased road traffic and wear and tear on local roadways.
Response: With regard to the WPDES CAFO permit, the Department only has the authority to monitor and address water quality based impacts from Richfield Dairy.

Comment #12: A number of comments, some of which generally supported agriculture, expressed concerns about the negative impact Richfield Dairy will have on air and water quality and smaller-scale farms. A number of these commenter's were local residents who expressed additional concerns about the negative impacts on the quality of life of people in the area (e.g. property values, traffic, noise, odors, wildlife impacts). They believe that these potential impacts present an unacceptable level of risk to the environment and they asked that the Department deny issuance of the WPDES permit.
Response: The Department supports responsible farming regardless of the size of a livestock operation. WPDES permitted CAFO facilities are required to adhere to very stringent requirements. The Department believes the permit as issued complies with ch. NR 243 and provides an adequate level of water quality protection. The Richfield Dairy facilities have been designed in a manner that exceeds NRCS Technical Standards to further reduce the potential of leaching. The manure storage facilities were also designed to exceed the 180-day storage capacity requirement, which also includes additional freeboard capacity to capture a twenty-five year rain event and prevent an overflow. It is important to note that an allowed overflow discharge to surface waters from the production area is very unlikely given the conditions contained within the WPDES permit. In addition, the only allowable land application discharges of manure, process wastewater or associated pollutants (e.g. nitrogen, phosphorus) from Richfield Dairy to surface waters are discharges of agricultural stormwater (those discharges that occur after compliance with ch. NR 243, the WPDES permit and an approved nutrient management plan) which are not subject to WPDES regulation.

As for land application areas, the WPDES permit establishes application restrictions and best management practices designed to keep pollutants on the land. Through permit coverage, all land application activities must be done in conformance with a nutrient management plan. In most cases, once a parcel of cropland comes under a chapter NR 243 based nutrient management plan, there will likely be a reduction of pollutant runoff from that parcel of land. This is due to the fact that cropland not previously covered under a nutrient management plan will, through permit coverage, become subject to more (water quality) protective management practices required by the WPDES permit program. Manure applications cannot exceed crop need and must be made in a responsible manner. Facilities must observe manure application set back requirements from private wells, conduits to groundwater and within defined surface water quality

management areas (SWQMS). Manure applications are restricted during snow covered and frozen ground conditions.

Information on permit conditions that protect water quality can be found throughout this document.

The non-water quality impacts described in many of the comments received and outlined in the Environmental Assessment for this operation are not regulated by the Department as part of the operation's WPDES permit nor can they serve as a basis for denying permit coverage. While negative impacts associated with the Richfield Dairy project may occur, the Department, through the EA process, has determined that the project will not have a significant adverse impact on the human environment.

Comment #13: If the DNR can't protect our soil from being blown away, ensure habitat protection for trout, and stop chemicals from being dumped on us by crop dusters, how can it protect us from an onslaught of chemical contaminations to sustain crop needed to feed, milk and clean 6,000 cows?

We already have allowable toxic chemicals from the paper mills being applied to our fields and now we want the manure of 6,000 plus cows. We understand that these chemicals permeate the groundwater, but what happens when they become airborne in Adams County during our annual "dust bowl" days that occur on numerous spring days due to high wind speeds and little windbreaks. Surely, this will increase particulate cow feces into our lungs and streams.
Response: The Department agrees that soil wind erosion within the Central Sands area is a concern. The Department does not have regulatory authority to address wind erosion However, the introduction of alfalfa crops into the cropping rotation will result in a reduction of wind erosion within those specific fields. Pesticides are primarily utilized within the cash cropping industry. Implementation of more diverse crop rotations should result in a net reduction in pesticide use. With the implementation of a nutrient management plan, manure applications will be limited to crop need and result in a reduction of commercial fertilizer applications.

Comment #14: Comments were received from individuals expressing concern about the impacts air and water pollution from the operation will have on their existing health conditions (e.g., asthma, severe allergies).
Response: The EA acknowledges potential health risks associated with air emissions from livestock operations. The EA also states that air emissions from such operations are difficult to predict. Finally, the EA states that RD has proposed measures to reduce and mitigate air emissions.

Comment #15: We all know very well, this company is staying just under the 5,000 animal limit because they know it's a triggering number for the EIS. No one purchases enough land for 10,000 cows when they are only going to purchase 5,000.
Response: The Department does not have a set size of operation at which an EIS is required. Whether an EIS is needed is based on the specifics of an operation.

Completing an Environmental Assessment is part of the process of determining whether an EIS is necessary for a given project. It was determined that an EIS was not needed for this project. There is no difference in content for an EA or EIS prepared by the Department.

Comment #16: This area (Adams/Waushara) is made up of unique topography. I have a definition of it below because the DNR has seen to overlook this major factor. Our land in this area that cannot support a CAFO. Wisconsin has sold their soul to the devil too many times for these CAFO's. It's time to stop.

I have included articles of why our land is so fragile. The fact that we have the huge rock formation coming out of the ground right there in Adams County is a definite sign. I know that the DNR has to know these things (although from my understanding many people with the DNR have no environmental background at all), but we have been told we must show you that we know it too. It's ridiculous that we have to pretend to be scientists to protect our environment from the scavengers when we pay people to do this for us.

Response: Information provided by the commenter discusses karst topography, which lends to a landscape that is characterized by numerous caves, sinkholes, fissures, and underground streams. Karst topography usually forms in regions of plentiful rainfall where bedrock consists of carbonate-rich rock, such as limestone, gypsum, or dolomite, that is easily dissolved. Surface streams are usually absent from regions where karst topography exists.

Adams County is in the Wisconsin Central Plain, which is characterized by flat or gently undulating topography. Relief is generally low except for occasional pinnacles and hills of sandstone such as Pilot know, Friendship Mound and Roche-A-Cri Mound in which the commenter references.

Adams County is divided into two physiographic areas. The hills and kettles in the southeast comprise one area, where these landforms were caused almost entirely by glacial deposition. The Johnstown moraine forms the western boundary of this area where the Richfield Dairy facility is to be located. The other area is larger and comprises a broad outwash plain bordered on the west by the Wisconsin River. The outwash deposits are sand over silty and clayey lacustrine deposits laid down in old glacial Lake Wisconsin. The Johnstown moraine in southwestern Adams County divides the drainage between the Wisconsin and Fox Rivers.

The predominant soil types within the area of the Richfield Dairy facility consists of Billett Sandy Loam and Coloma Sand. The Billett series consists of deep, well drained soils on outwash plains. The soils formed in loamy and sandy outwash deposits. The Coloma series consist of deep, somewhat excessively drained, rapidly permeable soils on outwash plains and moraines. The soils formed in sandy glacial till or outwash plains and moraines. There are no documented karst areas in Adams County.

Comment #17: The potential for this huge operation to drive out small family farms in Wisconsin. Sustainability, local food production and maintaining a lower carbon footprint are not fostered by the developments such as Richfield Dairy. Large CAFO's benefit from taxpayer subsidies not available to small family farms.
Response: There is an ongoing debate about whether large-scale livestock operations are sustainable and their impact on the viability of smaller-scale livestock operations. The Department does not have the expertise to comment on which size farms benefit the most from government subsidies.

Comment #18: Staff representing the Northeast Region were not involved in drafting the EA and should have been to minimize or eliminate the environmental hazards of the construction and operations of these CAFO's
Response: The Richfield Dairy facility is physically located within Adams County and the DNR's West Central Region. Concerns expressed by local residents within Waushara County, which is located within the DNR's Northeast Region, are generally related to odor, water withdrawal from the high capacity wells and manure spreading on area crop fields as they specifically relate to impacts on the areas water quality and water quantity.

Ch NR 429, Wis. Adm. Code includes a procedure for determining objectionable odors based on conditions at the facility once it has been constructed and is operating. The high capacity well permit would be handled by DNR Engineers located in the Madison Central Office and the Nutrient Management Plan was reviewed and approved by the Madison Office Water Resources Specialist. These approvals are based upon existing standards and codes that are applicable on a statewide basis. Enlisting review assistance from Department Staff located in the DNR Northeast Region would be considered a duplication of effort, as all facilities must conform to the same standards and codes regardless of location. Therefore, the Department does not believe that regional boundaries related to review and approvals are relevant to the issuance of the WPDES permit or high capacity well permit.

Comment #19: Referencing the Department response to the environmental assessment significant of precedent section question "would a decision on this proposal influence future decisions or foreclose options that many additionally affect the quality of the environment? Describe any conflicts the proposal has with plans or policy of local, state, or federal agencies. The Department received the following comment: "NO" is clearly an incorrect determination. Has Waushara County's Land Use Plan been consulted? The Town of Coloma, just east of the proposed CAFO is a high density residential section of Waushara County. This CAFO will have a large and negative effect on tourism in Waushara County. Many jobs will be lost, business failures are likely.
Response: As stated in the EA, facilities of this kind are not new or precedent setting in Wisconsin. Approval of permits by the Department does not preempt, and therefore is not in conflict with, local land use control.

Comment #20: I am concerned because the EA discusses an NMP and BMPs with very loose terms. The EA describes this protection that will minimize sediment delivery if

they are properly controlled. It also describes the study is expected to develop standards and voluntary BMPs to reduce or minimize potential problems from CAFOs.
Response: The EA is not a regulatory document and does not contain all restrictions that apply to Richfield Dairy. The actual land application restrictions are contained in the WPDES permit and Richfield Dairy's NMP. The comment is correct that air BMPs are voluntary. Air BMPs are not enforced via the WPDES permit.

EA-WATER QUALITY

Comment #21: The EA correctly states that nitrogen containing compounds such as ammonia and NOx result in increased nutrient loading and acidification of soils and waters. This statement must be researched and quantified in order for the environmental impact to be accessed.
Response: Nitrogen containing compounds are generated during the manure application process and will result in an increased nutrient loading to soils, acidification of soils and groundwater above current conditions. However, the Richfield Dairy NMP contains several required nutrient / manure management practices that, taken together, help reduce the risk for nutrient loading above crop fertility needs and further reduces the rate, scope and/or frequency of soils and water acidification. These practices include requirements to regularly test all crop fields for soil P, K, and pH levels and plan appropriate management practices to prevent over application of nutrients. Practices include lime applications to reduce soil acidification, immediate incorporation or injection of liquid manure, regular calibration of spreading equipment to ensure that application rates reflect the UW recommendations for crops selected and the planned application of manure in the spring, prior to crop establishment. Spring application prior to crop establishment on highly permeable soils reduces the risk for N mineralization and leaching from applied manure as opposed to fall manure applications. The NMP also includes detailed manure spreading and soil restriction maps of all fields covering more than 16,000 spreadable acres, including field and map verification procedures to ensure that all manure spreading setbacks are properly followed and s. 243.14 prohibited areas (shallow groundwater, conduits to groundwater) are followed or avoided when fields are utilized for manure application.

Comment #22: DNR's Environmental Analysis Review Conclusions About Applicant's Nutrient Management Plan Do Not Constitute an Evidentiary Basis or an Articulation for Concluding that Applicant's Operations Can be Validly Permitted under s. 283.31(3), (4) & (5) in a Manner that will Assure Compliance with Groundwater Quality Standards for Nitrate

The DNR Environmental Analysis (EA), makes a series of erroneous presumptive conclusions that the applicant's final approved nutrient management plan (NMP) will somehow prevent having any groundwater quality water problems – all of these claims are either unsupported, erroneous, are gross distortions or make unverified/unverifiable claims. Moreover, none of Applicant's NMP measures will address or assure whether NMP-allowed nitrogen applications will, in themselves, result in jeopardizing compliance with nitrate groundwater enforcement standards.

DNR's EA says the approved NMP "....reduces the risk of over application and nitrogen leaching." The EA goes on to claim: "If the operation conducts land spreading in accordance with an approved NMP, maintains an adequate land base for land spreading, and properly inspects and maintains manure storage facilities and runoff control systems, the threat to groundwater and surface water should be minimal under normal operating and climatic conditions."

The EA claims: "The operation must comply with its WPDES permit and associated Nutrient Management Plan. Consequently, the land spreading of manure should not yield any substantial increase in risk to the environment."

The applicant's NMP is written to embrace 'university recommendation' nitrogen applications that are contained in the SNAPPLUS algorithms. But reliance on university recommendations on nitrogen application rates in agriculture does not come close to assuring compliance with nitrate groundwater quality standards. One modeling review of a known nitrate problem in a municipal water system in the Central Sand Plains area illustrates that NMP-contained university nitrogen application recommendations do not provide for groundwater quality standard compliance and are otherwise not sustainable:

"For conventional practices, predicted steady-state nitrate-N concentrations are 38 mg/L for the Whiting recharge area and 26 mg/L for Plover. Full farmer adoption of university recommendations decreases the predictions to 26 mg/L for Whiting and 19 mg/L for Plover. These concentrations are about 1.5-2 times higher than present values. Agriculture is responsible for 90-99% of the nitrate loading. Even eliminating all other sources of nitrate only marginally will bring down nitrate concentrations."

Thus, in this Central Sand Plains groundwater modeling situation, mere compliance with university recommended nitrogen field application rates can only ensure that expected groundwater enforcement standards for nitrate are exceeded on a regional basis by a factor of 2, and are not otherwise protected as required by the ch. 140 groundwater enforcement standards.

Wisconsin 'university recommendations' for nitrogen application recommendations for farm fields address both animal waste and conventional commercial fertilizer total combined inputs. However, the primary purpose of the 'university recommendations' is to deduce a nitrogen application rate that will render a specific planned field crop yield rate. 'University recommendations' for nitrogen are not cropping nutrient removal rates.

Such university recommendations' do not address impacts on groundwater, and are not a basis for making statements that such rates ensure compliance with groundwater quality standards. There is thus no reason to believe that the university recommendations used and evaluated in the Richfield Dairy NMP for each NMP field's annual nitrogen waste/fertilizer nitrogen recommendations constitute an acceptable maximum nutrient input to land spreading fields that will ensure compliance with the nitrate groundwater enforcement standards or the preventative action limit for nitrate.

Nothing in Applicant's submitted NMP can substitute for a valid groundwater pollutant modeling demonstration to relate nitrogen loading rates to expected groundwater nitrate concentrations.

Response: The department disagrees that following UW crop recommendations (A 28909) for manure application rates/timing/amts within Richfield Dairy NMP will not assure compliance with groundwater quality standards for nitrate. The UW crop recommendations were adopted by the department as regulatory/discharge limits via adoption of NR 151 and NR 243 performance standards. The standards are referenced within the proposed WPDES permit and all CAFO permitted farms must demonstrate compliance with these criteria. The UW recommendations are based upon years of peer reviewed agronomy/crop fertility, nutrient management and water quality research completed by UW faculty - http://www.soils.wisc.edu/extension/dir.php & http://www.soils.wisc.edu/soils/staff.php - at various UW Ag research stations - http://www.ars.wisc.edu/ - throughout the state, including the central sands region - http://www.ars.wisc.edu/hancock/history.html
http://www.soils.wisc.edu/extension/area/horizons/2005/CornNrecs.pdf
http://www.soils.wisc.edu/extension/materials/VegCropsNPMgmt0306.pdf
http://www.soils.wisc.edu/extension/pubs/A3588.pdf
http://learningstore.uwex.edu/Assets/pdfs/A3422.pdf
http://www.soils.wisc.edu/extension/materials/Potato_ACA.pdf
http://www.soils.wisc.edu/extension/materials/Manure_Potatoes.pdf
http://www.soils.wisc.edu/extension/pubs/pa_sampling.pdf
http://www.soils.wisc.edu/extension/nhss/2011/11_07_ruark_sweetcorn.pdf

The department believes following UW nutrient application recommendations helps prevent over-application of nutrients and helps protect surface and ground waters of the state from environmental degradation. The underlying goal of the recommendations is to apply enough nutrients to the crop for optimum (not maximum) growth throughout the season. Because crop nutrient demands are not uniform throughout the growing season, an adequate supply must be available during the period of peak demand. The program defines the "critical" level as the cutoff between optimum and high soil test levels. The critical level determination within the UW recommendations is based upon the probability of yield increase to applied nutrients. If nutrient supply exceeds the critical soil test level, there is an increased risk of mobile nutrients moving into groundwater and surface water.

