GREEN LAKE COUNTY

571 County Road A, Green Lake, WI 54941

The following documents are included in the packet for the Land Use Planning & Zoning Committee meeting on *<u>Friday, June 14, 2024.</u>*

<u>Packet Pages</u>:

66-664 **Item #6: Owner:** Christopher D. & Ruth M. Retzlaff, **Agent:** Michael McConnell, Kopplin & Kinas Co. Inc., **Location:** County Highway K and Searle Road, **Parcels:** 004-00789-0000 & 004-00792-0000. **Legal Description:** NE ¼ of SE ¼ and SE ¼ of SE ¼ , located in Section 36, T16N, R13E, Town of Brooklyn, ±80.0 acres. **Request:** The owners are requesting a Conditional Use Permit for a limestone quarry.

66-354 Information on these pages was submitted for Item #6 prior to the May 2, 2024 Land Use Planning & Zoning Public Hearing.

355-664 Information on these pages was submitted for Item #6 for the June 14, 2024 Land Use Planning & Zoning Public Hearing.

665-672 **Item #7: Owner:** Christopher D. & Ruth M. Retzlaff, **Agent:** Michael McConnell, Kopplin & Kinas Co. Inc., **Location:** County Highway K and Searle Road, **Parcels:** 004-00789-0000 & 004-00792-0000. **Legal Description:** NE ¼ of SE ¼ and SE ¼ of SE ¼ , located in Section 36, T16N, R13E, Town of Brooklyn, ±80.0 acres. ***Purpose:** The owners have submitted a Non-metallic mining reclamation permit application.

The above public hearing item is required to obtain reclamation-related testimony for the purpose of Department review. In accordance with Chapter 295, Wis, Stats., NR135 Wis. Admin. Code and Section 323 Green Lake County Code of Ordinances, the Land Use Planning & Zoning Department is the Regulatory Authority that determines whether a Reclamation Permit is issued. The Land Use Planning & Zoning Committee has no approval authority.

If you have questions or need additional information,
please contact the Land Use Planning & Zoning Department at (920) 294-4156

Green Lake County

GREEN LAKE COUNTY
LAND USE PLANNING & ZONING DEPARTMENT

Matt Kirkman *Office: 920-294-4156*
Director *FAX: 920-294-4198*

Land Use Planning & Zoning Committee Meeting Notice

Date: Friday, June 14, 2024 Time: 9:00 AM
Green Lake County Government Center, County Board Room
571 County Rd A, Green Lake WI

****Amended AGENDA***

Committee Members

Chuck Buss, Chair
Bill Boutwell, Vice- Chair
Curt Talma
Gene Thom
Harley Reabe

Secretary: Karissa Block

Virtual attendance at meetings is optional. If technical difficulties arise, there may be instances when remote access may be compromised. If there is a quorum attending in person, the meeting will proceed as scheduled.

This agenda gives notice of a meeting of the Land Use Planning and Zoning Committee. It is possible that individual members of other governing bodies of Green Lake County government may attend this meeting for informative purposes. Members of the Green Lake County Board of Supervisors or its committees may be present for informative purposes but will not take any formal action. A majority or a negative quorum of the members of the Green Lake County Board of Supervisors and/or any of its committees may be present at this meeting. See State ex rel. Badke v. Vill. Bd. of Vill. of Greendale, 173 Wis.2d 553, 578, 494 N.W. 2d 408 (1993).

1. Call to Order
2. Certification of Open Meeting Law
3. Pledge of Allegiance
4. Minutes of 5/2/2024
5. Department Activity Reports
   a) Land use & septic permits
   b) Violation reports
6. Orthoimagery Proposal
7. Budget Line Item Transfer
8. Budget Carryover (Land Information, Non-metallic Mining Reclamation, & Professional Services)
9. Public Comment (15 minutes total/3 minute limit per person)
10. Public Hearing: (Not to begin before 9:30 AM)

Each item below will consist of:
   a) Applicant Testimony
   b) Public Testimony/Comment: 15 minutes total/3 minute limit per person
   c) Committee Discussion & Deliberation
   d) Committee Decision
   e) Execute Ordinance/Determination Form

Item #1: Owner: Kyle M. Miller, **Location:** W2786 County Road I, **Parcel:** 012-00211-0300. **Legal Description:** Part of the E ½ of SW ¼ , located in Section 12, T14N, R12E, Town of Manchester, ±14.1 acres. **Request:** The owners are requesting a Conditional Use Permit for a commercial greenhouse to grow, store, and sell trees and shrubs.

