

Permit Fact Sheet

General Information

Permit Number:	WI-0059536-04-2
Permittee Name:	Kinnard Farms Inc
Address:	E2675 County Hwy S
City/State/Zip:	Casco WI 54205
Discharge Location:	E2675 County Road S, Casco, WI (Site One) and E2669 County Road S, Casco (Site Two)
Receiving Water:	Unnamed tributaries to Casco Creek within the Kewaunee River Watershed, and groundwaters of the state

Animal Units				
	Current AU		Proposed AU	
			(Note: If all zeroes, expansions are not expected during permit term)	
Animal Type	Mixed	Individual	Mixed	Individual
Milking and Dry Cows	11,130	11,369	0	0
Total		11,369		0

Facility Description

Kinnard Farms Inc. is an existing Concentrated Animal Feeding Operation in Kewaunee, WI. Kinnard Farms is owned and operated by Lee Kinnard and family. As of October 2021, Kinnard Farms has 7,950 milking and dry cows. Kinnard Farms anticipates generating 103,038,952 gallons of manure and process wastewater and 2,045 tons of solid waste in 2022. Kinnard Farms has greater than the required minimum of 180 days of manure storage and has 16,325.44 acres in its approved nutrient management plan, of which 14,337.59 acres are rented or in agreements and 1,987.85 acres are owned.

Kinnard Farms' permit reissuance (WPDES Permit No. WI-0059536-04-0) was challenged by various petitioners. The department reached a settlement agreement which contained the condition that Kinnard Farms' permit would be modified for inclusion of an animal unit maximum condition and, if practical, requirements to monitor groundwater at land application site(s) if the WI Supreme Court decides the department has authority to do so. On July 8, 2021, the Court issued its opinion *Clean Wisconsin, Inc. vs DNR* describing that the department has this authority.

This permit is being modified for inclusion of requirements to monitor groundwater at land application site(s) and an animal unit maximum of 13,369 animal units. Permit sections 1.1.1, 2.1.2, and 3.10 were added to the permit.

1 Livestock Operations

1.1.1 Animal Unit Maximum

The permittee may not exceed 11,369 animal units under this permit. Manure and process wastewater volumes generated by 11,369 animal units is the permittee's foreseeable maximum level of discharge in accordance with s. 283.31(5), Wis. Stats. If the permittee intends to increase animal units beyond 11,369 then an application to modify this permit shall be submitted.

2 Groundwater – Proposed Monitoring and Limitations

2.1.2 Groundwater Monitoring System for Kinnard Land Application Sites

Location of Monitoring System: Land application sites, to be determined during phased plan implementation.

Wells to be Monitored: To be determined during phased plan implementation.

Well Used To Calculate Indicator Parameter Preventive Action Limits (PALs): To be designated in a Department approved groundwater monitoring plan in accordance with the Schedules section of the permit. PALs for Indicator Parameters contained in the table below shall be calculated based on background groundwater quality data after 8 consecutive samples have been collected from designated well(s). Groundwater contaminant concentrations shall be minimized and PALs met in groundwater monitoring wells to the extent that is technically and economically feasible.

Compliance Well(s) for Enforcement Standards (ESs): To be designated in a Department approved groundwater monitoring plan in accordance with the Schedules section of the permit.

Enforcement standards are to be met in groundwater located beyond the design management zone established in accordance with section s. NR 140.22(3), or at the property boundary, whichever is closer. See the Standard Requirements section of this permit for additional conditions related to exceedance of groundwater standards.

Required Monitoring: Samples shall be collected from each well to be monitored. Wells shall be sampled for the parameters in table below at the specified frequency. The Department will notify the permittee if any wells need to be resampled prior to the next month in the event a well(s) exceeds a standard for any parameter(s).

NOTE: Hourly water level, temperature, and specific conductance monitoring is required in at least one well.