The UW Nitrogen (UW N) rate recommendations for corn are based upon soil organic matter, soil texture, growing degree days and yield potential of the soil. Please note corn for grain or corn for silage crops represent 30% of total acres within Richfield NM plan; all these acres have planned manure applications to meet corn crop needs using MRTN method. Recommendations for other crops are based upon soil organic matter and yield goal. The N recommendations are supported by field studies where crop responses to various rates of nitrogen have been measured on soils typically used for production of various crops. N recommendations vary according to crop to be grown, soil characteristics and yield potential, and soil organic matter content. The UW N recommendations are not written to maximize crop production.

The UW N recommendations contain a specific section entitled: Managing nitrogen to avoid losses. This section explains nitrogen rate, nitrogen credits and soil test nitrate recommendations assume best management practices will be used to control nitrogen losses. The following best management practices are described in detail in this section to control nitrogen losses:
(1) Nitrogen Rate, (2) Nitrogen Source, and (3) Nitrogen Timing. Many of these same best management practices will be used during manure applications planned by Richfield Dairy (e.g., following MRTN for all corn crop acres in plan; taking credit for manure and previous legume crops, applying manure in spring before crop establishment vs. fall application, regular testing of all manure sources applied to fields).

Some published studies that support UW N rate recommendations for corn and for reducing risks for nitrate leaching, include:

Adraski, T.W., L.G. Bundy, and K.R.Brye. 2000. Crop management and corn nitrogen rate effects on nitrate leaching. J. Environ. Qual. 29:1095-1103.

Hong, N., P.C. Scharf, J.G. Davis, N. R. Kitchen, and K.A. Sudduth. 2007. Economically optimal nitrogen rate reduces soil residual nitrate. J. Environ. Qual. 36:354-362.

The commenter submits that Attachment #2 - NITRATE LOADING AND IMPACTS ON CENTRAL WISCONSIN GROUNDWATER BASINS – by George J. Kraft – demonstrates that UW recommendations used in the Richfield Dairy NMP, will not ensure compliance with the nitrate groundwater enforcement standards or the preventative action limit for nitrate. The study uses the N-budget approach of Stites and Kraft (1997) to estimate each crop's nitrate-N loading rate (lbs. nitrate-N/acre).

After review, the study is a prediction and was not confirmed by any follow up sampling to verify the prediction. Moreover, the study is missing critical documentation of the nutrient management practices followed by growers in the sampling area(s). The N-loading rates quoted in study may not reflect the actual fertilizer applications or sources used by growers nor is it clear if any crop uptake of nutrients were considered. These two items are critical since it forms the basis for mass balance model and commenter's conclusions.

The study also does not indicate if any growers had or followed a nutrient management plan. Nor does the study confirm, what, if any, other nitrogen management practices, as described in UW crop recommendations, were followed by growers when applying commercial N. Examples of such practices include: application timing- spring vs. fall application; for sands, use side-dress or split N applications with most of nutrients applied after crop establishment; using N inhibitors; taking applicable N credits; schedule irrigation to minimize N leaching; under conditions were N leaching is likely, use all ammonium N sources, slow-release fertilizer materials, delay N application to match crop uptake; for potatoes, either apply 25-50% of crop N at emergence and remainder at

tuberization or apply remaining N in multiple split applications). Without this documentation, it is erroneous to conclude that nitrate concentrations will increase if UW recommendations are followed.

Last, the department agrees that highly permeable, sandy soils found within many RD fields have risks for groundwater contamination and the need for the farm to maintain compliance with groundwater quality standards. With that said, the department considers the factors listed under comment response #36 within the Notice of Final Determination for the permit, in addition to the requirement to adhere to UW recommendations, will help minimize the risk of nitrate N discharges to groundwater resource(s).

Comment #23: Besides the probable increase in nitrates in our well water, we are also concerned about other contaminants such as: hormones, chemicals, antibiotic-resistant bacteria, cleaning agents, ammonia and heavy metals, and silage leachate. Pathogens such as E.coli bacteria, cryptosporidium, and salmonella - all of which can cause sickness or death in humans and animals - may be present in CAFO wastes. The EA did not address these contaminants**.** No studies were cited to support the claim that the proposed process of waste management will decrease the nitrates in the groundwater (as stated at the hearing on July 18).
Response: The Department does not have the authority, via NR 243, Wis. Adm. Code or the WPDES permit to regulate other hormones, chemicals, antibiotic-resistant bacteria, cleaning agents, ammonia and heavy metals. The Department does have the authority to regulate silage leachate and, to some extent, pathogens, via land spreading requirements of NR 243 and WPDES permit. The points listed within comment response #36 within the Notice of Final Determination for the WPDES permit, addresses the commenter's concerns regarding nitrates in groundwater and pathogens:

Comment #24: The EA discusses that the operation will also be required to conduct manure and soil sampling to determine appropriate application rates, depending on soil and crop types but does not review frequency or timing to be reviewed by a certified crop consultant.
Response: The proposed WPDES permit requires Richfield Dairy to develop and maintain a NM plan that is consistent with the permit and NR 243.14 requirements, including regular manure sampling (2x/month) and soil sampling (1x/4years) to determine appropriate application rates. It also contains requirement for revising the NM plan with this information on, at least, an annual basis. All NM plans and revisions must be developed and/or approved by a certified crop consultant.

Comment #25: Nowhere in the EA is the potential of a Scab epidemic mentioned. It is well known that applying manure to potato fields can cause an increase in scab infection (see info from Purdue University at http://vegetablemdonline.ppath.cornell.edu/factsheets/Potato_Scab.htm).
Response: The Department agrees that manure applications to potato fields, in general, can increase the risk for scab infection of potato plants. Also, reference comment response #86 of the "**Permit Changes and Response to Comments"** document for additional information.

Comment #26: I disagree with the DNR conclusion that the EIS Process is not required for the proposed Richfield Dairy. The environmental analysis (EA) was incomplete and was not of sufficient scope and detail to conclude that this is not a major action which would significantly affect the quality of the human environment. Therefore, an environmental impact statement is required prior to final action by the Department on this project.

The construction and the ongoing business will be a Major Action Requiring the Full EIS Process. The proposal is of such magnitude and complexity with such considerable and important impacts on the quality of the human environment that it constitutes a major action significantly affecting the quality of the human environment.

At best, the EA restates the company's plans for the facility and provides textbook descriptions of scientific processes, neither of which are a suitable substitute for the required analysis necessary to make an informed decision on the issuance of a WPDES permit.

<u>Specifically, the EA's "Conclusions of the Environmental Effects and Their Significance" are incomplete, lacking in depth of analysis and at times not accurate and therefore require a full EIS prior to final action by the Department on this project.</u>

The EA does not have sufficient data and analysis to have made the following statements:

1) Consequently, the land spreading of manure should not yield any substantial increase in risk to the environment.
2) Manure will be land spread in accordance with a Department approved Nutrient Management Plan, which will not allow poor land application practices; thus, operating practices should have minimal impacts on the environment.
3) Provided manure land-spreading is limited to existing croplands and application practices avoid increased nutrient loading to surface waters (see later discussion in this section), no serious threat to sensitive resources in the vicinity would be expected. Therefore, long-term significant impacts on terrestrial animals and vegetation are not expected.
4) No waterways, wetlands or other aquatic resources are present at the immediate farm site. Therefore, no ORW or ERW resource waters will be affected.
5) If the operation conducts land spreading in accordance with an approved NMP, maintains an adequate land base for land spreading, and properly inspects and maintains manure storage facilities and runoff control systems, the threat to groundwater and surface water should be minimal under normal operating and climatic conditions.
6) Manure will be land spread in accordance with a Department approved Nutrient Management Plan, which will not allow poor land application practices; thus, operating practices should have minimal impacts on the environment.
7) There are typically positive short-term economic effects to contractors and vendors during the construction phase of CAFOs. Long-term positive effects are also

The previous statements listed above are presented as facts to justify the Draft EA conclusion that an EIS is not necessary to make a final decision on the permit application. The EA statements in fact are made with improper extrapolation of data and/or incomplete or not of sufficiently rigorous research and/or are contradicted by other statements within the EA and therefore cannot be relied on to make an informed decision.
Response: See Response to Comment#1 for discussion on WEPA concerns.

With respect to NM plan, the Department disagrees that the EA statements of fact lacked depth of analysis and at times were not accurate, for the following reasons:

A NMP must be submitted to the Department and then reviewed for consistency with NR 243 performance standards before approval is granted, and a WPDES permit is issued. The Department fully understands that s. 243.14 includes specific NMP content requirements (which include, by reference, applicable sections of the NRCS 590 NMP standard) and also multiple and specific land spreading requirements designed to prevent manure and process wastewater from entering into surface or ground waters of the state.

- Failure to meet all s. 243.14 criteria is grounds for an incomplete application determination by the Department.
- The purpose of the NR 243 performance standard is to implement design standards for accepted management practices and establish permit requirements as a basis for issuing WPDES permits.
- Accepted management practices are practices, techniques or measures through which runoff, manure, milking center waste, leachate, or other waste streams associated with animal feeding operations are handled, stored, utilized or otherwise controlled in a manner to achieve compliance with NR 151 livestock performance standards and prohibitions and water quality objectives established under chs. 281 and 283, Wis. Stats.
- The general and specific land spreading requirements of NR 243.14 are more restrictive or prohibitive than similar criteria within the NRCS 590 standard (Winter Spreading, Nutrient Crediting, Setbacks from conduits to groundwater, surface water and wetlands, record keeping, manure testing).
- The applicant, owns and operates several permitted CAFO facilities in the state, many of which have herd sizes greater than 3000 animal units and have NMP's that encompass hundreds of fields and thousands of acres planned for manure and process wastewater applications to meet crop needs (N.P & K) and nothing more.
- Some of these CAFO facilities were recently issued or re-issued WPDES permits.
- Milk Source Holdings, Inc., has consistently demonstrated on existing facilities their ability to implement nutrient management plans which conform to NR 243 performance standard requirements.
- Milk Source overall record of compliance with WPDES permits demonstrates a consistent trend of water quality protection by the company.

- Milk Source has submitted NMP's to the Department for review and approval which exceed some s. 243.14 requirements and afford increased protection of surface and groundwater resources.

Comment #27: The EA correctly states that nitrogen containing compounds such as ammonia and NOx result in increased nutrient loading and acidification of soils and waters. This statement must be researched and quantified in order for the environmental impact be accessed.
Response: Nitrogen containing compounds are generated during the manure application process and will result in an increased nutrient loading to soils, acidification of soils and groundwater above current conditions. However, the Richfield Dairy NMP contains several required nutrient / manure management practices that, taken together, help reduce the risk for nutrient loading above crop fertility needs and further reduces the rate, scope and/or frequency of soils and water acidification. These practices include requirements to regularly test all crop fields for soil P, K, and pH levels and plan appropriate management practices to prevent over application of nutrients. Practices include lime applications to reduce soil acidification, immediate incorporation or injection of liquid manure, regular calibration of spreading equipment to ensure that application rates reflect the UW recommendations for crops selected and the planned application of manure in the spring, prior to crop establishment. Spring application prior to crop establishment on highly permeable soils reduces the risk for N mineralization and leaching from applied manure as opposed to fall manure applications. The NMP also includes detailed manure spreading and soil restriction maps of all fields covering more than 16,000 spreadable acres, including field and map verification procedures to ensure that all manure spreading setbacks are properly followed and s.. 243.14 prohibited areas (shallow groundwater, conduits to groundwater) are followed or avoided when fields are utilized for manure application.

Comment #30: One comment listed a number studies/research papers indicating Serious Pre-existing Problems of Contaminated Groundwater in the General Central Sands Area Occupied by the Applicant's Land Spreading Fields and Production Area.

A field research paper for 1999 indicates serious, intractable groundwater nitrate problems throughout the Central Sands agricultural region:

Another paper concurs with the observation of serious nitrate groundwater problems in the Wisconsin Central Sands agricultural area:

All of the papers indicate the proclivity for nitrate problems in the Wisconsin Central Sand Plains created by nitrogen application to highly permeable soils in the area of the proposed facility and its land spreading fields.
Response: The Central Sand Plains are vulnerable to groundwater contamination from agricultural chemicals. The threat to groundwater can be lessened if pest management and nutrient management strategies are used by all farmers. Managing manure according to a nutrient management plan as required under a CAFO permit will limit nitrate inputs to groundwater. It is assumed that lower application rates will result in less nitrate inputs to groundwater. Site specific groundwater monitoring of land application sites over a

long period would be required to determine trends in nitrate concentration in response to nutrient management plans.

Comment #31: The EA states that "There is a concern about nitrate contamination already present in the area," this is a major environmental issue and requires investigation by the DNR. The applicant will be required to follow an approved NMP on all of the 16,429 acres under contract for manure application, which reduces the risk of over application and nitrate leaching. This is an incomplete comparison, the DNR needs to research actual current manure and commercial fertilizer applications and then make a comparison, there are no measurable facts in the EA comparison only unsubstantiated assumptions on current applications of fertilizer and manure and therefore no meaningful conclusions about the increase or decrease in the amount of nutrients can be made.
Response: The Department is unable to make the comparison suggested by the commenter as none of the local growers that farm the acreage identified within the Richfield Dairy NMP have an approved NRCS 590 NMP. The reasons growers do not have a standard 590 plan include: (1) many growers in the area do not agree with all of the UW crop fertility recommendations required in a standard 590 plan; (2) to require growers to obtain and follow a 590 NMP, the county/state must offer, by law, 70% cost share assistance for the increased costs associated with a standard 590 plan; (3) the cost share rate to develop a NMP is approximately $28/acre. For the 16,429 acres associated with the Richfield Dairy NMP, this would result in an up front cost of $460,000 dollars to county/state government (the 2009 and 2010 annual budget for NMP development in Adams County was $65,000 and the annual state budget for NMP development ranges between 3-5 million).

As a WPDES permitted facility, RD is not eligible for state cost share funding, as it is required under the WPDES permit that the facility develop and implement a NMP that meets s.243.14 requirements. The permit requires RD to maintain detailed manure spreading and calibration records and to provide updated annual NMP reports to the Department. The NMP and WPDES requirements offer greater transparency to what nutrients are applied to crops above the current conditions. These factors provide the basis for the Department's determination that the applicant will be required to follow an approved NMP on all of the 16,429 acres under contract for manure application, which reduces the risk of over application and nitrate leaching.

Comment #32: The EA states that the NMP will limit nutrient application to crop need where there were no limits in the past. There is a reduced risk of nitrate leaching from manure then from commercial fertilizer. Unlike commercial fertilizer where all nitrogen components are immediately available, manure contains a significant amount of organic nitrogen which is neither available to plants nor mobile in the environment until converted to plant available ammonium, nitrite or nitrate by soil microbes. These descriptions are not valid for making critical decisions. Actual data must be analyzed containing the current applications of commercial fertilizer and manure-application before a statement of comparison and the reduce risk can be made.
Response: The Department disagrees. Manure by definition, is an organic N source. It is fundamentally different than commercial fertilizer (which has inorganic N and is

immediately plant available form of N) as stated within the EA. Since none of the growers / landowners who have land base that is included within the Richfield Dairy NMP have a NRCS 590 NMP, a comparative analysis is not feasible.