***Item #2: Owner:** Dennis R. Moldenhauer & *Kelly L. Moldenhauer, **Location:** Toledo Road & County Highway H, **Parcel:** 014-00854-0000. **Legal Description:** Lot 1 of CSM 1137, located in Section 34, T15N, R12E, Town of Marquette, ±10.5 acres. **Request:** The owners are requesting a rezone from A1, Farmland Preservation District, to A2, General Agriculture District.

Item #3: Owner: Nancy L. Hynes, **Agent:** Melanie Cody, **Location:** Irving Park Road and Hickory Road, **Parcel:** 004-00723-0000, **Legal Description:** Lot 1 of CSM 205, located in Section 30, T16N, R13E, Town of Brooklyn, ± .55 acres. **Request:** The owners are requesting a rezone from R1, Single-Family Residence District, to RC, Recreation District.

Item #4: Applicant: Green Lake County Land Use Planning & Zoning Committee, **Request:** The committee is requesting an amendment to the Code of Green Lake County, Chapter 350, Zoning Ordinance; more specifically, to amend Section 350-65B., requiring a rural address or fire number prior to Land Use Permit issuance.

Item #5: Applicant: Green Lake County Land Use Planning & Zoning Committee, **Request:** The committee is requesting an amendment to the Code of Green Lake County, Chapter 350, Zoning Ordinance; more specifically, to amend Section 350-77 by adding the definition of ***caretaker***.

Green Lake County

GREEN LAKE COUNTY
LAND USE PLANNING & ZONING DEPARTMENT

Matt Kirkman
Director

Office: 920-294-4156
FAX: 920-294-4198

Land Use Planning & Zoning Committee Meeting Notice

Date: Friday, June 14, 2024 Time: 9:00 AM
Green Lake County Government Center, County Board Room
571 County Rd A, Green Lake WI

***Amended AGENDA**

Committee Members

Chuck Buss, Chair
Bill Boutwell, Vice- Chair
Curt Talma
Gene Thom
Harley Reabe

Secretary: Karissa Block

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Item #6: Owner: Christopher D. & Ruth M. Retzlaff, **Agent:** Michael McConnell, Kopplin & Kinas Co. Inc., **Location:** County Highway K and Searle Road, **Parcels:** 004-00789-0000 & 004-00792-0000. **Legal Description:** NE ¼ of SE ¼ and SE ¼ of SE ¼ , located in Section 36, T16N, R13E, Town of Brooklyn, ±80.0 acres. **Request:** The owners are requesting a Conditional Use Permit for a limestone quarry.

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***Item #7: Owner:** Christopher D. & Ruth M. Retzlaff, **Agent:** Michael McConnell, Kopplin & Kinas Co. Inc., **Location:** County Highway K and Searle Road, **Parcels:** 004-00789-0000 & 004-00792-0000. **Legal Description:** NE ¼ of SE ¼ and SE ¼ of SE ¼ , located in Section 36, T16N, R13E, Town of Brooklyn, ±80.0 acres. ***Purpose:** The owners have submitted a Non-metallic mining reclamation permit application.

11. Committee Discussion
    a) Future Meeting Dates: July 11, 2024 @ 10:00am
    b) Future Agenda items for action & discussion
12. Adjourn

Microsoft Teams meeting: This meeting will be conducted through in person attendance or audio/visual communication. Remote access can be obtained through the Microsoft Teams link on the agenda posted on the County website's Events Calendar:

Microsoft Teams meeting
Join on your computer, mobile app or room device
Click here to join the meeting
Meeting ID: 296 349 313 972
Passcode: 9VUWqS
Download Teams | Join on the web
Or call in (audio only)
+1 920-515-0745,,516863131# United States, Green Bay
Phone Conference ID: 516 863 131#
Find a local number | Reset PIN
Please accept at your earliest convenience. Thank you!
Learn More | Help | Meeting options | Legal

Please note: Meeting area is accessible to the physically disabled. Anyone planning to attend who needs visual or audio assistance, should contact the County Clerk's Office, 294-4005, not later than 3 days before date of the meeting.

GREEN LAKE COUNTY
LAND USE PLANNING AND ZONING
COMMITTEE MEETING MINUTES
Thursday, May 2, 2024

CALL TO ORDER

Secretary Karissa Block called the meeting of the Land Use Planning and Zoning Committee to order at 9:01AM in the Green Lake County Government Center, County Board Room #0902, Green Lake, WI. The requirements of the open meeting law were certified as being met. Public access was available via remote programming as well as in person. The Pledge of Allegiance was recited.

Present: **Bill Boutwell, Curt Talma, Chuck Buss, Gene Thom**
Absent: **Harley Reabe**
Also Present: **Matt Kirkman,** Land Use Planning and Zoning Director; **Karissa Block,** Deputy County Clerk; **Noah Brown,** Land Use Specialist; **Jeff Mann,** Corporation Counsel; **Ryan Schinke,** Land Use Coordinator/Technician; **Cate Wylie**, County Administrator

ELECTION OF CHAIR AND VICE CHAIR

Motion/second (Boutwell/Talma) to elect Chuck Buss as Chair. Clerk asked for any other nominations. Motion carried with no negative vote.