PARAMETER	UNITS	PREVENTIVE ACTION LIMIT	ENFORCEMENT STANDARD	FREQUENCY **
Depth To Groundwater	feet	*****	N/A	Hourly/Monthly
Groundwater Elevation	feet MSL	*****	N/A	Hourly/Monthly
Temperature	deg F	*****	N/A	Hourly/Monthly
Specific Conductance Field	µmhos/cm	*****	N/A	Hourly/Monthly
Carbon, Total Organic	mg/L	*****	N/A	Monthly
Chloride Dissolved*	mg/L	125	250	Monthly
COD, Filtered	mg/L	*****	N/A	Monthly
Nitrogen, Ammonia Dissolved*	mg/L	0.97	9.7	Monthly
Nitrogen, Nitrite + Nitrate (as N) Dissolved*	mg/L	2.0	10	Monthly

Nitrogen, Total Kjeldahl Dissolved	mg/L	*****	N/A	Monthly
Potassium Dissolved	mg/L	*****	N/A	Monthly
Solids, Total Dissolved	mg/L	*****	N/A	Monthly
pH Lab	su	*****	N/A	Monthly
E. coli	#/100 ml	0	0	Monthly
Total Coliform General	#/100 ml	0	0	Monthly

*In the event that background well concentrations exceed the PAL or ES for a given parameter, the Department may consider granting exemptions to groundwater quality standards and establishing site specific Alternative Concentration Limits (ACLs) in accordance with Chapter NR 140, Wis. Adm. Code.

**Monthly samples shall be collected from all wells, unless a different frequency is agreed upon in the Phase 2 Groundwater Monitoring Plan. Sampling of all off-site wells shall be conducted within 24 hours of a recharge event if a recharge event actually occurs during the month. If a recharge event does not occur in a particular month, then sampling for that month is still required. Results for parameters monitored on an hourly monitoring frequency shall be submitted to the Department in writing on a quarterly basis, separate from required monitoring forms. The highest recorded value during a given month shall be reported on monitoring forms submitted to the Department.

*****Preventive Action Limits (PALs) for NR 140 Indicator Parameters have not yet been established for this site. For more information see “Indicator Parameter – Preventive Action Limits” in the Standard Requirements section. PALs are not calculated for all parameters.

3 Schedules

3.10 Groundwater Monitoring System - Plan

Applicable to Land Application Sites

Required Action	Due Date
Phase 1 - Groundwater Monitoring Plan: Submit a Phase 1 groundwater monitoring plan consistent with the Groundwater Requirements section of the permit for the initial monitoring wells for Department review and approval. The plan shall outline the permittee's design for monitoring at least two land application sites. At least one site shall be west of the Site 2 production area and at least one site shall be south of the Site 2 production area. Each proposed site's tillage, cropping, and nutrient application practices must be typical for Kinnard Farms. The Phase 1 plan must include installation of a sufficient number of groundwater monitoring wells to establish site groundwater quality and groundwater flow direction, at least three wells per site are required. The Phase 1 plan shall be appropriate for the geology and hydrogeology of the site. The Phase 1 plan shall include a procedure for identifying recharge events to initiate recharge-triggered sampling. Sites selected shall have a shallow depth to bedrock. The Phase 1 plan shall outline the permittee's design for monitoring land application site(s). The submittal shall include plans and specifications for installation of monitoring wells to be constructed in accordance with the requirements of ch. NR 141, Wis. Adm. Code.	05/25/2022
Phase 2 - Groundwater Monitoring Plan: Submit a Phase 2 groundwater monitoring plan for Department review and approval for installation of additional recommended groundwater monitoring wells to be constructed in accordance with the requirements of ch. NR 141, Wis. Adm. Code. The Phase 2 plan shall include the following: a detailed site characterization based on data collected during Phase 1, a summary of groundwater flow direction and seasonal variability, recommendations for the number and location of additional sites and/or groundwater monitoring wells, and a list of proposed sampling parameters and frequency. The plan shall be appropriate for the geology and hydrogeology of the site. Sites selected shall have a shallow depth to bedrock. The Phase 1 plan shall include a procedure for identifying recharge events to initiate recharge-triggered sampling. The	

<p>department may require additional sites, wells, or sampling parameters to ensure compliance with nutrient management plan effluent limitations and groundwater quality standards. The Phase 2 plans and specifications shall be submitted to the department within 60 days of collecting the 8th monthly sample associated with the Phase 1 plan.</p>	
<p>Well Installation: Complete well installation in accordance with ch. NR 141, Wis Adm. Code, within 90 days following approval by the Department of the Final Groundwater Monitoring Plan. (Note: Documentation of well construction must be submitted to the Department within 60 days of well installation).</p>	