Comment #33: Changed crop rotation will include perennial forage crops such as grass, hay and alfalfa on at least 25% of the acres. This statement confirms that 25% of the manure will not be incorporated into the field to reduce the risk of leaching into groundwater and run-off into surface-water, the EA does not address these increased risks.
Response: The Department disagrees. The Richfield Dairy NMP depicts crop rotations with 25% of acres having perennial forage crops. The NMP shows only 4% of the 16,429 acres is planned for alfalfa/perennial forage crop. The remaining 96% is planed with annual crops such as corn grain, corn silage, potato, winter wheat, snap beans and sweet corn. If such crops receive liquid or solid manure, the manure is planned to be immediately incorporated or injected.

Comment #34: The EA does not address the Karst Topography. From Wikipedia: ***Karst topography*** *is a geologic formation shaped by the* dissolution *of a layer or layers of soluble* bedrock*, usually* carbonate rock *such as* limestone *or* dolomite,[1] *but has also been documented for* weathering *resistant rocks like* quartzite *given the right conditions.*[2] *Due to subterranean drainage, there may be very limited surface water, even to the absence of all rivers and lakes. Many karst regions display distinctive surface features, with* sinkholes *or dolines being the most common. However, distinctive karst surface features may be completely absent where the soluble rock is mantled, such as by glacial debris, or confined by a superimposed non-soluble rock strata. Some karst regions include thousands of* caves*, even though evidence of caves that are big enough for human exploration is not a required characteristic of karst.*
Response: Karst topography, which lends to a landscape that is characterized by numerous caves, sinkholes, fissures, and underground streams. Karst topography usually forms in regions of plentiful rainfall where bedrock consists of carbonate-rich rock, such as limestone, gypsum, or dolomite, that is easily dissolved. Surface streams are usually absent from regions where karst topography exists. Adams County is in the Wisconsin Central Plain, which is characterized by flat or gently undulating topography. Relief is generally low except for occasional pinnacles and hills of sandstone such as Pilot know, Friendship Mound and Roche-A-Cri Mound in which the commenter references.

Adams County is divided into two physiographic areas. The hills and kettles in the southeast comprise one area, where these landforms were caused almost entirely by glacial deposition. The Johnstown moraine forms the western boundary of this area where the Richfield Dairy facility is to be located. The other area is larger and comprises a broad outwash plain bordered on the west by the Wisconsin River. The outwash deposits are sand over silty and clayey lacustrine deposits laid down in old glacial Lake Wisconsin. The Johnstown moraine in southwestern Adams County divides the drainage between the Wisconsin and Fox Rivers. The predominant soil types within the area of the Richfield Dairy facility consists of Billett Sandy Loam and Coloma Sand. The Billett series consists of deep, well drained soils on outwash plains. The soils formed in loamy

and sandy outwash deposits. The Coloma series consist of deep, somewhat excessively drained, rapidly permeable soils on outwash plains and moraines. The soils formed in sandy glacial till or outwash plains and moraines. There are no documented karst areas in Adams County.

Comment #35: The Environmental Assessment's discussion of the significance of cumulative impacts did not properly address the impact of additional nitrogen loading of the groundwater that would be caused by the manure spreading proposed. The increased nitrogen loading associated with the manure spreading needs to be evaluated in relation to the existing nitrogen loading of groundwater in the area. It is clear, as explained above, that nitrogen loading associated with the current cropping practices in the area is already causing harm to waters of the State. The proposed additional nitrogen loading would be a cumulative impact that would increase that harm.

The DNR has the authority and a general duty to consider whether the cumulative impacts associated with these approvals may harm waters of the state. Since these cumulative impacts harm the waters of the State, the DNR should deny the approvals associated with these impacts using its delegated duty and authority for protection of the State's public trust.
Response: The nutrients from Richfield Dairy's manure and process wastewater are meant to replace, not add, to the nutrients that are placed on area crop fields. Fields previously not covered under an NMP that receive Richfield Dairy manure will be covered under an NMP. The associated nutrient budgeting that goes along with an NMP, particularly under NR 243 and a WPDES permit, may result in decreased nutrient loading to area surface waters and groundwater. The Department is obligated by law to review a given proposal to determine if the proposal can meet the standards and any prescribed conditions of a permit or approval. If a proposal can meet permit requirements, we are obligated by law to issue the permits and approvals. Refer to comment response #36 regarding cumulative effects.

Comment #36: Your brief statement under Sec. 2, Cumulative Effects is inadequate review, as it remains unsubstantiated, to date. This will now be the third CAFO attempted to be sited in a 13 mile direction/radius, and the DNR has STILL utterly failed to address, analyze or even acknowledge cumulative impacts. We would, therefore, argue and comment that this third facility *is very poorly sited and concentrated in a small area* to the detriment of local high groundwater and public waters, especially Pleasant Lake, such that cumulative impacts WILL be significant, and thus an EIS is required.
Response: The Department does consider all projects requiring permits at the time they are proposed. As each is reviewed, cumulative effects are considered. In the case of the Richfield Dairy EA, no significant impacts were found. The Department does not have the authority to dictate locations of CAFOs. The Department is obligated by law to review a given proposal to determine if the proposal can meet the standards and any prescribed conditions of a permit or approval. If a proposal can meet permit requirements and they have sufficient land to apply manure and process wastewater, the Department is obligated by law to issue the permits and approvals. Potential effects on Pleasant Lake are addressed in the EA.

Comment #37: Regarding the statement within the environmental assessment that no waterways, wetland or other aquatic resources are present at the immediate farm site. Therefore, no ORW or ERW resource waters will be affected, the Department received the following comment: "How can this claim be made? Nutrient that will leak from the site will affect groundwater and as a result affect waters of the state – ORW, ERW and those not classified."
Response: While discharges are allowed under the WPDES permit, the restrictions in the WPDES permit and Richfield Dairy's NMP are designed to minimize potential impacts and ensure that groundwater and surface water quality standards are met.

Comment #38: Referencing the section of the environmental assessment stating that Richfield Dairy will follow any natural resources laws that may pertain to how and where the clay is obtained (for construction of reviewable facilities), the Department received the following comment: "There is nothing presented here regarding the risk of *E.coli* contamination to the groundwater. A significant omission. Wisconsin's central sands and the groundwater that underlie them are incredibly vulnerable. Nowhere is this document is that mentioned. To assume the fine loam soils of eastern Wisconsin can be used as a model for what is likely to result in Wisconsin's central sands is an error in judgment. This CAFO will have a large regional impact (16000 + acres will be changed), it is a significant change to the region that has not been evaluated before (there was no EIS completed for Opitz Custom Heifers), it is a major action that will affect the quality of the human environment."
Response: It is expected the proposed operation will present less environmental risk than the previous / historic agricultural use for two main reasons. First, the proposed operation will be applying nitrogen contained in manure (where the nitrogen is less mobile than is true for liquid commercial fertilizer). Second, the proposed operation will be subject to regulatory limitations through the WPDES Permit, including a nutrient management plan that must limit nutrient application based on plant needs.

Nitrate conversion to nitrogen gas is called denitrification, and this process occurs best in water that contains low concentration of dissolved oxygen (referred to as reducing or redox conditions). Research has been done in attempt determine the vulnerability of private wells in the glacial aquifer system to nitrate contamination. An example of such research is described in the United Stated Geological Service publication SIR 2010-5100, Relations That Affect the Probability and Prediction of Nitrate Concentration in Private Wells in the Glacial Aquifer System in the United States, by Kelly L. Warner and Terri L. Arnold, http://pubs.usgs.gov/sir/2010/5100/. This research shows the environmental characteristics with greatest influence related to nitrate contamination near or above the drinking water standard of 10 mg/l nitrate are percent silt in soil, soil type, aquifer material and depth. So deeper groundwater tends to have fewer nitrates than groundwater closer to the ground surface, but this is also strongly dependent on local hydrogeologic conditions. The research also shows nitrate concentration can be highly variable over short distances. Nitrate contamination in an individual well was also correlated to the number of septic systems located with a particular distance from the well.

As for pathogens associated with livestock manure, they aren't a regional groundwater contaminant concern, but a concern to a well if surface runoff infiltrates down the well casing and then the individual well needs a one time treatment (with bleach). The DNR does not expect the proposed production site or land application sites to cause groundwater quality standards to be exceeded, or exacerbate (make worse) exceedences of groundwater quality standards that may already exist. The DNR acknowledges the nitrate concentration in groundwater will reduce more slowly if nitrogen continues to be added to surface soils, by land application of either manure or liquid chemical fertilizer. However, nitrogen added via manure application is less leachable than nitrogen added via liquid chemical fertilizer.

EA-WILDLIFE

Comment #39: Regarding wildlife, the EA states "While no specific animal or plant inventories have been conducted at this location, a review of the Natural Heritage Inventory records indicate no endangered or threatened species, natural areas or other sensitive biological resources are present or depend on the development site or within a one mile radius." The manure spreading will be over 16,000 acres (about 25 square miles) so the effects will (be) felt more than one mile away from the site. Based on the US Fish & Wildlife Services information: Adams & Waushara Counties are home to 3 endangered species: Karner Blue Butterfly, Gray Wolf and Whooping Cranes (which nest in Adams Co.).

From the EA: "Occasional visits/use by mobile rare species such as whooping crane or bald eagle may occur but will not be negatively impacted by such use."

This would be a questionable statement based on the fact that the manure spreading area is south of the Necedah Wildlife Refuge. And there are other wildlife refuges in Adams County including Colburn Wildlife area, Roche A Cri State Park and Leola Marsh Wildlife Area.
Response: The Department disagrees. The immediate project area and proposed land spreading sites are existing cropland and would be expected to provide habitat primarily for common animal species acclimated to farm operations. Since the farm and land spreading sites are currently used for agriculture, the proposed land use will not change significantly as a result of the issuance of the WPDES permit.

Comment #40: Biologically, the EA mentions very little of wildlife in the area. All the manure created must be spread on a huge area that is not listed, but mentions they have permission to spread on 16,000 acres and probably will affect areas and watersheds not listed. Because these discussions (EA) are so loose they will most definitely degrade rare habitat of Karner blue butterfly, massassuga rattlesnake, Blanding's turtle and countless entomology in rivers not listed.
Response: The Department disagrees. The immediate project area and proposed land spreading sites are existing cropland and would be expected to provide habitat primarily for common animal species acclimated to farm operations. Since the farm and land

spreading sites are currently used for agriculture, the proposed land use will not change significantly as a result of the issuance of the WPDES permit.

Comment #41: From the EA, "A site visit will be conducted by Department staff to determine if lupine is present on the property. If lupine is present, it will be referred to the regional ecologist for further evaluation." Has this been done? Lupine and the Karner Blue Butterfly have had a population within the area about 1 to 2 miles south of the proposed site. Karners will sometimes travel up to a mile in search of new territory. The manure spreading will cover a large area and how will this, along with changing the agriculture affect our wildlife? Our water quality? The air quality? We don't feel the EA has sufficiently answered these questions.
Response: The Department conducted an on site review within the project area where the facility is to be constructed as well as at all road access locations. No lupine was found at these locations. The site review focused on the specific area where construction activities would occur. Land spreading sites were not reviewed for Lupine, as the proposed land use for these fields will remain for agricultural crop production.

EA-ECONOMICS/PROPERTY VALUES

Comment #42: The Department is obligated by statute and rule to consider the economic impacts of the proposed projects (see s. 1.11(2)(c), Stats., and ss. NR 150.01 and NR 150.22. Nothing has been said in the "Economics" section regarding the effect of this operation on Wisconsin tourism. It is likely to be negative. I understand the desire to pump up the dairy industry, but at what cost to other economic interests?
Response: The statewide EA for a general WPDES permit for dairy CAFOs did not find adverse impacts of CAFOs on tourism. See:
http://dnr.wi.gov/runoff/pdf/ag/Large_Dairy_CAFO_GP-Environmental_Assessment.pdf

Comment #43: Several individuals submitted comments to the Department noting their concern about the loss of local property values in the area, or that they believe the EA underestimates the potential drop in property values after the Richfield Dairy facility is built.
Response: The EA provides adequate analysis of impacts on property values, and relies on a 2003 study from Pennsylvania. "The tax base in local areas may go up in response to the increase in property values and improvements at production sites. Property values may also go up for parcels used for growing crops and application of manure. The value of nearby residential properties may go down due to the close proximity of CAFOs. On a large scale there may be little or no change in the tax base due to the presence of CAFOs (Purdue Extension Guide AY-318-W http://www.ansc.purdue.edu/cafo/).

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 a 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 Guide AY-318-W http://www.ansc.purdue.edu/cafo/).

A 2003 study of property values in Berks County, Pennsylvania sheds some light on the effects of CAFOs on nearby residential properties. The following summary is from the executive summary of the report (Ready and Abdalla, 2003, *The Impact of Open Space and Potential Local Disamenities on Residential Property Values in Berks County, Pennsylvania.* Department of Agricultural Economics and Rural Sociology, The Pennsylvania State University. See: http://landuse.aers.psu.edu/study/BerksLandUseShort.pdf).

> *Several potential local disamenities were found to have a negative impact on nearby house prices. Of the potential local disamenities investigated, the impact of landfills on house price was largest, and extended the farthest (up to 3200 meters). A landfill located 800 meters from a house decreases that house's sale price by an estimated 6.9%. The impact of a large-scale animal production facility (over 200 animal equivalent units or aeu's) on house price was about one half to two thirds as large as that from a landfill (4.1% at 800 meters), and did not extend as far (up to 1600 meters). The impacts on house price from mushroom production and from the regional airport were much less (0.4% and 0.2%, respectively, at 800 meters). The impact from high traffic roads was small, and extended only a short distance. No significant impact was found for sewage treatment plants.*
>
> *Additional analysis attempted to investigate whether different types of animal production facilities had different impact on nearby house prices. Differences in the impact due to differences in the size of the operation (number of aeu's) were not statistically significant. Further, medium-sized production facilities (200 to 300 aeu's) were found to have a statistically significant negative effect on house prices when considered apart from larger facilities. Similarly, the impact did not vary significantly by species (poultry, swine, and beef/dairy). An analysis of proximity of animal production facilities and residential properties showed that the density of single family homes around animal production facilities was lower than the average for rural parts of the county. An implication is that some potential for conflicts is avoided due to the way in which these land uses are located on the land.*
>
> *The total impact on surrounding house prices was calculated for a landfill, the regional airport, and an animal production facility. The average impact on the value of 3342 houses located within 3200 meters was $2442 (all values are in 2002 dollars). The total impact on all houses was $8,162,000, which is 2.6% of the assessed value of the affected properties. The average impact of the regional airport on 2256 houses located within 1600 meters of the airport runway and its flight paths was $104, and the total impact on the value of these properties was $235,000, or 0.1% of the assessed value of the affected properties. This calculation does not include 2391 properties located near the airport within the City*

of Reading. The average impact of a single animal production facility on 119 single family residences located within 1600 meters of the facility $1,803. The total impact on all 119 houses is $215,000, or 1.7% of the assessed value of the affected houses. These figures are intended as illustrations, and should not be considered averages for similar facilities. The impact from any given landfill, airport, or animal production facility will depend on the number of houses located near the site, and on the market value of those houses absent the facility."

Comment #44: Referencing the section of the environmental assessment stating that the value of nearby residential properties may go down due to the close proximity of the CAFO's, the Department received the following comment. "This assumes that both the property increasing in value and that decreasing in value are in the same county and town. In this situation this is NOT the case. The land values may increase in Adams County, but the loss to property values will occur in Waushara County and the Town and Village of Coloma. Hardly equitable."
Response: The EA analysis of impacts on property value makes no assumptions as to which county or township impacts may or may not occur.