Motion/second (Buss/Thom) to elect Bill Boutwell as Vice Chair. ***Motion/second (Buss/Thom)*** to close nominations and cast a unanimous ballot for Bill Boutwell. Motion carried with no negative vote.

Chair Buss took his spot as Chairman

APPROVAL OF MINUTES

Motion/second (Boutwell/Thom) to approve the minutes of the 04/12/2024 meeting. Motion carried with no negative vote.

DEPARTMENT ACTIVITY REPORTS

- Land Use & Septic Permits
- Violation Reports

Kirkman reviewed his reports

2024-25 COMPEHENSIVE PLAN AND FARMLAND PRESERVATION PLAN 10-YEAR UPDATE

The Planning and Zoning Department has been working on the text and demographics of the Farmland Preservation Plan. Kirkman shared that the Planning and Zoning Workshops will still be happening down the road.

ZONING ORDINANCE AMENDMENT

Motion/second (Boutwell/Thom) to adopt the Ordinance amending 350-65 B. Motion carried with no negative vote.
Motion/second(Thom/Boutwell) to amend Ordinance 350-77 due to word usage and definitions. Motion carried with no negative vote.

LAND USE PLANNING & ZONING COMMITTEE JULY MEETING TIME – 10:00AM, THURSDAY, JULY 11

The normal scheduled July meeting lands on July 4th. Do to that being a Holiday, the July meeting will be changed to Thursday, July 11th, at 10:00am.

PUBLIC COMMENT (3 MINUTE LIMIT) - None

Motion/second (Thom/Boutwell) to recess until the 9:30am hour. Motion carried with no negative vote.

Motion/second (Talma/Boutwell) to move back into session. Motion carried with no negative vote.

PUBLIC HEARING – 9:30AM

Chair Buss read the Public Hearing rules.

Item #1: Owner: S&L Holding, Location: Highway 23 & 49, Parcels: 004—00314-0200, -0300, -0400, & -0501. Legal Description: Lots 2,3,4, and Outlot 1 of CSM 1202, located in Section 15, T16N, R13E, Town of Brooklyn, ±3.88 acres. Request: The owners are requesting a Conditional Use Permit for a boat storage building, individual storage units, and a sales office.

Julie Thom, W1049 State Rd 23 49 spoke against item #1

Kirkman presented the Planning and Zoning report regarding Item #1

Motion/second (Boutwell/Thom) to suspend the rules to allow the applicant to speak. Motion carried with no negative vote.

Lee Garro,760 Prairie Pl, Green Lake WI, 54941 confirmed the size of the building.

Motion/second (Boutwell/Thom) to postpone Item #1 to retain further information. Motion carried with no negative vote.

Item #2: Owner: Robert and Janel Wustrack, Location: N6410 Forest Ridge Road, Parcel: 004-00275-0300. Legal Description: NE ¼ & NW ¼ of NW 1/4, located in Section 14, T16N, R13E, Town of Brooklyn, ±29.08 acres. Request: The owners are requesting a rezone from A1, Farmland Preservation District, to A2, General Agriculture District.

No comments from the public

Kirkman presented the Planning and Zoning report regarding Item #2

Motion/second (Talma/Boutwell) to approve the zoning change from A1, Farmland Preservation District, to A2, General Agriculture District. Motion carried with no negative vote.

Item #3: Owner: Christopher D. & Ruth M. Retzlaff, Agent: Michael McConnell, Kopplin & Kinas Co. Inc., Location: County Highway K and Searle Road, Parcels: 004-00789-0000 & 004-00792-0000. Legal Description: NE ¼ of SE ¼ and SE ¼ of SE ¼ , located in Section 36, T16N, R13E, Town of Brooklyn, ±80.0 acres. Request: The owners are requesting a Conditional Use Permit for a limestone quarry.

Chair Buss stated there will be a 15 minute limit on the public hearing portion for item #3. Chair Buss called for public comments.

Diane Mockridge, N5111 Skunk Ridge Lane Ripon WI spoke against Item #3

Christa Westerberg, 122 W Washinton Ave, Madison WI - represents the Green Lake Association and Green Lake Sanitary District. Christa spoke against the 15-minute limit and Item #3.

Mark Disown, W3299 Princeton Rd, Green Lake WI spoke against Item #3

Stephanie Prellwitz, Green Lake Association spoke against Item #3

Lura Lind, 118 Hall St spoke against Item #3

Burr Zaretsky N5602 County Rd A Green Lake WI, spoke against Item #3

Kirkman presented the Planning and Zoning report regarding Item #3

Motion (Thom) to deny Item #3. No second, motion fails.