Attachments:

Groundwater evaluation memos

Proposed Expiration Date:

January 31, 2023

Prepared By:

Tyler Dix

CAFO Permit Coordinator

March 22, 2022

DATE: November 5, 2021 CAFO Permit # 0059536-04-01

TO: James Salscheider – CAFO Specialist – NER/Green Bay
Ben Uvaas – CAFO Enforcement Program Coordinator – NER/Oshkosh
Tyler Dix – CAFO Permitting Program Coordinator – WT/3

FROM: Ian Anderson – CAFO Hydrogeologist Program Coordinator

SUBJECT: Kinnard Farms Inc. – Offsite Groundwater Monitoring

Background:

The Kinnard Farms production site, satellite farm, and many landspreading fields are located in Sections 19, 20 and 30, T25N R24E, Town of Lincoln, Kewaunee County. Many of the fields included in the Kinnard Farms Nutrient Management Plan (NMP), where the facility landspreads manure, are within 5 miles of the production area, which is bordered by fields receiving manure from Kinnard Farms. The remaining fields cover a wide swath of Kewaunee County and some are as far away as northern Manitowoc, Southern Door and southeast brown Counties. All of the Kinnard Farms NMP fields in the Town of Lincoln are located over Silurian bedrock. The Dairy currently houses 7,950 milking and dry cows, and anticipates generating approximately 103 million gallons of manure and process wastewater and 2,045 tons of solid manure.

According to the UW-Stevens Point WI Well Water Quality Viewer, 29% of private wells in section 20 have tested positive for total coliform bacteria. During the Kinnard farms contested case hearing in February, 2014 the Administrative Law Judge heard testimony that up to 50 percent of private wells in the Town of Lincoln were contaminated and that 30 percent of wells tested positive for E. coli bacteria.

Sampling of production area monitoring wells has shown nitrate concentrations greater than 20 mg/L in upgradient and downgradient wells. These concentrations exceed both the 10mg/L state health-based drinking water standard and the 10mg/L groundwater quality enforcement standard (NR 140) for nitrate. All four active monitoring wells have tested positive for Total Coliform bacteria and only MW-1 has not had an E. coli positive sample during the monitoring history. Total coliform bacteria, including E. coli bacteria, has an enforcement standard of 0 in NR 140.

Site Geology/hydrogeology:

Water supply well construction reports (WCRs) in the area surrounding the production site show limestone or dolomite bedrock encountered at depths between 7 and 63 feet, and reported depth to groundwater, at the time of construction ranging from 21 to 81 feet. Based on WCRs near the production site and *Hydrogeological Characterization of the town of Lincoln, Kewaunee County, Wisconsin* (Parsen et al., 2017), the Silurian Dolomite forms an unconfined aquifer approximately 400 feet thick that is highly fractured with thin soil cover.

Potential landspreading site contaminant sources:

Animal waste is known to contain pathogens such as total coliform bacteria including E. coli and nitrogen in various forms. These contaminants can readily enter an aquifer system in a karst setting and can travel quickly along bedrock fractures (Parsen et al. 2017). According to Bradbury et al. (WOFR 2001-01, 2002), “minimum rates of vertical groundwater movement range from 13 to 115 ft/day following recharge events” in a similar karst setting. Potential sources of the contamination in groundwater in this area include the Kinnard Production area and manure landspreading sites. Several potential contaminant sources can be found at the Kinnard Farms production area, including waste storage, feed storage runoff

and wastewater runoff. Dairy operation animal waste, feed storage leachate and process wastewater are known to contain significant levels of potential nitrogen groundwater contaminants, including nitrate and ammonia. However, groundwater upgradient of the production area in MW-1 and MW-2 exceeds NR 140 enforcement standards, indicating landspreading as a potential source. In addition, the occurrence of groundwater contamination in private wells in the Town of Lincoln suggests landspreading may be the source of contamination. For these reasons offsite groundwater monitoring located at landspreading sites is reasonable to allow the determination of the source of contamination.