Comment #45: A number of comments expressed concern about decreases in tourism, real estate values, income from rental properties because of the likely pollution of ground and surface waters and the odors that will result from CAFO's.
Response: In light of permit requirements, The Department does not agree that pollution of ground and surface waters in the area surrounding the proposed Richfield Dairy project is likely. The Department acknowledges that real estate values, particularly for those residential properties near the operation, may decrease. Impacts to tourism are difficult to predict and will depend on which, if any, impacts (odors, noise, traffic) occur in areas where people recreate. The statewide EA for a general WPDES permit for dairy CAFOs did not find adverse impacts of CAFOs on tourism. Reference:
http://dnr.wi.gov/runoff/pdf/ag/Large_Dairy_CAFO_GP-Envrionmental_Assessment.pdf

Comment #46: Regarding the statement within the environmental assessment that the DNR has not done a study to examine if or how property values may have changed after confined animal feeding operation permits have been issued elsewhere, the Department received the following comment: "Why not? This could be part of an EIS. It is significant and not been evaluated before."
Response: The EA provides adequate analysis of impacts on property values. The Richfield Dairy EA adequately covers the content requirements of NR 150.22(2), and did not find significant impacts that would otherwise require the EIS process under NR 150.20(1)(c)3.

Comment #47: Regarding the environmental assessment noted in direct economic affects from Richfield Dairy, the Department received the following comment: "Will these added dollars be spent in Adams and Waushara Counties or elsewhere? How many farmers in Adams and Waushara County will be put out of business? How many jobs will be lost? In other words, what will the net job effect be? The Waushara County economy depends upon clean lakes and streams to support tourism. How will the

Richfield CAFO affect tourism in Waushara County? How many tourism jobs and businesses will be lost as a result of this CAFO? The Richfield Dairy will have a large regional impact on jobs – and EIS should be completed to assess this before permits are issued."

Response: The EA provides adequate analysis of impacts on employment. The Richfield Dairy EA adequately covers the content requirements of NR 150.22(2), and did not find significant impacts that would otherwise require the EIS process under NR 150.20(1)(c)3. Neither an EA nor an EIS provides authority to alter the permit decision.

EA–AIR QUALITY/ODOR

Comment #48: As stated in the EA animal agricultural operations generate odors and air pollutants. When enough animals are concentrated together in a small area, air emissions may cause human health and environmental concerns. Chapter NR 445 establishes ambient air concentrations for ammonia and hydrogen sulfide, two pollutants associated with agricultural waste from animal feeding operations. These concentrations are 418 and 335 micrograms per cubic meter, respectively, on a 24-hour average basis. Air emissions from animal feeding operations are not categorically exempt from these reporting requirements. The EA correctly states that nitrogen containing compounds such as ammonia and NOx result in increased nutrient loading and acidification of soils and waters. This statement must be researched and quantified in order for the environmental impact to be accessed.

Response: Fully evaluating the fate/transport of reactive nitrogen (including NOx, N2O & NH3 – in terms of acidification and eutrophication) was beyond the scope of the EA. Air emission estimates are presented within the EA. The EA also discusses the limitations of dispersion modeling for livestock emissions. According to chapter NR 150.22(1)(e), Wis. Adm. Code, not all impact parameters must be quantified in an EA. If identified as unknown, however, there must be a discussion of the relevance of, and evidence for the information, and evaluation of adverse impacts. The EA meets these criteria.

Comment #49: The EA also states that both quantity and the types of air contaminant emissions from animal agricultural operations are difficult to estimate, making off-site air quality impacts difficult to predict. The difficulty according to the EA is due to diurnal and seasonal temperature variation, varying number and type of animal species present (which may change over time), type of housing and manure handling system, feed type, and chosen management practices. However, the difficulty of the analysis does not relieve the DNR of its duty to examine the impact to air quality and its eventual effect on the water quality. All of the variables are know or can be estimated based on information contained in the permit application, the NMP and published and peer reviewed scientific studies. The potential for a severe negative impact to both ground and surface waters requires the DNR to research the most likely environmental impacts before issuing a WPDES permit.

Response: Refer to previous response to comment.

Comment #50: To address air emissions and odors, Richfield Dairy plans to cover its main manure storage facility and exhaust emissions through a biofilter to minimize potential air emissions associated with manure storage. The permit also requires incorporation of all surface-applied manure within 48 hours-a BMP determined by WDNR to reduce odor and emissions from land application sites. (Michael Best)
Response: Covering manure storage is expected to reduce odors and air emissions associated with covered manure storages. It is uncertain how other uncovered manure storage, solids separation and storage, and subsequent land application will impact odor and air emissions overall. Land application BMPs identified by the Agricultural Waste Air Emissions Advisory Group in its December 13, 2010 report, include injection, followed by immediate and rapid incorporation (less than 12 hours), and band spreading. Incorporation within 48 hours was not identified as a BMP to mitigate ammonia or hydrogen sulfide emissions from land application of liquid manure

Comment #51: We believe this farm will negatively affect the areas air quality. The commenter referenced the environmental assessment section which states, "even with the proposed (and unspecified "additional") measures in place, the new facility and the large quantity of animals housed and manure generated may produce occasional or more frequent odors that may be objectionable to some neighbors. Other potentially affected odor receptors include the Village of Coloma (~3 miles northeast) and Pleasant Lake residents (~2 miles southeast)."
Response: The Department does not dispute the assertion that the proposed facility may affect air quality and that odors will be generated. This is true for any size of animal livestock operation, even with successful air quality BMPs in place or with production methods which minimize air quality impacts. Federal air permit requirements are incorporated into state air permit rules in chs. NR 405, 406, and 407. In addition, chs. NR 406 and 407 also include air permit requirements for minor sources. Emissions associated with animal feeding operations are not, categorically, exempt from these requirements. However, the revisions to chs. NR 406 and 407 published in July 2004 established an exemption period ending in July 2007 for sources of hazardous air contaminant emissions from agricultural waste. The exemption period was extended, again, in February 2008 for chs. NR 406 and 407 and how they relate to NR 445.

Chapter NR 445 establishes ambient air concentrations for ammonia and hydrogen sulfide, two pollutants associated with agricultural waste from animal feeding operations. These concentrations are 418 and 335 micrograms per cubic meter, respectively, on a 24-hour average basis.

Similar to federal air emission reporting requirements, state air emission reporting requirements include the reporting requirements in ch. NR 445 and the annual air emission reporting requirements of ch. NR 438. Air emissions from animal feeding operations are not categorically exempt from these reporting requirements.

Comment #52: If the Department permits this operation, it should also require monitoring of malodorous emissions and particulates to protect public welfare.

Response: The Department believes it does not have the authority to require air quality monitoring for the proposed facility

Comment #53: The Department should consider the air quality impacts to the environment and people. The animals and land spread manure will produce concentrated noxious and harmful gaseous emissions. Ammonia, hydrogen sulfide, methane and particulate emissions that can exceed OSHA safe exposure limits may affect residents of Coloma and Pleasant Lake which is unacceptable. These toxins can cause respiratory distress, lead to asthma and other breathing ailments. This will also make the air rancid and impact the experience of fishing and hunting nearby or just living in Coloma.
Response: The Department acknowledges that livestock operations can impact both indoor and outdoor air quality. The Department does not have the authority to regulate indoor air quality.

Comment #54: It is evident that because of the nature of cows and manure high concentrations of ammonia and hydrogen sulfide will be release into the air. It is also evident that because of legislators desire to increase Wisconsin's role as a dairy state and to increase state revenues they have excluded CAFOs from air quality regulations. They have excluded the biggest offenders. CAFOs do a great job of farming dairy cows and tending to water problems but they do nothing to address the air and odor issues which continue 24/7. Milk Source has said they may put a cover on one of the open manure pits. They may or may not. There is no mandate to do so. This will help, but not solve the problems. You can mitigate water problems, but once these odors and contaminants are released into the air they cannot be mitigated. Negative comments were made about absent property owners of the lake area. If you do a little investigating you will see that these property owners pay a large percentage of the revenues of Coloma Township. Degrading air and water quality of the are will have a large negative economic impact on Coloma Township. Protect the rights of citizens to clean air and not hide behind other issues.
Response. The Department does not dispute many of the commenter's points on air quality except a clarification that high mass emissions (flux) of air pollutants do not necessarily create high ambient (or indoor) air concentrations of those pollutants. The Department agrees that all livestock operations generate odors and air pollutants.

Comment #55: Although CAFOs are exempt from NR 445, they are not exempt from the more general "100 tpy of any air contaminant" permit trigger and this would suggest that hydrogen sulfide, ammonia and VOCs should be monitored at this facility.
Response: The Department concurs with the commenter that permit thresholds of 100 ton per year for "any air contaminant" apply to the proposed facility. However, the Department believes it does not have the authority to require air quality monitoring.

Comment #56: Recent revisions to exempt CAFOs from air pollutants have not been approved by EPA.
Response: While this is true, Ch NR 445, Wis. Adm. Code is a state rule and agricultural waste had previously been deemed in compliance with the rule. In addition,

the portions of Ch NR 445 regulating agricultural waste are currently suspended by the legislature.

Comment #57: NR 429, dealing with objectionable odors should be applied when evaluating impacts of this facility.
Response: Ch NR 429, Wis. Adm. Code includes a procedure for determining objectionable odors based on conditions at the facility once it has been constructed and is operating.

Comment #58: Based on estimates from a similar project by the Oregon Dept. of Environmental Quality, the project could emit an estimated 38.5-76.1 tons/yr VOCs and 37.2-426.8 tons/yr ammonia. The DNR regulates VOCs for industrial sources at 25 tons per year and ammonia at 100 tons per year, suggesting that they should also monitor and regulate air emissions from the Richfield Dairy.
(http://www.deq.state.or.us/aq/dairy/docs/technicalreport.pdf)
Response: The Department concurs with the commenter that permit thresholds of 25 tons of VOC or 5.7 pounds per hour (contained in s. NR 406.04 (2)(c), Wis. Adm. Code) and 100 ton per year for "any air contaminant" (major source is defined in s. NR 407.02 94)(b), Wis. Adm. Code) apply to the proposed facility. The proposed facility, as with any source of air pollution, is required to evaluate existing information and determine its air emissions, and comply with any air regulatory requirements that apply. The Department also believes it does not have the authority to require air quality monitoring.

Comment #59: Regarding the statement within the environmental assessment that "Nitrogen containing compounds such as ammonia and NOx result in increased nutrient loading and acidification of soils and water," the Department received the following comment: "There is little limestone in Waushara County. The emissions from the CAFO will likely result in the pH of the lakes in the region decreasing – an acid rain problem. How can this be environmentally sound?"
Response: Air emission estimates are presented within the EA. The EA also discusses the limitations of dispersion modeling for animal agricultural emissions. According to chapter NR 150.22(1)(e), Wis. Adm. Code, not all impact parameters must be quantified in an EA. If identified as unknown, however, there must be a discussion of the relevance of, and evidence for the information, and evaluation of adverse impacts. The EA meets these criteria.

Comment #60: The Department received the following comment regarding Richfield's proposed animal mortality storage building. "How long will bodies be held? Although there is no current request for a crematorium, can the prohibition of one be placed in this document so that one does not appear in the future? If they would want a crematorium in the future, what is the process to make the request? Are they licensed? Permitted?
Response: The mortality facility consists of a three sided concrete roofed building with an overhead door on the front to allow access. Mortalities will be stored in the structure and picked-up within 24-hours by a contractor for use at a fur farm near Black Creek. While Richfield Dairy has not indicated an intent to construct a crematorium,

"crematories" are exempt from construction permitting under s. NR 406.04(1)(s), Wis. Adm. Code.

Comment #61: Will the Richfield Dairy have to meet the new air permit requirements under NR 405-407 going into effect July 31, 2011.
Response: There are no "new" requirements in effect after July 31, 2011 per se and the proposed facility is subject to air pollution rules with the exception of Ch NR 445, Wis. Adm. Code.

Comment #62: The Department received the following question based upon the statement in the environmental assessment under the Air Quality heading that if enough animals are concentrated together in a small area, air emissions may cause human health and environmental concerns. "How are you defining "enough"? i.e. How many animals equal "enough"?"
Response: The Department does not dispute the assertion that the proposed facility many affect air quality (both indoor and outdoor) and that odors will be generated. This is true for any livestock facility regardless of size, even with successful air quality BMP's in place or with production methods, which minimize air quality impacts. Both human health and environmental concerns can be adversely affected by a relatively small number of animals, so more importantly, it is how those animals and their wastes are managed which ultimately determines human health and environmental outcomes.

Comment #63: The EA doesn't require BMPs for hydrogen sulfide and ammonia. The permit should stipulate specific techniques to mitigate emissions of hydrogen sulfide. (Sierra Club)
Response: EAs do not contain enforceable conditions: They are an 'information document' that lays out the issues and environmental effects of a given project or new source category. They do not have any authority to require any applicable air management requirements, including any air quality beneficial management practices (BMPs).

Additionally, in 2011, the Joint Committee on Review of Administrative Rules of the Wisconsin State Legislature temporarily suspended portions of the state air toxics rule Ch. NR 445, Wis. Adm. Code (which includes ammonia and hydrogen sulfide) for "agricultural waste" until the end of the legislative session which ends in spring or early summer of 2012. In June 2011, the Natural Resources Board (NRB) was asked to make the suspension of rules for agriculture sources permanent. The NRB rejected the request.

Unless the state legislature extends or makes permanent a compliance determination for "agricultural waste," facilities, such as the proposed Richfield Dairy, will need to demonstrate compliance with Ch. NR 445, Wis. Adm. Code when the temporary suspension ends.

BMPs identified by the Agricultural Waste Air Emissions Advisory Group in its December 13, 2010 report (http://dnr.wi.gov/air/agWaste.html), include a number of air quality mitigation practices and techniques for the dairy sector.

Comment #64: Simply stating that "the Wisconsin DNR is currently working with an agricultural waste advisory group to examine and recommend beneficial practices that reduce ammonia and hydrogen sulfide air emissions and will work for Wisconsin farms," is not analysis or a useful statement of the environmental impact. No conclusion on the environmental impact of the proposed facility can be made from this statement. Furthermore, comments about the facility proposed practices which are expected to mitigate air emissions also do not qualify as analysis of environmental impact of a process. Research and analysis from an EIS needs to be completed and in order to make a permit decision.
Response: Air emission estimates are presented in the EA. The EA also discusses the limitations of determining animal agricultural emissions. According to chapter NR 150.22(1)(e), Wis. Adm. Code, not all impact parameters must be quantified in an EA. If identified as unknown, however, there must be a discussion of the relevance of, and evidence for the information, and evaluation of adverse impacts. The EA meets these criteria.

Comment #65: The Environmental Assessment (EA) states that there are 5 single family dwellings within a 1 mile radius of the proposed site. It mentions Village of Coloma and Pleasant Lake as areas which may be affected by odor from the Richfield CAFO. Residential properties like my own and also properties of non-resident landlords which are between this 1 mile limit on one hand and the Village of Coloma and the Pleasant Lake Community on the other, are not mentioned in the EA, yet all of us will run the risk to be exposed to noise and odors associated with the Richfield CAFO operation:
Response: The Department acknowledges that the physical appearance of the site will change and that the activity level, noise and traffic at the farm and surrounding roads will be greater. While the use of the site will remain agricultural, the construction phase of the project will be most noticeable to neighbors located within a one-mile radius of the facility site. At the time Richfield Dairy becomes operational, odors from the facility will also be more noticeable to neighbors. Residents not located within the immediate vicinity of the facility may notice odors on a less frequent basis, particularly during the spring or fall period when the manure storage facility is agitated and the manure is land applied to area fields.