Motion/second (Boutwell/Talma) to postpone the Conditional Use Permit for a limestone quarry. Motion carried with no negative vote.

Item #4: Owner: Christopher D. & Ruth M. Retzlaff, Agent: Michael McConnell, Kopplin & Kinas Co. Inc., Location: County Highway K and Searle Road, Parcels: 004-00789-0000 & 004-00792-0000. Legal Description: NE ¼ of SE ¼ and SE ¼ of SE ¼ , located in Section 36, T16N, R13E, Town of Brooklyn, ±80.0 acres. Request: The owners are requesting a Non-metallic mining reclamation permit for a limestone quarry.

Michael McConnell – Agent for the applicant spoke for an extension on Item #4.

Christa Westerberg – Representing Green Lake Association and Green Lake Sanitary district spoke for an extension on Item #4.

Debby Zaretsky, 344 Lac Verde Circ, Green Lake, WI spoke against item #4

Mark Bierman N6345 Forest Ridge Rd, spoke in favor of item #4

Burr Zaretsky N5602 County Rd A, spoke against item #4

Kirkman presented the Planning and Zoning report regarding Item #4

Motion/second (Boutwell/Talma) to postpone Item #4. Motion carried with no negative vote.

Motion/second (Boutwell/Talma) to suspend the rules to allow Steve Gaffield to present for a limit of 10 minutes. Motion carried with no negative vote.

Steve Gaffield, Professional Engineer from Madison, WI presented.

COMMITTEE DISCUSSION

a. Next meeting date – June 6, 2024 @ 9:00AM
b. Future agenda items for action & discussion

ADJOURN
Chair Talma adjourned the meeting at 10:49am.

Respectfully submitted,

Karissa Block
Deputy County Clerk

Land Use Permits: 4/1/2024 - 4/30/2024

Town of Berlin

Permit Number	Parcel Number	Site Address	Issued Date	Owner Name	Estimated Cost	Project_1 Type/SubType	Project_1 Description	Project_2 Type/SubType	Project_2 Description
13630	002002100000	N8822 WHITE RIDGE RD	04/01/2024	CYNTHIAJ GRISWOLD, KIRKW GRISWOLD	765000	Accessory Structure - Porch	Front Porch	Accessory Structure - Porch	Screen Porch

Town of Brooklyn

Permit Number	Parcel Number	Site Address	Issued Date	Owner Name	Estimated Cost	Project_1 Type/SubType	Project_1 Description	Project_2 Type/SubType	Project_2 Description
13620	004010040100, 004010040200	W2209 HICKORY RD , W2219 HICKORY RD	04/05/2024	HICKORY ROAD REAL ESTATE LLC	204600	Land Disturbing Activity - Driveways	W2219 Permeable Paver Driveway to House	Accessory Structure - Attached Deck/Patio	W2219 Roadside Patio
13626	004010040200	W2219 HICKORY RD	04/08/2024	HICKORY ROAD REAL ESTATE LLC	30000	Accessory Structure - Attached Deck/Patio	Wrap around Deck Replacement		
13628	004004430300	W2354 STATE ROAD 23	04/15/2024	JULI REALTY LLC	38000	Principal Structure - Single Family	Mobile home concrete slab lot in 402	Principal Structure - Single Family	Mobile home concrete slab lot in 406
13631	004005390400, 004019040000	W1020 CRYSTAL LN , No Address Available	04/02/2024	LISA BARANOWSKI CONESA REVOCABLE TRUST, LISABARANOWSKI CONESA REVOCABLE TRUST	76000	Accessory Structure - Fence	72 inch tall perimeter fence and gates. 72 inch back chain link fence and aluminum fence as shown in the site plan.		
13633	004009440100	N5111 LAWSON DR	04/05/2024	AMERICAN BAPTIST ASSEMBLY	5000	Accessory Structure - Accessory Structure	10 x 10 outdoor grilling platform with a roof and 14 x 10 concrete slab.		
13636	004005290000	N5861 COUNTY ROAD A	04/11/2024	CAROL DIETSCHE, RODNEY DIETSCHE	30000	Accessory Structure - Attached Deck/Patio	Deck	Accessory Structure - Stairs/Walkway	Deck Stairs
13640	004018330000	W1721 NORTH ST	04/16/2024	KARLAJ MASEK	21000	Accessory Structure - Porch	120 sq ft porch with wooden deck and a roof.		