Need to investigate and required response action if source is landspreading practice or activity:

Chapter NR 140, Wis. Adm. Code, establishes state groundwater quality standards that apply to all facilities, practices and activities which may affect groundwater quality, and which are regulated by the department under chs. 281 and 283, Stats. In accordance with s. NR 243.13(5), Wis. Adm. Code, all permitted large CAFOs are required to comply with state groundwater quality standards. This includes landspreading activities under an approved NMP. Sampling of monitoring wells at the Kinnard Farms production area has identified that groundwater is contaminated with nitrate at concentrations as high as 29.3 mg/L and has identified contamination with total coliform. These results exceed ch. NR 140 groundwater standards. Ch. NR 140 directs the department to assess the cause and significance of contaminants in groundwater above state groundwater quality standards, and to determine appropriate response actions to minimize the concentration of contaminants in groundwater and prevent exceedances of ch. NR 140 Enforcement standards.

Recommendations:

Available information shows that the Kinnard Farms production site and landspreading sites are located in an area susceptible to groundwater contamination. Well construction reports, and a hydrogeologic study in the Town of Lincoln indicate karst geology, including documented sinkholes. Groundwater monitoring at the Kinnard production site show persistent exceedances of groundwater quality standards for nitrate and bacteria. Contamination of nearby private wells with bacteria has been reported. Since nitrate and bacteria exceeding NR 140 enforcement standards are found in monitoring wells upgradient from the production site and in private wells, I recommend that a groundwater monitoring system, consisting of at least three monitoring wells located in at least one field that is actively used for landspreading, be installed to evaluate whether landspreading practices or activities may have contaminated groundwater and caused exceedances of nitrate and total coliform groundwater standards at the upgradient monitoring wells or nearby private wells. The pending permit modification resultant from the 2019 settlement agreement should include a requirement that Kinnard submit an offsite groundwater monitoring plan, subject to department approval.

References:

Field Verification of Capture Zones for Municipal Wells at Sturgeon Bay, Wisconsin. WOFR 2001-01. Bradbury, Rayne & Muldoon. 2002.

Hydrogeological Characterization of the Town of Lincoln, Kewaunee County, Wisconsin. WOFR 2017-05. Parsen, Mauel & Streiff. 2017.