Comment #66: Comments expressed concern the EA downplays or does not adequately address air quality (Odor) and noise issues. Some expressed concerns that their house and their neighbors would be subject to air/odor based on prevailing winds in the area.
Response: The Department does not dispute the assertion that the proposed facility may affect air quality and that odors will be generated. This is true for any size of animal livestock operation, even with successful air quality BMPs in place or with production methods which minimize air quality impacts. Federal air permit requirements are incorporated into state air permit rules in chs. NR 405, 406, and 407. In addition, chs. NR 406 and 407 also include air permit requirements for minor sources. Emissions associated with animal feeding operations are not, categorically, exempt from these requirements. However, the revisions to chs. NR 406 and 407 published in July 2004 established an exemption period ending in July 2007 for sources of hazardous air

contaminant emissions from agricultural waste. The exemption period was extended, again, in February 2008 for chs. NR 406 and 407 and how they relate to NR 445.

Chapter NR 445 establishes ambient air concentrations for ammonia and hydrogen sulfide, two pollutants associated with agricultural waste from animal feeding operations. These concentrations are 418 and 335 micrograms per cubic meter, respectively, on a 24-hour average basis.

Similar to federal air emission reporting requirements, state air emission reporting requirements include the reporting requirements in ch. NR 445 and the annual air emission reporting requirements of ch. NR 438. Air emissions from animal feeding operations are not categorically exempt from these reporting requirements.

It is difficult to predict the odors that will be emitted from the operation. The operation has proposed to cover two of the three storage structures, which is likely to reduce odors from the operation's production area. Distance will also mitigate odors. Based upon modeling that has been done, air quality is not expected to be significantly impacted by the operation.

The Department disagrees that the EA downplays air emission issues. The EA adequately covers air emission effects.

EA–WATER QUANTITY

Surface & Ground Water

Revised version of the Surface & Ground Water section with changes based on

- *Updated information about the construction and pumping of the proposed wells*
- *Kraft & Mechenich (2010) regional drawdown modeling and Kraft (2011) Richfield Dairy drawdown modeling*
- *Expanded DNR review of impact of proposed wells on waters of the state based on the Lake Beulah Management District v. DNR Supreme Court decision.*

The proposed Richfield Dairy facility and wells are located approximately 1.1 miles west of the Mississippi River / Lake Michigan Surface water drainage divide and approximately 0.4 miles east of the Mississippi River / Lake Michigan groundwater divide. Surface water flows to the southwest, and groundwater flows to the southeast. Area geology consists of 150-200 feet of sand overlying 200-300 feet of sandstone. Based upon soil borings taken in May 2010, the depth to groundwater is greater than 32 feet below the ground surface.

Groundwater quality in the area is generally considered fair to good. However, nitrate levels are high in many wells, with 24% exceeding the Enforcement Standard threshold of 10 mg/l (ppm). Due to the preexisting nitrate issue at the site, the high capacity well application indicates that the dairy wells will be completed in the sandstone bedrock aquifer.

Average water usage for Richfield Dairy has been estimated at ~52.5 million gallons / year, 143,846 gallons / day or 99.9 gallons / minute. Animal watering and cleaning accounts for 44 million gallons/year, with evaporative cooling of the livestock facility during hot weather accounting for the remaining 8.5 million gallons/year. To meet their water demand, Richfield Dairy has submitted a high capacity well approval application to the DNR to construct two wells at a depth of ~350 feet. The DNR reviews high capacity well applications under its authority in Chs. 280 and 281, Stats, and chs. NR 812 and 820, Wis. Admin. Code to assess the proposed wells' impact on waters of the state, including potential impacts to trout streams, outstanding resource waters (ORW), exceptional resource waters (ERW) and springs. DNR Water Use staff have assessed the application to determine if the proposed wells would adversely affect any of these resources.

The proposed project is located within an area that has a relatively high water table, a high groundwater infiltration rate and a low surface water runoff rate. DNR water use staff have concluded that the water withdrawals associated with the proposed wells do not pose a risk of significant adverse impacts to neighboring wells if operated at the expected annual rate of 52.5 million gallons per year, and no pump tests will be required as part of their review of the application. To help ensure adequate water quantity for neighboring wells, DNR plans to limit *annual* pumping of the proposed wells to no more than an average of 250 gallons per minute (131.2 million gallons per year) and to limit *monthly* pumping to no more than 500 gallons per minute (21.6 million gallons per month).

No waterways, wetlands or other aquatic resources are present at the immediate farm site, and no Outstanding Resource Waters (ORWs) or Exceptional Resource Waters (ERWs) will be significantly affected by dairy operations. The closest navigable waterway is an unnamed tributary to Little Roche a Cri Creek, located ~2.5 miles northwest of the proposed Richfield Dairy facility. Other streams in the general vicinity of the proposed dairy include Fordham Creek, located 4.7 miles to the southwest, (with an intermittent unnamed headwater stream 2.7 miles southwest of the dairy), and Little Roche a Cri Creek, located 5.6 miles to the northwest of the proposed Richfield Dairy site. Fordham Creek and Little Roche a Cri Creek are trout streams and designated as ERWs, and both are located within the Central Wisconsin River Basin. In addition, Chaffee Creek and Tagatz Creek, both classified as trout steams and ORWs, are each located 3.5 miles from the proposed wells, within the Upper Fox River Basin. The water levels in these streams fluctuates seasonally. Base flow amounts in these streams have been reduced to varying degrees by groundwater withdrawals in the region (mainly irrigation) (Kraft and Mechenich, 2010). By itself, the proposed groundwater pumping at the dairy will not significantly impact stream flow. Kraft (2011) has modeled a maximum increase in base flow reduction of 5% due to the Richfield Dairy wells. According to Kraft (2011) this maximum reduction occurred in three 200 m segments of unnamed tributaries to Little Roche a Cri Creek. The greatest threat to local streams would be additional nutrients if permit-required BMPs are not implemented or maintained.

Pleasant Lake is located ~2.7 miles southeast of the dairy and is located in the upper reaches of the Upper Fox River Basin. Pleasant Lake's water level fluctuates seasonally and annually as a result of natural influences. However, groundwater modeling by Kraft and Mechenich (2010) and Kraft (2011) concludes that existing groundwater pumping in the area may also be resulting in statistically significant declines in lake levels beyond the level of change resulting from climatic variability alone. For example, Kraft and Mechenich (2010) attribute an average drawdown of 1.5 feet in the level of Pleasant Lake from 1993 – 2007 to groundwater pumping, suggesting that collective withdrawals from wells close to the lake could be having a significant effect on lake levels. Even assuming the cumulative effects of pumping may have impacts on the amount of groundwater available to surface water resources in the Central Sands, as described in the Kraft and Mechenich report, the Department's review is limited to whether the proposed wells on the high capacity property will have potential significant adverse environmental impacts. The groundwater model submitted by Kraft (2011) indicates that additional water table drawdown in the area around Pleasant Lake due to the proposed wells would be about 2 inches. A 2 inch reduction in water level potentially caused by the proposed dairy's wells would be fairly minimal in comparison to observed water level fluctuations in Pleasant Lake since 1964—and would not constitute a significant adverse impact on the lake.

<u>Response to Ken Wade's critique of DNR's drawdown modeling</u>:
Mr. Wade does an excellent job of pointing out the difficulties involved in modeling a large, complex system using simple tools. DNR acknowledges the assumptions and limitations of analytical models to accurately determine impacts in a large, complex groundwater system. For this reason, DNR generally uses analytical models on a much smaller spatial scale (where the model assumptions are a closer reflection of reality). The distance to the water bodies of concern in this case is beyond the normal screening distance where these models would ideally be used. Consequently, the Department used the models as screening tools to qualitatively identify potential impacts. The Department's determination of "no significant adverse impact" was based on the results of running the analytical model for an extended period (300 days) at 1000 gpm, ten times the dairy's actual estimated pumping amount. After this time period, the Jacob straight-line analytical model had reached "steady state" and the wells' modeled cone of depression extended less than half the distance to Pleasant Lake. The Department also ran a Theis analytical model (which uses slightly different assumptions) over the same time period, and that model produced results similar to the Jacob straight-line analytical model.

Mr. Wade's letter does not provide alternate drawdown amounts directly attributable to the Richfield Dairy wells, but rather points to the exacerbation of the existing cumulative impacts described in Kraft and Mechenich (2010). Mr. Wade does propose that the more complex numerical modeling of Kraft and Mechenich (2010) could be used to more accurately determine the effect that the dairy's wells would have on area water bodies. Dr. Kraft has provided DNR with this type of analysis. The results show two inches of additional groundwater drawdown in the vicinity of Pleasant Lake and base flow reduction of 5% or less in the upper reaches of several streams. The model was run at steady state, which basically represents an infinite pumping time under average recharge

conditions. The Department does not interpret these modeled reductions to mean that the proposed wells will have a significant adverse environmental impact.

Conestoga-Rovers' and New Field's groundwater/surface water impact analyses: Conestoga-Rovers (CRA) and New Field (NF) each provided an analysis of groundwater and surface water impacts on behalf of the applicant, Milk Source. Both analyses concluded that the two proposed wells would individually cause no adverse impact to groundwater or surface water. While the Department generally agrees with this conclusion, several points in the reports require additional discussion.

CRA and NF each state that the Dairy's water use will be similar to the water use from the site's existing irrigation well. This is a major basis for the conclusion that no new impacts to groundwater or surface water will occur. Irrigation pumping did exceed the 52.5 million gallons annual use anticipated by the Dairy in two of the fifteen years on record. However, the Richfield Dairy's expected annual water use exceeds the average irrigation water use by 40% (for recent years) to 65% (for all years on record). The CRA and NF reports also ignore water losses. Based on ch. NR 142, Wis. Admin. Code, the Department assumes that 90% of water used at a dairy facility is "lost" from the groundwater system due to evaporation or incorporation into a product, versus 70% of irrigation water lost.

CRA performed a zone-of-capture analysis based on the dairy's expected water use; and that analysis concluded that water resources outside the site boundaries would not be affected by pumping. The zone of capture is an area from which the wells would be expected to draw water. This calculation is used to design remedial systems at contaminated sites or to define wellhead protection areas. The zone of capture is not the same as the area in which the water table will be lowered due to pumping. The groundwater drawdown area is not addressed in the CRA report. Another issue with the defined zone of capture is that the direction of groundwater flow, represented in Figure 2 of the CRA report as to the southwest, does not reflect the mapped direction of regional groundwater flow, which is to the southeast.

NF reviewed available well construction reports and concluded that the nearest low capacity well was 1/2 mile from the site. NF concluded that "based on these distances, no material negative impact is expected". However, many existing low capacity wells do not have well construction reports on file. Subsequent DNR review identified a private residence/water supply approximately 400 feet from the proposed wells. Based on the proximity to this well, the Department will place limits on maximum pumping at the dairy.

Both the CRA and NF reports discount the modeling conducted by Kraft and Mechenich (2010) as too general to be applied to specific groundwater impacts from the Richfield Dairy wells. These critiques are based on the sparseness of data and the regional versus local scale of the model. It is a valid point that the model was designed to identify regional cumulative impacts of groundwater withdrawals and may not be the best tool to determine impacts from individual wells. However, the model does represent a much

more detailed representation of the system than the analytical model used by CRA (or the drawdown analysis conducted by DNR). As mentioned above, the Kraft model has been used to simulate the effects of the new Richfield Dairy wells. The results show small additional reductions in local stream flow (5% or less) and in water table elevations near Pleasant Lake (roughly 2 inches). Assuming these changes would occur, the Department does not consider these changes to be significant adverse environmental impacts to surface water.

Kraft Model

The numerical model submitted by George Kraft is an analysis of groundwater drawdown that is more detailed than the analytical models used by DNR to evaluate well impacts. As such, DNR has carefully considered potential impacts to groundwater and area surface waters in light of the modeling results. There are several issues with using this model to quantitatively determine the impacts of these wells on specific water bodies.

- Scale: The model was developed at a regional scale with a level of input data appropriate to that scale. Model results may not be entirely valid for local areas without further refinement.
- Lake levels: In the model, lakes are not modeled as separate entities. Lake levels are assumed to be equivalent to water table elevations. Surface water inputs can be a large part of a seepage lake's water budget, and individual lakes have varying seepage rates, so this may not always be the case (although a lower water table will increase groundwater flow out of the lake).
- Water loss amounts: The model represents groundwater pumping for irrigation as "missing" recharge rather than modeling individual pumping wells. There are valid reasons for using this method (to reflect water actually lost instead of water pumped, for example). However, it does create some difficulty in making an apples-to-apples comparison of additional impacts simulated by shutting down the existing irrigation well and inserting pumping from the new wells into the model.

Assuming that model results represent actual steady-state impacts, the additional groundwater drawdown resulting from the Richfield Dairy wells in the vicinity of Pleasant Lake would be 2 inches. The additional base flow reduction in the headwaters of Roche a Cri Creek would be around 5% (this is the maximum modeled flow reduction). The modeled reduction amounts do not constitute significant environmental impacts to the waters of the state.

The Department acknowledges that there are preexisting cumulative impacts from all groundwater withdrawals in the southeast Adams/ southwest Waushara county area. However, as stated above, even assuming the cumulative effects of pumping may have impacts on the amount of groundwater available to surface water resources in the Central Sands, as described in the Kraft and Mechenich report, the Department's review is limited to whether the proposed wells on the high capacity property will have potential significant adverse environmental impacts. In this case, that assessment shows no indication that such impacts will occur

EFFECTS OF WITHDRAWALS ON SURFACE WATER RESOURCES

Response to Comments #67-73 follows comment #73.

Comment #67: The Department received a number of comments from local residents regarding concerns that the addition of two more high capacity wells with a projected annual withdrawal rate of 52 million gallons will lower the water level of Pleasant Lake and also impact their private water supply. Several individuals also noted that Pleasant Lake is currently at its lowest level since record keeping began in 1964.

Comment #68: As a resident of Coloma, Wisconsin, I am against the CAFO in Richfield.

Although I am all for creating jobs, even if it's low income, and supporting a Wisconsin Business, Milk Source out of Kaukauna, I am most concerned about the water issues. We are in the Town of Coloma and have a well. We use Pleasant Lake. The fact that this operation could affect our water quality and tables deeply concerns me.

Comment #69: I am opposed to the permit because of the large volume of water that will be removed from the water table. Trout need water to survive and if they are allowed to remove that much water from the (area) it will cause the water levels to drop, thus causing harm to the trout and eco system.

Comment #70: How will the Great Lakes Basin aquifer be affected?

Comment #71: How will additional pumping from the Great Lakes Basin tributary groundwater impact Waushara County surface waters.

Comment #72: Regarding the statement within the environmental assessment that DNR Water Supply staff will assess the proposal (high capacity well permit application), to determine if the proposed wells would adversely affect any of these water resources: "DNR Water Supply staff could and should carry their assessment beyond these three resource classes to other surface waters in the region. An EIS should be conducted to assess harm to surface water beyond trout streams, ORW and ERW waters."

Comment #73: Regarding the statement within the environmental assessment that the groundwater use by the proposed dairy should not have any noticeable effects on Pleasant Lake's water elevations, the Department received the following comment: Where is the reference to the model that leads to this claim? Based on the rejection by the DNR of the Kraft & Mechenich, 2010 paper, Groundwater Pumping Effects on Groundwater Levels, Lake Levels, and Stream flows in the Wisconsin Central Sands by http://www.uwsp.edu/cnr/watersheds/Reports_Publications/Reports/gwpumpcentralsands2010.pdf it would seem to be in order for the DNR to produce a peer reviewed journal article supporting this claim."

Response #67-73: Whenever a well is operated, an area of localized groundwater drawdown develops. This "cone of depression" is a radial zone around the well in which groundwater levels drop from pre-pumping level. The size of the zone of groundwater decline is related to the geologic conditions, the pumping rate of the well, and the duration of pumping.