Town of Green Lake

Permit Number	Parcel Number	Site Address	Issued Date	Owner Name	Estimated Cost	Project_1 Type/SubType	Project_1 Description	Project_2 Type/SubType	Project_2 Description
13635	006013350000	N3018 N KEARLEY RD	04/10/2024	CRYSTALL COLLIEN, LAWRENCEE COLLIEN	14000	Accessory Structure - Attached Deck/Patio	Replacement Patio	Accessory Structure - Stairs/Walkway	Stair Replacement
13639	006014810000	W2676 OAKWOOD BEACH RD	04/16/2024	JOCELYNL MCLEOD, MICHAELJ MCLEOD	27500	Accessory Structure - Attached Deck/Patio	Replacement of existing wrap around deck 557sqft		
13641	006001270000	N4145 LAKEVIEW RD	04/16/2024	BEUTHIN FAMILY RECREATIONAL TR	20000	Accessory Structure - Shed	Shed with Lean To		
13642	006005500000	N2983 E LITTLE GREEN RD	04/18/2024	BRANDONW SOSINSKY	25000	Land Disturbing Activity - Impervious Surface Treatment Device	2 3/4 inch clear stone infiltration basins	Land Disturbing Activity - Driveways	Driveway 1000sqft
13644	006011090000	N5051 COUNTY ROAD A	04/18/2024	MARGARETM RENS, MASON RENS	36000	Ag. Structure - Agricultural Building	Barn 1440 sq ft	Accessory Structure - Sign	small sign hung on a post. Est 4-5 sq ft

Town of Kingston

Permit Number	Parcel Number	Site Address	Issued Date	Owner Name	Estimated Cost	Project_1 Type/SubType	Project_1 Description	Project_2 Type/SubType	Project_2 Description
NONE									

Town of Mackford

Permit Number	Parcel Number	Site Address	Issued Date	Owner Name	Estimated Cost	Project_1 Type/SubType	Project_1 Description	Project_2 Type/SubType	Project_2 Description
13638	010002780000	W720 HICKORY DR	04/16/2024	JEFFREY S & MARGARET ANN STUCKERT JOINT SURVIVOR TRUST	80000	Accessory Structure - Agricultural Building	Agricultural pole barn with steel siding and concrete slab.		
13649	010001281002	W1823 E MANCHESTER ST	04/26/2024	ANDREWL VIS, JESSICA VIS	595000	Principal Structure - Single Family	New home with attached garage.		

Town of Manchester

Permit Number	Parcel Number	Site Address	Issued Date	Owner Name	Estimated Cost	Project_1 Type/SubType	Project_1 Description	Project_2 Type/SubType	Project_2 Description
13646	012001040100	N2127 MARQUETTE RD	04/19/2024	WILBUR M & EDNA A BONTRAGER	15000	Accessory Structure - Agricultural Building	Milk building addition	Accessory Structure - Agricultural Building	New agricultural building for storage

Town of Marquette

Permit Number	Parcel Number	Site Address	Issued Date	Owner Name	Estimated Cost	Project_1 Type/SubType	Project_1 Description	Project_2 Type/SubType	Project_2 Description
13648	014002850300	W6984 PUCKAWAY RD	04/25/2024	MARK B & LAURA A MILLER	25000	Accessory Structure - Attached Deck/Patio	Deck		