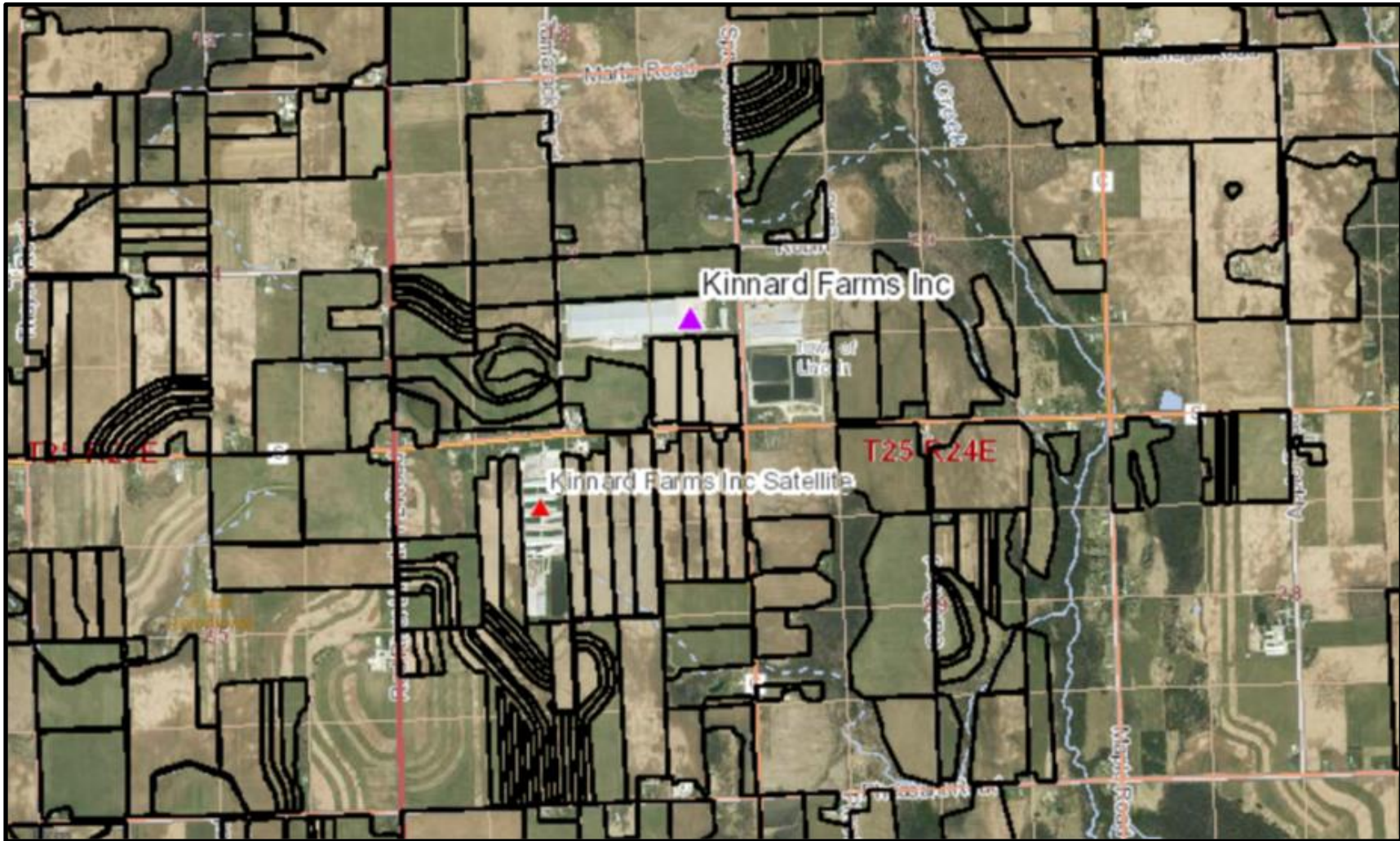
UWSP Well Water Quality Viewer. https://gissrv3.uwsp.edu/webapps/gwc/pri_wells/

Attachments:

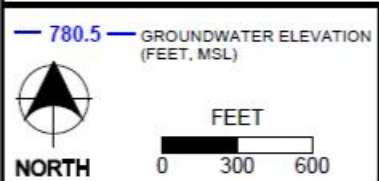
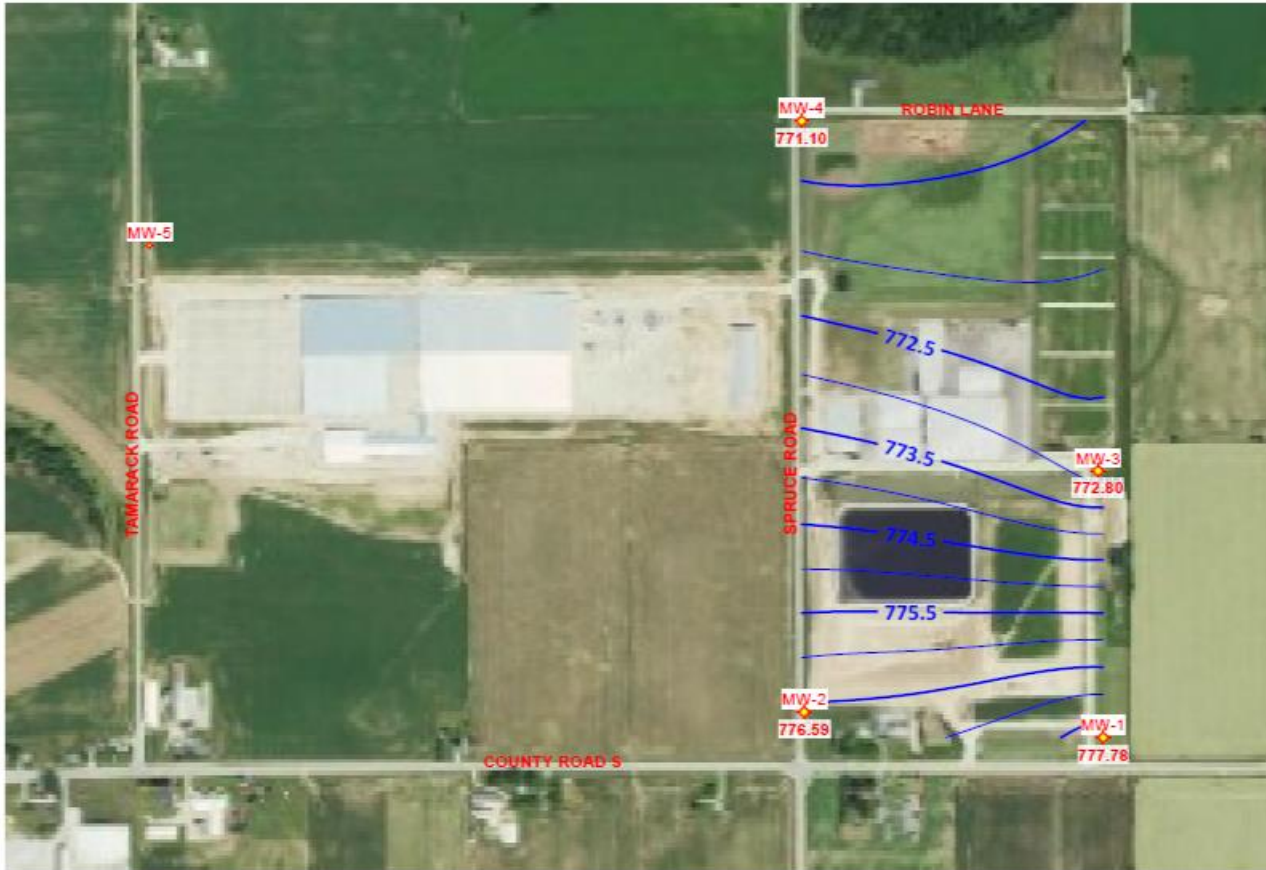
1. Aerial photo of production area
2. Map of Kinnard Farms NMP Fields Near the Production Area
3. Kinnard Farms Production Area with Monitoring Well Locations and Gradient
4. Depth to bedrock and karst features map (Map 3 from WGNHS Town of Lincoln report)



Attachment 1 – Aerial Photo of Kinnard Farms Production Area (Outlined in blue)



Attachment 2 – Kinnard Farms NMP Fields (outlined in black) Near the Production Area




S.S. Papadopoulos & Associates, Inc.
 Environmental and Water-Resource Consultants
 1801 Rockville Pike, Suite 220
 Rockville, MD 20852