An evaluation of the Richfield Dairy high capacity well application showed no substantial potential for significant direct impacts to trout streams, ORWs, ERWs, springs or other surface water bodies. Analysis of groundwater drawdown (applying Theis and Jacob methods), using aquifer characteristics derived from testing of the nearby Coloma municipal well and assuming continuous pumping for 300 days at the wells' maximum pumping capacity (1000 gpm total) , showed that zero water table drawdown would occur at distances of 4100-6600 feet (0.78-1.25 miles) from the well. Pleasant Lake, the closest surface water body, is 2.8 miles from the proposed wells, more than twice this zero-drawdown distance. The nearest trout streams, Chaffee and Tagatz Creek, are 3.5 miles from the proposed well site, also beyond the zone of influence of the proposed wells, according to the Department's analysis.

On October 7, 2011, the Department received a more detailed numerical groundwater model of the system from Dr. George Kraft. This model is based on the modeling referenced in the *Kraft & Mechenich (2010)* report. Dr. Kraft's modeling indicated that at steady state (a sort of time-averaged result), additional groundwater drawdown in Pleasant Lake could be approximately 2 inches, and stream base flow could be reduced by a maximum of 5% from base conditions (maximum reductions were modeled in a very limited section of the headwaters of Little Roche a Cri Creek). The model used the dairy's expected annual average groundwater pumping of 52.5 million gallons and was run until steady state conditions developed. As discussed in **Response #86-97** below, the Department's review is limited to whether the proposed wells on the high capacity property will have potential significant adverse environmental impacts. By themselves, the reductions modeled by Dr. Kraft are relatively minor and do not constitute a significant adverse environmental impact to lakes or streams. The predicted amount of groundwater drawdown and base flow reduction fall within the normal range of fluctuation for groundwater levels, lake levels and stream flow.

Reference response #102-#105 for a discussion of potential impacts to private water supplies.

Comment #74: Pleasant Lake is located ~2.7 miles to the Southeast and is located in the upper reaches of Upper Fox River Basin and subject to seasonal fluctuations of water levels. This is mainly a result of natural influences due to its location rather than groundwater withdrawal from pumping. Pumping closer to the lake may have an effect; however, the groundwater use by the proposed dairy should not have any noticeable effects on Pleasant Lake's water elevations. These statements in the EA contradict and therefore have no meaning.
Response: The statements in the EA are not contradictory. They simply describe different possible causes of lake level changes. The main mechanism that causes lake

levels to rise and fall is seasonal fluctuation due to natural cycles. Longer term climatic factors can also affect lake levels over several years and such influences have been observed throughout different parts of Wisconsin. Groundwater pumping can also affect lake levels; the extent of this impact on specific lakes is complex and site specific and is often the result of cumulative impacts of many operating wells within a given watershed. In this case, analyses have shown that no environmentally significant drawdown to Pleasant Lake or other surface water bodies will be directly associated with the proposed Richfield Dairy wells, as described in Response #67-73.

Comment #75: Any and all other additional requirements necessary to achieve and MAINTAIN water quality standards for Pleasant Lake, in particular, under the public trust doctrine, should be analyzed and additionally permitted. The groundwater maps being relied upon in the DNR's analysis are now over 30 years old and a DNR representative him/herself has acknowledged that these maps can no longer be accurate given the addition of 700+ high capacity wells in Waushara County alone, and the vicinity surrounding the proposed CAFO, drawing down and changing groundwater flows over the last thirty years significantly. The DNR is required to base its analyses on up to date information, and these maps and presently drafted Permit alone, are insufficient to properly safeguard and protect threatened groundwater flows, feeding precious state waters and private and public water supplies.
Response: DNR's conclusion that the Richfield Dairy wells will not significantly impact surface water bodies is not dependent on the direction of groundwater flow, although the Dairy's location on the eastern side of the groundwater divide was considered during the review. It should be noted that the 1981 water table map depicts groundwater from the wells' location flowing directly toward Pleasant Lake. Because of this, a change in groundwater flow patterns would not result in a determination of additional harm to the lake.

Comment #76: What is the elevation of the farm in relation to the neighboring surface water bodies? What ground water draw down will dry up Pleasant Lake, 2.7 miles to the east, Fordham Creek ~4.7 miles to the Southwest and Little Rochi Cri Creek 5.6 miles to the Northwest; and Necedah Federal Wildlife Refuge, ~ 10 miles north of the proposed Richfield Dairy site, both are trout streams and designation as Exceptional Resource Waters.
Response: The elevation of the proposed wells is 1080 feet above mean sea level (ft. msl); the elevation of Pleasant Lake is 979 ft. msl. The lake is approximately 30 feet deep. As described in Response #67-73, simple analyses of groundwater drawdown showed that the water table will not be lowered by any measurable extent at distances greater than 4100-6600 feet (about 1 mile) from the wells, and a numerical groundwater model submitted to the Department showed that long-term lake drawdowns attributable to the proposed wells would be around 2 inches.

WATER USE AMOUNT

Response to comments #77-78 follows comment #78.

Comment #77: Each well would be supplied with a 500 gallon/minute pump with proposed average water use of 600,000 gallons/day and maximum water use of 720,000 gallons/day. Therefore total maximum permitted groundwater withdrawal would average 1,200,000 gallons/day (440 million gallons/yr) with a maximum of 1,440,000 gallons/day (526 million gallons/yr). The Environmental Assessment (EA) indicates the estimated groundwater use at the Richfield Dairy would be 52.5 million gallons/year (144,000 gallons/day or 100 gallons/minute). The yearly maximum pumping rate allowed in the proposed high capacity well permit exceeds the EA-stated expected Richfield Dairy groundwater use by 1000% (factor of 10).

Comment #78: What is the real water usage for Richfield Dairy, now and in the future?

Response #77-78: The Department's review of potential impacts from the proposed wells was based on information from Richfield Dairy's high capacity well application. The dairy did not provide an estimated water use of 52.5 million gallons per year in its high capacity well application. Instead, the application requested an average daily pumpage of 600,000 gallons for each well (417 gallons per minute) and a maximum daily pumpage of 720,000 gallons for each well (500 gallons per minute). The Department used the higher values for water use in its analysis of impacts related to operation of the wells.

The dairy stated that the higher daily pumpage requested in the well application is needed for peak water use during summer (for livestock cooling). The dairy anticipates that its actual annual water use will be approximately 52.5 million gallons, as stated in the EA. In the Department's experience, this is a typical water use amount for a dairy operation of this size.

Based on considerations regarding nearby private wells (see response #102-#105 for a discussion of private water supplies), the maximum withdrawal amount for Richfield Dairy's high capacity wells will be reduced from the amounts originally requested (1,000 gallons per minute, or 525.6 million gallons per year) to 21.6 million gallons in any 30-day period, and 131.2 million gallons in any 365-day period. This translates to a maximum average pumpage of 500 gallons per minute during any one month and a maximum average pumpage of 250 gallons per minute over the course of a year. These restrictions are not expected to alter the dairy's projected water use.

Response to comments #79-80 follow comment #80.

Comment #79: During the hearing, Mr. Ostrom stated that the well (high capacity) will use exactly the same amount of water it has been using. The well may currently be permitted for the same amount (I don't know that for a fact), but:

The well logs as maintained by the DNR from the proposed site date back to 1978 with data through 2010. During that span of 32 years the pump was actually in operation for only 15 years. Over the course of those 32 years a total of 478,554,253 gallons were

pumped. This equates to an average of 14,954,000 gallons per year. Even if calculations are only based on the years in which the well was in production (which frankly doesn't make sense) the average jumps to 31,903,000 gallons per year. The 52.5 million gallons that is proposed per the EA is an annual increase of 350% over the long term historical use! That information comes from the DNR's own logs. When Mr. Ostrom's "fact" was challenged, the DNR rep stated that looking back since 2007 it was something in the range of 40 million gallons (I can't recall the exact number) which would be a 40% increase.

The bottom line is that in allowing Milksource to present during the informational portion of the meeting, there was no fact checking, and they could simply say anything they wanted, be it in error, a misrepresentation or an outright lie. What else were they wrong about yet putting forth as fact?

Comment #80: The EA states: "Water usage at the facility is estimated to be about 52.5 million gallons per year, which includes 44 million gallons for animal watering / cleaning and 8.5 million gallons for evaporative cooling of the barn during hot weather. The applicant notes that the 52.5 million gallons per year is less water than what has been historically utilized for crop irrigation at the site."

In reviewing the well logs from the site extending back 32 years… no matter how I do the math I cannot come even close to find that the applicants statement is anything but false. In fact, the average water usage over 32 years has been just less than 15 million gallons per year. Even if I toss out those years in which irrigation did not occur the number is still less than 32 million gallons. And from a lake and stream perspective, these are the number that count and need to be compared against.

And the new wells, is it really necessary to have 2 wells capable of producing 600,000 – 720,000 gallons per day or 262 million gallons per year each or 525 million gallons per year combined? Why I ask is this capacity needed if in fact there is only a need for 52.5 million gallons, expansion plans? Are you not concerned about streams drying up such as the Little Plover has done or lake levels dropping?

Response #79-80: The DNR reviewed Richfield Dairy's high capacity well application for impacts to trout streams, Exceptional and Outstanding Resource Waters, and springs in compliance with Ch. NR 820, Wis. Adm. Code. The review also considered potential impacts to other area surface water bodies, such as Pleasant Lake and Chaffee and Tagatz creeks. DNR analyzed the new wells based on the total requested pumping capacity (1000 gpm). This amount is much larger than the dairy's projected average annual use (~100 gpm). The review – which assumed a groundwater withdrawal rate of 1000 gpm – found no probable significant impacts to surface water as a result of the proposed wells. As discussed in response #317-320, conditions on the final high capacity well approval will reduce the approved average annual withdrawal rate to 250 gpm and reduce the average withdrawal rate in any month to 500 gpm.

Several comments expressed concerns about the comparative amounts of past and future groundwater pumping. The historical average pumpage of the existing irrigation well is around 31.9 million gallons per year. The absence of records from 1989-2006 should not be interpreted to mean that no pumping took place. The lack of pumping data reflects the fact that owners of high capacity wells were not required to report pumping data during that period. Pumping for the most recent period of record-keeping (2007-2010) averaged 37.2 million gallons per year.

The dairy's contention that it will use similar amounts of water to past pumpage is based on comparing *monthly* pumping rates during the summer. On an *annual* basis, the dairy's projected groundwater withdrawal of 52.5 millions gallons per year constitutes a 40% increase over the 2007-2010 period, or a 65% increase over the average for all years on record. The Department is updating the Environmental Assessment to include past high capacity irrigation water usage at the site.

Comment #81: This is a permit on water quality, and here on Wood Lake we are all about water quality. We diligently monitor our boat landing to keep our lake free from AIS. We educate our members about maintaining their septic systems. We encourage our boaters to "keep it deep" so not to stir up the bottom sediments and release phosphorus into our lake. So our property owners are very pro-active and do all we can to keep our lake clear and clean.

The idea of a 6000+ dairy farm (CAFO) has many of us concerned. This is something we cannot control. Granted, we cannot control mother nature, but eventually (like this year) we do get a surplus of moisture to make up for any deficits. With the CAFO there is only deficit. Even though the amount of water being withdrawn from our aquifer is supposedly the same as the current crop, the water being drawn out for the CAFO will not make it's way back into the ground. At least with crop irrigation a portion of that water will seep back into the ground. So let's say 30% of the crop irrigation water makes it back into the aquifer and 0% from the CAFO goes back. Using this assumption, the CAFO be taking out today's equivalent of 74mm gallons a year - substantially more.

After hearing Jim Ostrom of Milksource speak, I did find the idea of a CAFO less appalling. However, I do believe that Milksource could locate their farm is a less environmentally sensitive area. There are just too many nearby lakes and streams that could be effected by this CAFO. Milksource's argument that they have already invested money in this site should not allow them to locate where ever they please without taking into account the effects the usage of water AND the effects of their by-products could have on neighboring water bodies. By the time we find out the CAFO has harmed the water it will be too late.

I ask you to help us at Wood Lake to keep control our water quality by denying this permit and thereby protecting our Natural Resource.
Response: The Department's review of potential impacts to nearby water resources assumed 100% water loss, and that the wells were pumping at their maximum requested

capacity (1000 gpm). That review found no potential for significant impacts to surface water resources as a result of the proposed groundwater withdrawal.

Under Ch. NR 142, Wis. Adm. Code, water losses from dairy farming are assumed to be 90%, while water losses from irrigation are assumed to be 70%. Past annual water loss from the irrigation well (for years with records) has averaged 22.3 million gallons per year (MGY). Water loss for the proposed wells could be between 47.25 MGY (at the dairy's projected annual usage rate) and 118.26 MGY (at the maximum approved annual average pumping rate of 250 gpm).

Response to comment #82 - #83 follows response #83:

Comment #82: Total water usage for Richfield Dairy has been estimated at ~52.5 million gallons / year, 143,846 gallons / day or 9.9 gallons / minute. Animal watering and cleaning accounts for 44 million gallons/year, with evaporative cooling of the livestock facility during hot weather accounting for the remaining 8.5 million gallons/year. This annualized water estimate does not take in to account the seasonal variations of the water use, as stated in the EA "evaporative cooling of the livestock facility during ho weather accounting for the remaining 8.5 million gallons/year," This 8.5 million gallons should have been divided over only the hot months when the water will be utilized. All conclusions in the EA about the impact to water levels are inaccurate based on the annualized water usage numbers. Further detailed analysis needs to be completed to accurately project any impacts to the environment due to water levels.

Comment #83: The increase in pumping rates at the Richfield Dairy site from a current average of 14,954,000 gallons per year to 52.5 gallons per year is a significant increase. Most of this increase will occur during the summer (e.g., weather for barn cooling), the same time period that irrigation systems are running and the time of greatest stress to the water table.

Response #82-#83: The Department's analysis of the high capacity wells was based on the total *maximum requested* capacity of the two new wells, 1000 gallons per minute (gpm). The Richfield Dairy's projected annual water use of 52.5 million gallons per year is equal to an average pumping rate of 99.8 gpm (52,500,000 gallons/year ÷ 365 days/year ÷ 1440 minutes/day). Using the dairy's estimates for the volume of cooling water used, pumping during summer months would be expected to average 150 gpm, while pumping during the rest of the year would average 84 gpm. While the proposed water use rate in the summer is significantly greater than the rate of water use in other times of the year, the projected summer water use rate is still well below the pumping rate used in the Department's impact analysis. By using a higher rate of water use, the Department's analysis is conservative and the results will tend to overestimate impacts in both the summer and winter months. Even with this approach, the Department's analysis indicates there will not be significant adverse impacts to any water resources as a result of the high capacity wells.

Comment #84: The EA states that "A high capacity well permit falls under the

provisions within Ch. NR 820, Wis. Adm. Code, to assess potential impacts to trout streams, outstanding resource waters (ORW), exceptional resource waters (ORW) and springs. DNR Water Supply staff will assess the proposal to determine if the proposed wells would adversely affect any of these water resources. This analysis needs to be completed prior to the issue of a WPDES permit. The estimated water usage by the new facility exceeds the historical usage of the existing well on the property. In order for the DNR staff to accurately analysis water quality issues for WPDES permit they need to first complete their analysis of for the well permit. This analysis in order to be meaningful must compare actual water usage of the previous well to the estimated monthly usage projected by the new facility.
Response: The Department completed its water quantity impacts review of the high capacity well application prior to issuing of the WPDES permit. See also Response #67-73.

Comment #85: Richfield Dairy's two proposed high capacity wells are not considered "new withdrawals" from the aquifer since they will be replacing an existing high capacity well which has historically pumped a significant amount of water from the aquifer, particularly during the irrigation season. No new impacts are expected from Richfield Dairy's proposed high capacity wells (comment references studies by Conestoga Rovers & Associates and NewFields, Inc.). (Michael Best)
Response: The DNR considers an application for a replacement well as equivalent to a new well application. Applications for replacement wells are reviewed with the same level of scrutiny as new wells. The finding of the DNR's review of the high capacity well application was that significant adverse impacts to waters of the state directly related to the proposed wells are very unlikely to occur.