Town of Princeton

Permit Number	Parcel Number	Site Address	Issued Date	Owner Name	Estimated Cost	Project_1 Type/SubType	Project_1 Description	Project_2 Type/SubType	Project_2 Description
13643	016003920500, 016003920800, 016003920900, 016003921000, 016003930000, 016003930100, 016003940000, 016003950000, 016003960000, 016003970200, 016003970300, 016003970500, 016003970601, 016003980200, 016003980400, 016005090000, 016005180500, 016011450000, 016011510000, 016011520000, 016011530000, 016011540000, 016011600000, 016011610000, 016011630000, 016011650000, 016011710000, 016011750000, 016015210000, 016015220000, 016015240000, 016003920100, 016003920200, 016003920400, 016005070000, 016005300100, 016011410000, 016011420000, 016011550000,	N4708 RADTKE RD , N4712 RADTKE RD , N4648 WILDWOOD LN , N4622 WILDWOOD LN , N4694 RADTKE RD , N4698 RADTKE RD , N4684 RADTKE RD , N4680 RADTKE RD , N4628 STATE ROAD 73 , N4558 N LILL AVE , N4570 N LILL AVE , N4546 N LILL AVE , N4578 N LILL AVE , N4550 N LILL AVE , N4554 N LILL AVE , N4460 STATE ROAD 73 , N4459 STATE ROAD 73 , N4423 S LAKESHORE DR , N4410 NELSON RD , N4418 NELSON RD , W3751 1ST ST , W3754 1ST ST , N4472 NELSON RD , N4488 NELSON RD , W3743 SWANSONS RD , N4389 S LAKESHORE DR , W3747 SWANSONS RD , N4370 NELSON RD , N4434 S LAKESHORE DR , N4430 S LAKESHORE DR , N4424 S LAKESHORE DR , No Address Available, No Address Available, No Address Available, N4489 NELSON RD , W3729 CENTER ST , N4445 S LAKESHORE DR , N4441 S LAKESHORE DR , N4436 NELSON RD , W3750 2ND ST , N4464 NELSON RD , N4395 S LAKESHORE DR , N4383 S LAKESHORE DR , N4377 S LAKESHORE DR , N4369 S LAKESHORE DR , N4359 S LAKESHORE DR , N4380 NELSON RD , N4356 NELSON RD , N4350 NELSON RD , N4342 NELSON RD , N4332 NELSON RD , N4326 NELSON RD , N4442 S LAKESHORE DR , N4412 S LAKESHORE DR , N4408 S LAKESHORE DR , N4365 S LAKESHORE DR , N4602 WILDWOOD LN , N4530 N LILL AVE, N4740	04/19/2024	ANDERSON IRREVOCABLE TRUST FOR THE BENEFIT- LANCE C ANDERSON, CABIN AT NELSON ROAD LLC, DAK FARMER TRUST, LFMZ W101 LLC, QUIMBY BAY PROPERTY OWNERS ASSOCIATION INC, STEVENSON REVOCABLE LIVING TRUST, SWANSON'S SUBDIVISION INC, WADE WICKUS PROPERTIES LLC, WESLEE WICKUS PROPERTIES LLC, AARON KNIEF, ALAN C & ROSANNE HAVAICH, ALISA BENDICKSON, ALLYSOND CAYCE 2012 REVOCABLE TRUST, ANN BARRETT 2020 LIVING TRUST, AUDRA YENTZ, CARYLA WITT, CHRISTINEE SMITH, CHRISTOPHERD RETZLAFF, CRAIG MOLDENHAUER, DAMONM LYON, DANIELJ MAY, DARLAC TRUE, DEBORAHA JAMISON ROGERS, DEBORAH A JAMISON ROGERS, EUGENEE ANDERSON, FATHER JOHN PRICE LIVING TRUST, FREDERICK CEDERHOLM REVOCABLE TRUST, GAILK ANDERSON, GAIL K ANDERSON , GARY L & ROBERTA A BENTILLA LIIVNG TRUST, GORDON & DOROTHY WINDAU TRUST, GREGORY & MARGARET SWANSON, HAROLDE WICKUS	50000	Other - Transmission Main	29 Bore pit/tie-in pits 27 Padmount Transformer 2 Junction Box 13 Pedestals		

13645	016003490700, 016003770000, 016015620100, 016015680000, 016015710000, 016015750000, 016015770000, 016003490000, 016003490100, 016003490300, 016003490400, 016003560000, 016003780000, 016003800000, 016010390000, 016015630000, 016015690000, 016015720000, 016015730000, 016015750100, 016015750200, 016015760000, 016015790000, 016015800000, 016015820000, 016017210000, 016003500300, 016003790000, 016003790100, 016003790201, 016003490800, 016015780000	W3655 BEYERS COVE RD , W3647 BEYERS COVE RD , N4760 N LAKESHORE DR , N4784 N LAKESHORE DR , N4796 N LAKESHORE DR , N4820 N LAKESHORE DR , N4840 N LAKESHORE DR , N4863 N LAKESHORE DR , W3644 BEYERS COVE RD , N4851 N LAKESHORE DR , N4867 N LAKESHORE DR , N4871 N LAKESHORE DR , W3653 BEYERS COVE RD , No Address Available, N4815 N LAKESHORE DR , N4764 N LAKESHORE DR , N4792 N LAKESHORE DR , N4802 N LAKESHORE DR , N4808 N LAKESHORE DR , N4826 N LAKESHORE DR , N4830 N LAKESHORE DR , N4836 N LAKESHORE DR , N4846 N LAKESHORE DR , N4854 N LAKESHORE DR , N4862 N LAKESHORE DR , W3704 BEYERS COVE RD , W3690 BEYERS COVE RD, No Address Available, No Address Available, No Address Available, W3645 BEYERS COVE RD, No Address Available	04/19/2024	, ANDERSON TRUST NO 2012, KSMWP CO RESIDENTIAL LAND TRUST AGREEMENT, ZIMBAL FAMILY TRUST, AMANDAL KONG, ANNEC LINNE, BRAD HERBOLSHEIMER, DARRIN S KUEHN, DEREK BOYCE, DESIREETRUST BRUSH, ELIZABETH M KNEESEL, ERVIN H JR VOSS, GLENNA RYNES QUALIFIED PERSONAL RESIDENCE TRUST, GLORIAJ REINDL, GLORIAS HILLS SEPARATE PROPERTY TRUST, HENRY F & BETTE J DUSEL TRUST, JAMES PETTINGER, JAMESD LINNE, JAMESR ZIMBAL SURVIVORS TRUST, JAMIE HAAS, JOHNCHRISTOPHER TOLBERT, JOHND TOLBERT, JOHN H JR & PAMELA A ROBISON, JULIE LISTON, KELLY HACKBARTH, KENT S& NANCY M ANDERSON MULLIGAN, KIMBERLEE BOYCE, KYLEW KLARICH REVOCABLE LIVING TRUST, KYLE W & MARK J KLARICH REVOCABLE TRUST, LARA HERBOLSHEIMER, LEE KITTELSON, LYNN OLIJNYK, MARTHAA ZIMMERMAN TRUST, MARTINF GREIF, MATTHEW D & ASHLEY A SCHWABERO, MICHAELC SELINKA, MICHAEL F STARSHAK, MYRON &	50000	Other - Transmission Main	24 Bore pit/tie-in pit 16 Padmount Transformer 2 Junction Box 10 Pedestal 2 Power Poles		
13647	016012910100	N4193 S LAKESHORE DR	04/19/2024	MARYB PURVES, STEVENW PURVES	240000	Additions / Alterations - Addition/Alteration to Principal Structure	Addition house	Additions / Alterations - Addition/Alteration to Accessory Structure	Concrete floor to the existing shed
13653	016011690000	N4365 S LAKESHORE DR	04/29/2024	MICHAELG BESHEL	330000	Principal Structure - Single Family	1770sqft 3 Bedroom SFD	Accessory Structure - Porch	Covered Porch