KINNARD FARMS
CASCO, WISCONSIN
POTENTIOMETRIC SURFACE 06/15/21

DRAWN BY	PROJ. No.	DATE	FILE
KM	1395	26 Jul 21	WTR 061521

Figure
1

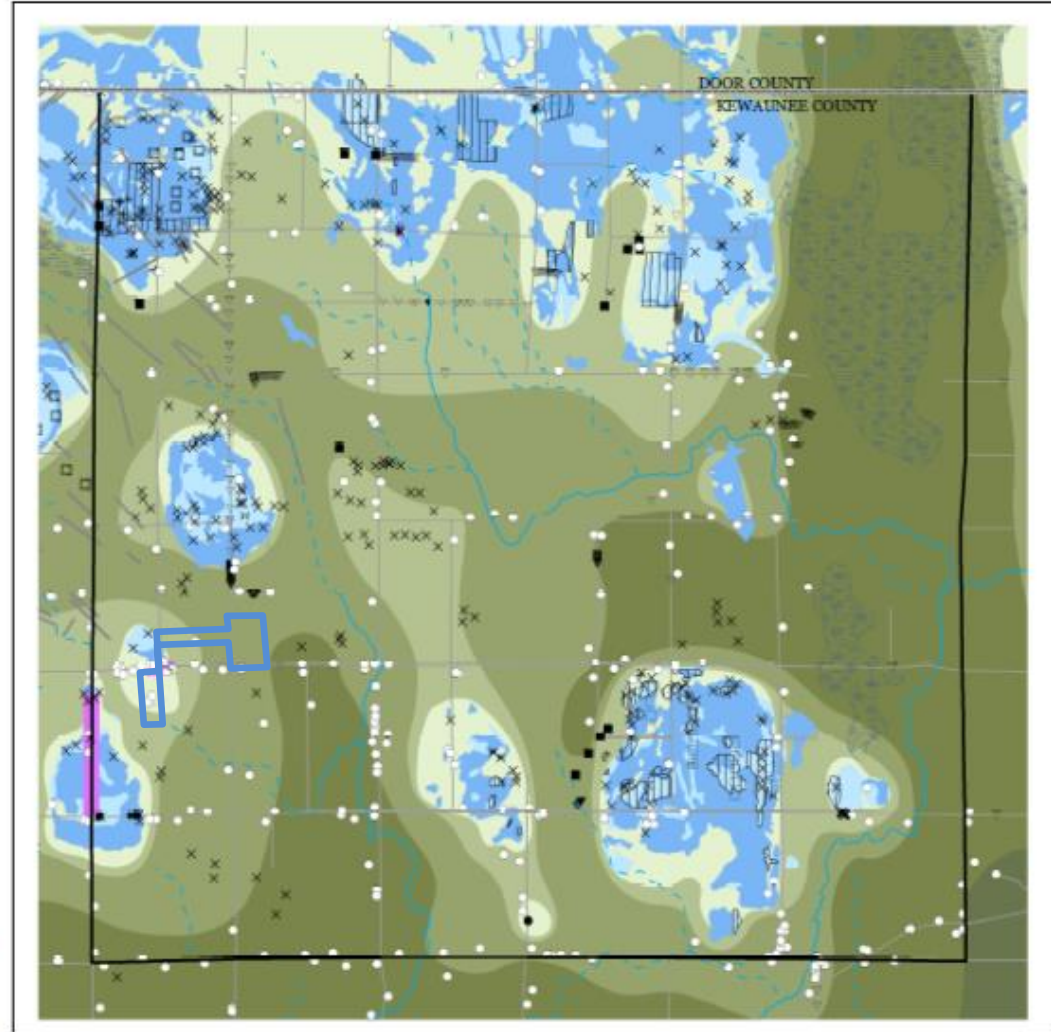
Attachment 3 – Kinnard Farms Production Area Monitoring Well Locations and Water Table Gradient (from SSPA 2nd Quarter Groundwater Monitoring Report dated August 9, 2021)

Legend

-  County Boundary
-  Town Boundary
-  Roads
-  Wetland areas
-  Perennial streams
-  Intermittent streams
-  Well construction reports
-  Fracture traces
-  Sinkholes
-  Geologic log
-  Borings (WGNHS)
-  Borings (wind turbine)
-  Hand auger and push-probe points
-  Surface geophysics measurements
-  Bedrock outcrop observations
-  Utility trenches
-  0 - 24 inches to bedrock (mapped by farmers)
- NRCS soil thickness, depth to bedrock (inches)**
 -  0 - 20
 -  20 - 40
- Depth to bedrock (feet)**
 - < 10 feet symbol" data-bbox="96 635 108 649"/> < 10
 -  10 - 20
 -  20 - 50
 -  50 - 100
 - > 100 feet symbol" data-bbox="96 727 108 741"/> > 100

0 0.5 1 Miles

1:50,000



Attachment 4 – Depth to Bedrock Map with Input Datasets (Modified from WOFR 2017-05). Note approximate location of Kinnard Farms Production area outlined in blue

DATE: March 15, 2022

WPDES Permit #: 0059536-04-01

TO: James Salscheider - CAFO Specialist - NER/Green Bay
Tyler Dix - CAFO Permitting Program Coordinator - WT/3

FROM: Ian Anderson – CAFO Hydrogeologist

SUBJECT: Supplemental Groundwater Monitoring Components – Kinnard Farms

This memo serves as an addendum to the Kinnard Farms Inc. Offsite Groundwater Monitoring memo dated November 5, 2021, recommending minimum requirements for offsite groundwater monitoring of landspreading fields at Kinnard Farms Inc. It was developed in response to comments received, and other additional information that I have considered since November 5, 2021, including the Phase II production area monitoring plan received 1-31-22.¹