CUMULATIVE IMPACTS

Response to comments #86-#97 follows comment #97.

Comment #86: The existing on-site high capacity irrigation well (WDNR 146), drilled in 1976, would be abandoned. An examination of WDNR 146 well record data shows that 478,336,400 gallons was pumped from 1978 through 2010 for an average withdrawal of approximately 15 million gallons/year (see Table 1).

The hydrologic features of concern in the site area are shown on Fig. 3 (streams) and Fig. 4 (lakes & high capacity wells). Note that the headwaters for the Little Roche a Cri Cr. are located approximately 3.0 miles west of the site and that Pleasant Lake and the headwaters of Chaffee Cr. are located at 2.5 and 3.0 miles east-southeast of the site. Note in Fig. 4 that the dense area of high capacity wells does not lay immediately adjacent Pleasant Lake, but is found at two miles and further to the west northwest. Kraft & Mechenich (2010) and Kraft et al. (201X) use a statistical comparison of well and lake water levels assumed not to be impacted by irrigation pumping to those that may have been impacted, and determined that Pleasant Lake water levels have been reduced by an average of 1.5 feet due to historic and current pumping in the area. The report goes on to

say that these impacts are probably underestimated by 0.4 to 0.76 feet because the calibrated numerical simulations showed a potential impact of 0.4 to 0.76 feet in area of the reference wells that were assumed not to be impacted by pumping. Fig. 5 compares the modeled groundwater declines (in color code) to the statistically determined water level declines at wells and lakes. Note that the model predicted a water level decline of approximately 2.0 feet at the proposed Richfield Dairy site area and approximately 1.0 foot at Pleasant Lake. This would indicate the model may be under-predicting impacts at Pleasant Lake since the statistical analysis resulted in a decline of 1.5 feet. Additional model calibration might be made, increasing the Pleasant Lake bed conductance, to better match the statistical results.

Fig. 6 shows that the model-predicted irrigation pumping impacts to the Little Roche a Cri Cr. headwaters produce a 20% to 30% reduction in stream base flow while the base flow reduction at Tagatz Cr. is 5% to 10%. It is noted that since the base flow reductions were based on steady-state model conditions the actual base flow reductions would be much greater during conditions of low flow base flow such as during periods of lower precipitation. Note that the Tagatz Cr. headwaters are approximately one mile further from the highly developed irrigated area than the headwater area of Chafee Cr., and therefore larger base flow reductions would be expected at Chafee Cr. This shows that impacts to stream headwaters over three miles from the heavily irrigated areas are expressed as significant reduction in base flow due to the pumping. The maintenance of base flow for these creeks is critical for the support of trout populations due to trout dependence on the cold groundwater discharge necessary to insure that adequate concentration of dissolved oxygen is provided for fish respiration. The warming of headwater stream temperatures due to reduced base flow produces a reduction in stream dissolved oxygen because of the decreased solubility of oxygen in warm water. This means that although the resource may not be impacted by pumping during climate-related periods of high groundwater recharge and discharge, reduced or low irrigation pumping, or colder air temperatures; severe impacts are likely and would be expected during weather variations resulting in low base flow and increased heat loads in summer.

The cumulative impacts of historic and current irrigated agriculture pumping have been shown to have already caused significant negative impacts to groundwater levels, lake levels, and stream flows in the vicinity of the proposed Richfield Dairy.

Based on the previous discussion, additional harm to waters of the state would result if the high capacity well permit would be approved. The two Richfield Dairy high-capacity wells would contribute to and exacerbate cumulative impacts caused by the existing pumping in the area. Due to the degree of existing pumping and documented resultant harm to the waters of the state the DNR must deny the high capacity well permit in order to prevent this additional harm.

Comment #87: As a property owner on Pleasant Lake, I am writing to protest the two proposed high-capacity wells by Milk Source Holdings, Inc., in Adams County, 2.7 miles west of Pleasant Lake. It is likely that this farm and these wells will negatively affect the

water quantity and quality of the lake. I know you agree that Wisconsin lakes are some of our greatest resources and should be preserved, managed and protected.

These high-capacity wells and farm will likely exacerbate current issues and could destroy property values:

1. Pleasant Lake is already at its lowest lake level since recorded levels were established in 1964.
2. Another Waushara County lake, Long Lake, experienced a similar issue and is now dry. Per the Milwaukee Journal Sentinel, "water siphoned for high-capacity wells and agriculture irrigation" was a factor."
3. Private wells and the lake water is often contaminated by farm run-off, specifically nitrogen, phosphates and bacterial contamination.

Please do not approve this dairy. At a minimum, I request that a public hearing be held and a full Environmental Impact Study to be conducted.

Comment #88: Since the high capacity wells are located in the Great Lakes aquifer and 60% of the manure will be discharged to the Mississippi River Drainage basin, creating a net loss of water to the aquifer feeding Pleasant Lake, Wood Lake and the Class 1 trout streams Chaffee Creek, Tagatz Creek, Wedde Creek and the Mecan River. Already these waters are impacted by agricultural water withdrawals through lower water levels and reduced flows.

Comment #89: Although some DNR people classify George Kraft, as a Kook, his data is scientifically sound. It shows a marked decrease in the central state aquifer levels with the increase use of high capacity wells. This dairy if granted a permit will have two such wells and as documented by their own estimation will use, at a minimum, 15,000,000 more gallons of water a year than currently being used. The current EA even says residents should expect some local wells to be impacted. This was with the misreporting of equal usage.

Comment #90: The Council (Waushara County Lakes Council, Inc.), is deeply concerned about the impact of groundwater pumping on surface water resources (our lakes, rivers, streams and wetlands). While no single high capacity well is a threat, the cumulative impact of an ever-increasing number of high capacity wells pumping out the groundwater in the watershed is. Waushara County has already experienced the effect of groundwater pumping in our watershed; Fish Lake, Huron Lake, Pine Lake Hancock, and Pleasant Lake all bear the scars.

Although he proposes dairy is to be located in Adams County, it will be located on the eastern side of the groundwater divide, and will be at the top of the recharge zone for groundwater flowing into Waushara County. This makes the construction of Richfield Dairy a great concern to the Waushara County Watershed Lakes Council. For these reasons, the Council requests that a public informational hearing be held to address how

the proposed Richfield Dairy will affect the quantity and quality of the ground water in Waushara County, and in turn, the surface water bodies of Waushara County.]

Comment #91: I am writing to express our opposition to the proposed Milk Source project, Richfield Dairy, here in Adams County.

As residents of Adams County, we are opposed to large-scale agricultural and farming practices in our county. The high-cap wells and water usage needed to sustain over 6,000 cattle plus manage feeding and maintaining this facility will put too many increased demands on an already fragile system.

As volunteers for the Citizen Based Stream Water Monitoring program, we have witnessed a draw down of the Roche-a-Cri River, Carter Creek and other steams here in Adams County. One only has to look at the current draught and see lower stream levels and less habitat for sustaining trout. Plus, when droughts occur, mega-farm agriculture is allowed to tap into these same water resources to protect their crops and animals. I don't believe we can increase this demand for 6,000 plus cows. The Little Plover River, and numerous lakes in adjacent Waushara County, have never recovered from lower groundwater levels and the irrigation and demand continues.

Our experience with corporate farms in Adams County has taught us that what the corporations say is one thing, and what they practice is another. Heartland Farms recently expanded into northern Adams County and promised to leave windbreaks to prevent wind erosion and retain the precious rural community. I have attached a photo (taken today) as proof of their environmental ethic and commitment to Adams County residents. What they say, and do, are separate things. Our property value has decreased and our township will have to cover the cost to plow more roads due to the lack of windbreaks. We have just witnessed a massive loss of forest and wildlife habitat, increased soil into the air, so bad that we can't have windows open in this heat, and forcing us to put our home up for sale. What hurts most is that 95% of Heartland Farms potatoes are grown for potato chips, the largest single contributor to obesity in America, according to the latest New England Journal of Medicine.

If the DNR can't protect our soil from being blown away, ensure habitat protection for trout, and stop chemicals from being dumped on us by crop dusters, how it can protect us from an onslaught of chemical contaminations to sustain crops needed to feed, milk and clean 6,000 cows?

We already have allowable toxic chemicals form the paper mills being applied to our fields and now we want the manure of 6,000 plus cows. We understand that these chemicals permeate the groundwater, but what happens when they become airborne in Adams County during our annual "dust bowl" days that occur on numerous spring days due to high wind speeds and little windbreaks. Surely, this will increase particulate cow feces into our lungs and streams.

I attended Richfield Dairy's presentation to the Adams Count Board this past spring and just don't believe what they propose will bring quality jobs to our county, keep our groundwater safe and NOT increase the impact that agriculture already has on our county's streams and groundwater. Instead of bringing jobs to Adams County, large-scale agriculture is forcing our small business to move, perhaps even out of the county.

Our SWIMS data already support the fact that our streams are under increased pressure due to agriculture in our county. Why is the DNR doing nothing with this information that we continue to provide on a yearly basis?

Comment #92: The Pleasant Lake Management District (PLMD) Board was provided with a presentation on this proposal at their April 16, 2011 meeting. Mr. Bill Harkel, Milk Source, LLC., provided a PowerPoint presentation consisting mostly of operations at their flagship dairy in Rosendale. Many of our questions, specific to groundwater use and pumping, land spreading, odor and pathogens, water quality, runoff and increased truck traffic, were not answered or answered from a business point of view and not science based as many of us had expected. This issue was also a subject at the Special Meeting of May 28, 2011 whereby member property owners gave the Board broad powers to represent their interests.

This was the first introduction to a large CAFO for many of our members. Due to jurisdictional issues, we had not been notified of this CAFO planned to be built in Adams County at the border of Waushara County, just 2.7 miles from the lake. Even though being a governmental unit, as per ch. 3 Wis. Stats., at this time we were not informed of nor provided with notice of any public meetings in the adjacent township or county for conditional use permits, etc. {Note: Also a Resolution was passed by our members at PLMD Annual Meeting July 2010 and forwarded to the DNR requesting to become a participant in the permit; see copy attached; to date we have never received any notice pertaining our requests.}

PLMD, a lake management district created in 2002 under ch. 33, Wis. Stats., and approved by resolution by the Waushara County Board, has always believed that the work needed to create & support a lake management district and the volunteer time (and expense) in obtaining approvals for such a distinct, assured that we were partners with the Wisc. DNR, in our goals, mission, activities, educational endeavors and expected outcomes. The 3-4 generations of property owners on this lake have strived to be good stewards at Pleasant Lake long before the creation of the PLMD and the enactment of many of the state rules which today we rely upon to preserve our environmental resources.

After attending the Informational and Public Hearings in Adams on Monday July 18, I question if the DNR accepts views of people like the 204 member property owners of Pleasant Lake and the Lake District Board as partners. More alarming was the apparent preferential treatment during the hearings towards the WPDES permit applicant Milk Source, Inc., their employees, business interests and paid lobbyist/legal team. (I individually requested information from Tom Baumann of DNR on 7/19/2011 on how to

file a formal complaint; to date, I have yet to receive a response.) In my opinion input from these sources were not science- or fact-based, but anecdotal stories about various business relationships and a regurgitation of a PR/marketing presentation sold to both the Town of Richfield and Adams County to obtain conditional use permits, and to the Town of Coloma, Village of Coloma and other local groups to find support for their interests.

The most glaring disappointment in this whole public process was the obvious impending approval of the WPDES permit. During its eight years of existence, PLMD has taken land stewardship seriously—we have developed partnerships with local, regional and state resource experts and contacts thereof, all in order to carry out our activities for a lake rehabilitation and improvement district.

When I enumerate the many positive activities PLMD has engaged in to improve our lake, the environment and the local community, I am saddened that the DNR is about to make a decision based on economics (mostly spoon-fed by the permit applicant) and not the negative impacts to the environment on a regional level brought to the DNR's attention at the hearing. Many question if this is the mission of the "NEW DNR", catering to business at the expense of the environment. This is why an EIS is so important in moving forward on the WPDES permit as land spreading of manure of the magnitude in the Central Sands and on other resources could also be affected – Mecan, Chaffee and Taggets creeks.

Much of our focus and education is related to water quality as well as water quantity; lake levels of this sand seepage lake are dependant on seasonal precipitation and snow melt as well as fluctuating ground water table. (Lake levels for Pleasant Lake are also accessible on the DNR webpage.) The number of high capacity wells in Waushara County as well as in the groundwater watershed shredding upstream in Adams County have been a great concern to PLMD as lake levels in the mid- to late- 2000s have been steadily decreasing levels. Please also consider our history of stewardship in any application(s) for a high capacity well(s) associated with the proposed Richfield Dairy.

Our greatest concern in that an EIS needs to be developed to make a complete and comprehensive review of this proposed facility and its offsite impacts. We are also focused on the water quality and quantity issues and feel and EIS is necessary to assess the groundwater situation in depth.

Comment #93: I request that the site selection for Richfield Dairy be reconsidered. The DNR is charged by the legislature to protect and preserve its waters under the Public Trust Doctrine. There are a large number of high capacity wells in this area and the groundwater resources of the central sands is overtaxed (see Kraft and Mechenich report, 2010). This has resulted in a lowering of river, lake and stream levels. The high capacity wells from Richfield Dairy will further stress the aquifer. This will potentially take away the rights provided to Wisconsin citizens under the Public Trust Doctrine. Moving the dairy to the west of the Great Lakes Basin groundwater divide would move it away from a region of highest groundwater demand in the state to an area that would be better able to support its needs and avoid potential legal challenges.

Comment #94: On July 6, 2010, the Wisconsin Supreme Court ruled the "DNR must consider the environmental impact of a proposed high capacity well when presented with sufficient concrete, scientific evidence of a potential harm to waters of the state." This evidence is described in the Kraft and Mechenich, 2010, report.

I am disappointed that the DNR does not appear to embrace the study by Kraft and Mechenich titled "Irrigation Effects in the Northern Lake States: Wisconsin Central Sands Revisited" as a respected and reliable source of information regarding the groundwater situation in the central sands.

Comment #95: If groundwater pumping is allowed to continue unchecked, more lakes and rivers will dry up, municipalities will not be able to supply water to their residents and agriculture in the central sands will die. For these reasons, I request that no new high capacity well permits be issued to Richfield Dairy at the proposed site.

Comment #96: Regarding the statement within the environmental assessment that the area geology consists of sand over 300 feet of sandstone which is located at an approximate depth of 150-200 feet, the Department received the following comment: "Not to mention the current stressed condition of the western aquifer of the Great Lakes Basin is a serious omission. The Kraft and Mechenich, 2010 report, *Groundwater Pumping Effects on Groundwater Levels, Lake Levels, and Streamflows in the Wisconsin Central Sands, provides a picture of the current condition of the central sand aquifer; it is inappropriate to leave it out."*

Comment #97: The Department received the following question regarding the exclusion of the George Kraft report from the environmental assessment's list of documents, plans, studies or memos referenced in the preparation of the environmental assessment: "Why wasn't George Kraft's 2010 ground water report considered in the construction of the EA?"
"http://www.uwsp.edu/cnr/watersheds/Reports_Publications/Reports/gwpumpcentralsands2010.pdf"

Response #86 - #97: These comments deal with the potential for cumulative impacts from high capacity wells on surface water bodies and groundwater in Adams and Waushara Counties. Even assuming that cumulative effects of pumping may have impacts on the amount of groundwater available to surface water resources in the Central Sands, as described in the Kraft and Mechenich report, the Department's review is limited to whether the proposed wells on the high capacity property will have potential significant adverse environmental impacts. In this case, that assessment shows no indication that such impacts will occur. (See Response #67-73 for more details of this analysis.)