Town of Saint Marie

Permit Number	Parcel Number	Site Address	Issued Date	Owner Name	Estimated Cost	Project_1 Type/SubType	Project_1 Description	Project_2 Type/SubType	Project_2 Description
13652	018005580100	W5397 COUNTY ROAD Y	04/30/2024	DEREKJ MASHUDA	550565	Accessory Structure - Attached Deck/Patio	Attached Deck	Accessory Structure - Attached Garage	Attached Garage

Town of Seneca

Permit Number	Parcel Number	Site Address	Issued Date	Owner Name	Estimated Cost	Project_1 Type/SubType	Project_1 Description	Project_2 Type/SubType	Project_2 Description
NONE									

April 2023 Estimated Cost: $7,293,300 — April 2024 Estimated Cost: $3,243,665.00

2023 YTD Estimated Cost: $17,581,983 — **2024 YTD Estimated Cost: $10,468,795.00**

Green Lake County Planning and Zoning

Sanitary Permits: 4/1/2024 - 4/30/2024

Permit Number	Parcel Number	Municipality	Address	Owners	Date Issued	Permit Type	SystemType	County Fee	DSPS FEE	Total cost to applicant
202424029	018005580100	Town of St. Marie	W5397 COUNTY ROAD Y	DEREKJ MASHUDA	4/29/2024	Reconnect	Conventional (Non-Pressurized	280		280
2.02E+08	016011220000	Town of Princeton	N4595 ELM ST	KYROND SENNER	4/22/2024	New System	Holding Tank	355	100	455
202424027	014001720000	Town of Marquette	W5156 PINE RD N	RANDAL R ET AL HEINECKE	4/23/2024	Replacement Tank Only	Conventional (Non-Pressurized	150		
202424026	010001281002	Town of Mackford	W1823 E MANCHESTER ST	ANDREWL VIS, JESSICA VIS	4/22/2024	New System	Conventional (Non-Pressurized	280	100	380
202424022	016005910000	Town of Princeton	W5850 LOSINSKI RD	MARINA SCHMIDT, ROBERT SCHMIDT, ROBERT C JR	4/8/2024	Replacement System	Conventional (Non-Pressurized	280	100	380
202424023	002000210000	Town of Berlin	N9390 WILLARD RD	RPB TRUST	4/8/2024	Replacement System	Mound	280	100	380
202424019	004010040100	Town of Brooklyn	W2209 HICKORY RD	HICKORY ROAD REAL ESTATE LLC	4/22/2024	Replacement System	Holding Tank	355	100	455
202424020	004010040200	Town of Brooklyn	W2219 HICKORY RD	HICKORY ROAD REAL ESTATE LLC	4/22/2024	Replacement System	Holding Tank	355	100	455
202424024	020002250100	Town of Seneca	N8886 BIG ISLAND RD	GERALD F & SHERI L TROCHINSKI	4/18/2024	Replacement System	Holding Tank	355	100	455
202424030	004011450000	Town of Brooklyn	W881 SUMMIT CT	KURTE DUPPLER, SUSANM MUELLER	4/30/2024	New System	Mound	280	100	380
202424018	016014580000	Town of Princeton	N5129 FOX RIVER LN	REBECCA GRASER, SCOTT GRASER	4/1/2024	Reconnect	Holding Tank	560		560
202424021	016007320100	Town of Princeton	N5668 SODA RD	JAMES STEINMETZ, JEAN STEINMETZ	4/8/2024	Reconnect	Conventional (Non-Pressurized	280		280
202424028	002000630300	Town of Berlin	N9417 32ND DR	CONNIE STREBELINSKI, RICHARD STREBELINSKI	4/29/2024	Replacement System	Conventional (Non-Pressurized	280	100	380
	Total Permits Issued: 12						Total:	4090	900	4840