Given the shallow karst bedrock in the Town of Lincoln, and the recharge driven nature of contaminant transport in such an environment, a monitoring plan must account for recharge events if it is to accurately capture risk to drinking water wells. It is critical that the plan developed on behalf of Kinnard Farms include a component of continuous monitoring (hourly) for temperature, conductivity, and depth to groundwater. A sudden and drastic change for these parameters will identify when recharge events are occurring, and should be correlated with snowmelt and/or major precipitation events. Dr. Muldoon's written comments to the department and published research support this approach to monitoring in this geologic setting (Muldoon and Bradbury 2010).

One example of how this can be accomplished is to install an autosampler or data sonde, in one of the monitoring wells on KFI property or where they conduct landspreading activity. There are, however, simpler ways to capture recharge events. A datalogger collecting continuous conductivity (specific conductance), water levels and temperature should accurately identify recharge events. This could be installed at the farm, or they may even be able to use well [KW-183](#), which is part of the Wisconsin Groundwater Monitoring Network, is equipped with a datalogger and telemetry, and is located about three miles southeast of the Kinnard Farms production area.

Once a recharge event is identified via continuous conductivity/temperature, then all monitoring wells should be sampled within 24-hours. Studies in Kewaunee County (Borchardt et al. 2019, Borchardt et al. 2021) have noted significant changes in water quality in less than a day in this setting. Collecting samples as precipitation-driven or snowmelt-driven runoff enters the aquifer system is the most appropriate way to determine if Kinnard Farms is meeting the conditions of its WPDES permit (NR 243.13 etc.), given the geologic conditions at the site. It should be noted that Kinnard Farm's proposed Phase 2 production area monitoring plan already includes this strategy.

¹ The Phase II production area plan proposes to replace MW-5, which was abandoned in April 2019 due to low water levels and slow recovery, construct a new downgradient monitoring well (proposed WM-6), and install a continuous temperature and conductivity datalogger, presumably to record and react to recharge events. MW-5 was located upgradient of the production area and is important for understanding groundwater flow direction, and upgradient groundwater quality as it flows toward the production area (Phase II Groundwater Monitoring Work Plan, SSPA).

Fields to be monitored must be immediately upgradient of the Kinnard Farms production area, and have relatively shallow depth to bedrock. Since groundwater in the upgradient wells (MW-1 and MW-2) on the production site exceed NR 140 standards, the most appropriate way to determine if Kinnard Farms is meeting the terms of their permit is to install at least three wells in the landspreading field immediately upgradient of onsite wells that do not meet groundwater standards. Since MW-5 did not intersect the most productive fracture, it has not been sampled recently and thus local groundwater flow direction is poorly constrained. As such, at least three wells should be installed immediately upgradient to the south, and similarly to the west. As Kinnard Farms described in the proposed Phase II production area monitoring plan, care should be taken to ensure that MWs are screened within the fracture most likely to represent contaminant pathways. This can be accomplished via geophysics, packer testing or preferably, a combination of these techniques.

In summary, in order to accurately capture risk to drinking water wells, and determine if landspreading activities in accordance with the approved NMP are causing or contributing to exceedances of groundwater standards, a monitoring system of at least three wells should be installed in a field with shallow bedrock that maintains typical cropping, tillage and application practices immediately west of the production area. A similar system should be installed in a field immediately south of the production area. Wells should be screened in the uppermost productive fracture, and monthly sampling of the systems should be required. Sampling should be recharge-triggered events if a recharge event occurs during that particular month. A plan containing these elements should be submitted as the Phase 1 Offsite Groundwater Monitoring Plan, subject to department approval, as part of the Permit Modification.

References

Muldoon M.A., and Bradbury K.R. *Assessing Seasonal Variation in Recharge and Water Quality in the Silurian Aquifer in Areas with Thicker Soil Cover*. Wisconsin Geologic and Natural history Survey Open-File Report 2019-04.

Phase 2 Groundwater Monitoring Work Plan, Kinnard Farms, Inc., WPDES Permit No. WI-0059536-04-0, Casco, Kewaunee County, Wisconsin. SS Papadopoulos & Associates, Inc.