See Response to Comment#1 for discussion on WEPA concerns.

GREAT LAKES COMPACT

Response to comment #98-#100 following comment #100:

Comment #98: In accordance with s. 281.343(4t)(e) and 281.346(2), the Great Lakes Basin (GLB) is defined by the "surface water divide" (a line delineated over the ground surface), not by groundwater resources or alleged hydrogeologic connections. The Richfield Dairy production area and its two high capacity wells are more than a mile outside the GLB. Therefore, the Great Lakes Compact statutes and rules are not applicable to Richfield Dairy's proposed water withdrawals. References to s. 281. 343(4h)(a)(4), a general policy statement, as means to identify the GLB using the aquifer below the ground surface are incorrect.

Regardless, the landspreading of manure and milk production at Richfield Dairy would not constitute a diversion from the GLB under the Great Lakes Compact. (Michael Best)

Comment #99: This withdrawal would also be in violation of the Great Lakes water compact because a large portion of the water is taken from an aquifer draining to Lake Michigan and discharged into the Mississippi Basin. The Department is charge with defending the public trust doctrine, enforcing the Great Lakes water Compact and should not allow these additional high capacity wells.

Comment #100: No new high capacity well permits should be issued to Richfield Dairy as long as it is located in the Great Lakes Basin.

Response #98-#100: The Great Lakes Compact states that the surface water divide is used to determine whether a withdrawal of surface water or groundwater is from the Great Lakes basin. The proposed Richfield Dairy wells are located west of the surface water divide; therefore for purposes of the Great Lakes Compact, the proposed water withdrawal is from the Mississippi River basin. Consequently, although the owner must register the withdrawal and annually report the monthly water withdrawals (a state-wide requirement for all water users with the capacity to withdraw more than 100,000 gallons per day), the withdrawal will not require a water use permit and is not considered a diversion under the Great Lakes Compact.

Comment #101: 68% of the 52.5 million gallons of groundwater pumped from the Great Lakes Basin by Richfield Dairy will be transferred to the Mississippi Basin through manure spreading activities. This violates the Great Lakes Compact. Moving the dairy west eliminates this problem.
Response: As stated above, the proposed wells are not located within the Great Lakes Basin as defined by the Great Lakes Compact and provisions in the Great Lakes Compact that pertain to diversions are not applicable.

RESIDENTIAL WELLS

Response to comment #102-#105 following comment #105:

Comment #102: I am opposed to issuing a permit for the (CAFO) – large corporate dairy farm for the following reason: I have a private well like most people and when they did the ditching" on County Road C, my water was reduced to a trickle. But I learned to deal with it. Any composition to it, I won't have any. And it is too late in the game for me to afford to dig a deeper well. Like most people living on fixed incomes, no body has the money for this expensive event.

(The Department's interpretation of this comment is that you are concerned that increased high capacity water withdrawals from the proposed Richfield facility will further lower groundwater levels within the immediate area of the proposed Richfield Dairy facility and result in the loss of a private water supply at your residence.)

Comment #103: We, the undersigned members of the PLMD (Pleasant Lake Management District) are strongly opposed to the establishment of the Richfield Dairy Facility. The dairy would be 2.3 miles from Pleasant Lake and 3 miles from the Village of Coloma. It would cause much Disruption to our Water Source, our Air Quality and the Amount of Traffic in our (and adjacent) areas. For these, and other unforeseen negative affects to our town we strongly oppose the establishment of the Richfield Dairy Facility.

Comment #104: This CAFO will take huge amounts of water from the aquifer and is likely to dry up nearby shallow residential wells. The owners will be forced to dig new, deeper wells that are very costly. If they can't afford to do that, what are the alternatives? Sell their home and their farm? What is it worth if it doesn't have clean water? Property values drop when a CAFO moves in nearby. [per Property Values: Concentrated Animal Feeding Operations and Proximate Property Values, The Appraisal Journal July 2001, Volume LXIX Number 3 By John A. Kilpatrick]*

Why is the owner of a high cap well allowed to pump more water per year than the volume of water that falls on the number of acres that party owns? This means that he/they are drawing water out from under the land of the neighbors. Would my neighbor be allowed to dig a mine down and then sideways under MY land, and mine precious minerals out from under MY land? Water IS a mineral, and it IS precious. Access to water has a monetary value (see Property Values, above).

Comment # 105: If Richfield Dairy is awarded a high capacity well permit, monitoring for groundwater quantity must be required. The permit must include a "no harm to surface or ground water" standard along with consequences for "harm."

Response #102 – 105: The distance between the nearest private well and the proposed high capacity wells is approximately 400 feet. Richfield Dairy estimates its average water use at 100 gallons per minute. According to the Department's analysis, after a year of constant pumping at this rate, drawdown in the nearest private well would be less than

two feet. In almost all cases, a groundwater decline of less than five feet will not impact the ability of a residential well to produce water. Drawdown in the nearest private well could approach five feet if the dairy wells were pumped constantly for a year at more than 250 gallons per minute; this is more than twice the dairy's estimated withdrawal amount.

All other public and private wells in the area are located much farther from the proposed wells and would also have much smaller water level drawdowns.

Due to the potential for impacts to the nearby private wells at higher pumping rates, DNR plans to include a condition similar to the following in Richfield Dairy's high capacity well approval:

> *Based on annual water use averaging 52.5 million gallons per year (estimate provided by Milksource, Inc.), the Department has determined that operation of the wells will not result in significant adverse environmental impacts. However, operation of the wells at or near their maximum capacity for an extended period could result in adverse impacts to the private well located at 1721 1st Drive. Therefore, the maximum total pumping from the two wells in any 30-day period may not exceed an average of 500 gpm (21.6 million gallons), and the maximum pumping in any 365-day period may not exceed an average of 250 gpm (131.2 million gallons).*
>
> *In addition, the Department may require monitoring and may impose additional restrictions or conditions on the use of the wells if available information indicates that pumping of the wells is resulting in adverse impacts to private wells or surface water.*

The common law in Wisconsin generally establishes that property owners are entitled to withdraw groundwater, provided that the withdrawal does not cause unreasonable harm to another. If water use by one landowner unreasonably interferes with a neighboring landowner's use of the groundwater, resolution of the conflict can also be decided through a civil suit. {See State v. Michels Pipeline Construction, Inc., 63 Wis.2d 278 (1974)}. High capacity well approvals include a condition stating that issuance of the approval does not relieve the owner from any liability related to claims brought by nearby landowners related to potential harm to their water supplies.

GROUNDWATER QUALITY

Comment #107: Regarding the statement within the environmental assessment that the proposed project is located within an area that has a relatively high water table, the Department received the following question: "What is meant by 'relatively high" this should be replaced with numbers!

Response: "Relatively high" is a subjective assessment of depth to water table over a large area. According to driller construction reports, groundwater depth near the production area and land application sites varies between 1 and 192 feet below the ground surface with 89% of the wells showing static water level in wells at 10 feet or greater below the ground surface. This information cannot be used to determine site specific depth to groundwater because the information was collected over many years. It does indicate that there maybe shallow groundwater in areas near land application sites. Under NR 243, there must be a two foot separation between the ground surface where manure is applied and groundwater as measured in a hole dug just prior to manure application. There is debate over whether this separation is adequate to protect groundwater in all circumstances. Research on this topic is ongoing.

Comment #108: Water in the proposed area is already high in contaminates. DNR reports show 24% of wells over nitrate limit and many others close. DNR has also required local eateries to post signs warning children 3 and under not to drink the water and in the case of BJ's just north of the proposed site required a new well. I understand this wasn't the case at other sites.
Response: Restaurants are regulated under the Safe Drinking Water Act. They are considered "Transient, non-community wells and are owners must sample for certain contaminants according to a schedule. If sample analytical results for a well exceed federal Maximum Contaminant Levels (MCLs), DNR will require them to post notices and in some circumstances will require a well owner to replace a well or install appropriate treatment. Exceedences of MCLs, especially for widespread contaminants like nitrate, unfortunately occur all over the state and especially in agricultural areas where soils are thin or permeable and groundwater occurs close to the land surface.

Below are three tables summarizing groundwater sample analyses for nitrate in wells located near the production site and land application sites. The analyses are from the DNR's GRN database and the UW Stevens Point Center for Science and Education Lab. No data from the proposed production site itself exists. Well water quality varies in the area of the proposed production facility and land application sites – as it does across the Central Wisconsin River basin and the state, in some locations in the area exceeding the enforcement standard. Tables show the most recent nitrate sample analytical results for each well sampled between 1/1/2000) and 9/1/2011 (some wells had multiple samples over several years). Samples represent analyses done over multiple years and through all different seasons. To get an accurate assessment of nitrate concentrations at the production site and near land application sites, monitoring wells would have to be appropriately installed and sampled quarterly.

Transient Noncommunity wells are required to treat water if nitrate levels exceed 20 ppm under the Safe Drinking Water Act.

Private Wells (DNR)						
Township	Range	No. of well samples	No. <PAL (2 ppm)	No. >=PAL, <ES	No. >=ES (10 ppm)	No.>=20 ppm
20	8	13	5	5	3	2
19	8	28	5	14	9	6

18	8	33	8	19	6	5
14	8	47	24	21	2	0
20	7	9	6	2	1	0
19	7	19	8	7	4	2
18	7	9	2	4	3	1
17	7	15	5	4	6	3
15	7	65	33	29	3	1
14	7	38	15	19	4	2
13	7	23	7	16	0	0
18	6	55	36	17	2	0
15	6	61	35	19	7	1
14	6	77	37	35	5	2
18	5	40	9	25	6	3
15	5	40	22	14	4	0
Total		572	257	250	65	28

Transient Noncommunity wells (DNR)						
Township	Range	No. of well samples	No. <PAL (2ppm)	No. >=PAL, <ES	No. >=ES (10ppm)	No.>=20 ppm
20	8	7	3	4	0	0
19	8	4	0	2	2	1
18	8	3	2	1	0	0
14	8	11	4	7	0	0
20	7	5	2	0	3	2
19	7	0	0	0	0	0
18	7	0	0	0	0	0
17	7	0	0	0	0	0
15	7	14	12	1	0	0
14	7	8	4	3	1	0
13	7	30	10	20	0	0
18	6	13	13	0	0	0
15	6	5	4	1	0	0
14	6	34	13	19	2	0
18	5	9	3	5	1	0
15	5	18	13	5	0	0
Total		161	83	68	9	3

Private wells (Center for Watershed Science and Education)						
Township	Range	No. of well samples	No. <PAL	No. >=PAL, <ES	No. >=ES	No.>=20 ppm
20	8	13	5	3	5	4
19	8	38	8	15	15	8
18	8	25	8	11	6	3
14	8	11	6	4	1	0
20	7	25	10	3	12	4
19	7	14	6	3	5	3
18	7	22	8	8	6	2
17	7	23	3	8	12	3

15	7	98	66	18	14	5
14	7	16	6	6	4	2
13	7	9	5	3	1	0
18	6	69	47	17	5	1
15	6	18	10	5	3	1
14	6	49	29	19	1	0
18	5	61	28	20	13	9
15	5	2	1	0	1	0
Total		493	246	143	104	45

The sample analyses show that about 16% of the private well samples collected from wells near the production area and land application sites, exceeded the Enforcement Standard of 10ppm. Of those analyses, about 7% were greater than 20 ppm. Sample analytical results from transient community well samples, serving restaurants and churches for example, showed that almost 6% exceeded the Maximum Contaminant Level for nitrate of 10 ppm. It is unknown how many of these transient community wells have been required to treat for nitrate so results are skewed.

Comment #109: The Applicant and DNR Have Failed to Provide Comprehensive, Clear and Site-Specific Information on the Present State of Groundwater Quality for Areas around both the Production Area and the Land Application Fields, But Nevertheless DNR's Environmental Assessment Acknowledges the Presence of Serious Nitrate Groundwater Contamination Problems.

Commenter's have reviewed DNR's RD Environmental Assessment, the DNR RD Fact Sheet and the DNR NMP submittal and other records searching for baseline information on current groundwater quality including compliance with present groundwater conditions with DNR's rule-based preventative action limits and enforcement standards for compliance of the 'waters of the state' with groundwater quality rules.

The Applicant has apparently not submitted any information about groundwater quality for any of the areas around the production area and land application fields.

The only review or information on present groundwater quality was provided only by DNR in sections of the DNR RD Environmental Assessment at p. 7. DNR first states:

"Groundwater quality in the area is considered between fair to good."

In making this characterization which could not be more generally stated, DNR's statement does not specify which of the 200+ field areas and/or production site, all scattered across large area of the Central Sands area and likely covering several tens of square miles of land area. DNR does not give any numerical criteria for what it deems to be 'fair' and 'good' groundwater quality.

Next, without explaining if the cited groundwater problems are 'fair' or 'good,' DNR then admits:

"Samples taken within the township of Richfield had detectable levels of atrazine and other pesticides. Nitrate level are high in many wells with 24% exceeding the Enforcement Standard threshold of 10 mg/l (ppm)."

This statement is not clear whether the 24% of tests exceeding the nitrate enforcement standard were confined to Richfield Township, or reflect a broader geographic area. DNR does not cite a source for the basis of the 24% figure cited.

The EA then states:

"There is a concern about nitrate contamination already present in the area."

In addition, Department water supply staff is working with the applicant to assess the nitrate situation and some possible well construction modifications, such as completing the wells deeper in the sand aquifer or maybe into the sandstone bedrock aquifer."

Nothing further is provided in either the EA or the Fact Sheet to address the so-called "nitrate situation."

The information in the EA about nitrates in wells around both the planned spreading fields and the production area is grossly inadequate for decision making. However, the EA does indicate the substantial actual presence of groundwater exceeding the DNR enforcement standard for nitrate of 10 mg/l provided in Table 1 of NR.140.10 (public health related groundwater standards).

In addition, a number of comments expressed concern about high nitrate levels (above the enforcement standards of 10 mg/l) in well water.
Response: The rating of "fair to good" is from the Central Wisconsin River Basin plan and is based on a numeric ranking based on available nitrate and pesticide data and land use. Ranking is used to determine basin wide water quality improvement goals. Groundwater quality varies from location to location within the basin. Groundwater in Adams County has high levels of nitrate in agricultural areas. Limiting the amount of commercial fertilizer, manure and other sources of nitrogen to the level needed by crops will limit the amount of nitrate reaching groundwater over the long term. A nutrient management plan such as the one required for the proposed Richfield Dairy may help avoid additional nitrogen loading.

DNR recommends that you have your well tested annually for nitrate and bacteria or if you notice a change in taste or smell in your drinking water. If you have further concerns, please contact the local DNR office and ask to speak to a Drinking Water specialist about your well.

Reference comment response #108 for additional information on groundwater quality in the area.

Comment #110: One comment listed a number studies/research papers indicating Serious Pre-existing Problems of contaminated Groundwater in the General Central Sands Area Occupied by the Applicant's Land Spreading Fields and Production Area.

A field research paper for 1999 indicates serious, intractable groundwater nitrate problems throughout the Central Sands agricultural region:

Another paper concurs with the observation of serious nitrate groundwater problems in the Wisconsin Central Sands agricultural area:

All of the papers indicate the proclivity for nitrate problems in the Wisconsin Central Sand Plains created by nitrogen application to highly permeable soils in the area of the proposed facility and its land spreading fields.

Response: The Central Sand Plains are vulnerable to groundwater contamination from agricultural chemicals. The threat to groundwater can be lessened if pest management and nutrient management strategies are used by all farmers. Managing manure according to a nutrient management plan as required under a CAFO permit will limit nitrate inputs to groundwater. It is assumed that lower application rates will result in less nitrate inputs to groundwater. Site specific groundwater monitoring of land application sites over a long period would be required to determine trends in nitrate concentration in response to nutrient management plans.

Reference comment response #108 for additional information.