May, 2024

Land Use Violations Report

First Notice

Parcel Number	Site Address	Owner Name	Permit #	Violation Type	Violation Description
014005110201	N2875 Nicolet Rd	Carolyn & Corneal Troyer	13383	Zoning, Junk	Movement of mobile home and construction of basement without a permit. Inoperable camper/mobile home and trailer/trailer frame. Junk includes: plastic drums, metal drums, ac unit, chest freezers, appliances, propane tanks, bins, buckets, lumber, etc. scattered throughout property. 3 boats on property when two rec vehicles allowed on R-4 zoned parcel. Waiting on certified mail receipt. Otherwise will have Sheriff's deputy serve the notice.

Second Notice

Parcel Number	Site Address	Owner Name	Permit #	Violation Type	Violation Description
002002260200	W282 County Road V	Stanley Hallman	13532	Zoning, POWTS	No LUP for conversion of Ag building to house, No reconnection permit for sanitary system, House not being lived in by owner / operator of the farm.
014001810000	N4356 PINE RD E	PAUL PETERSEN	13618	Zoning	3 Recreational Campers in A-1, Farmland Preservation District
008004680000	W6502 STATE ROAD 44	Carolee Miller	13533	Shoreland	No LUP and building within the shoreland setback. Certified Mailing -unclaimed resent through S.O.

Sent to Corp. Counsel

Parcel Number	Site Address	Owner Name	Permit #	Violation Type	Violation Description
004003750100	N6264 N lawson Dr	David Santee	13356	Zoning	Establishing a residence without a conditional use permit on C-2 parcel.
004003750100	N6264 N Lawson Dr	David Santee	13460	Zoning	Operating a long term rental in a zoning district that does not allow long term rentals as an allowed use.
020004510000, 0200045	Hopp Road Right of way	Hopp	13395	Floodplain	Installed three sets of three culverts in 2008 without WDNR or County Zoning approval. Resolution is to remove all three sets of culverts to restore natural flooding conditions. Update: Joe said he would work with the Town's attorney to draft a legal letter to Mike Arrowhead of Walleyes for Tomorrow. The letter would be worded in such a way that Walleyes for Tomorrow will be responsible for removing the culvert sets on both parcels.

Monthly Violations Resolved	YTD Violations Resolved
3	9
Zink	
Logan	
Pomplun	

POWTS Violation Report 5/30/24

First Notice

Parcel Number	Site Address	Owner Name	Permit #	Violation Type	Violation Description	Violation Date	Mailing Addr	Add2	City	State	Zip	Zip4
008001790100	NA	Brezezinski	20200000081	Failing POWTS	composting toilet permit application. Pit	2/19/2024	509 LINWOOD AVE		STEVENS POINT	WI		
008004020000	W6712 Park View LN	Dorothy Yoder	00824056	POWTS Failure	Illegally installed holding tank of some kind.	5/23/2024	W6712 PARKVIEW LANE		DALTON	WI		
012005160100	N879 Lane 7	William Bontrager	00071169	POWTS Failure	Tank not watertight	4/24/2024	N879 LANE 7		MARKESAN	WI		
020002500400	W2635 Fox River	Harold Conn	00037515	POWTS Failure	growing into it. No longer watertight or	5/21/2024	7104 W 73RD PL		CHICAGO	IL		

Final Notice

Parcel Number	Site Address	Owner Name	Permit #	Violation Type	Violation Description	Violation Date	Mailing Addr	Add2	City	State	Zip	Zip4
002002391300	W768 OAK DR	MORK LYNN D & PAMELA K	000264879	POWTS Failure	Tank not watertight	4/16/2024	W768 OAK DR		BERLIN	WI	54923	

Corporation Counsel

Parcel Number	Site Address	Owner Name	Permit #	Violation Type	Violation Description	Violation Date	Mailing Addr	Add2	City	State	Zip	Zip4
004003750100	N6264 N LAWSON DR	SANTEE DAVID ROY	326	POWTS Failure	Drain field is failing and pump/float wiring is not legal.	1/31/2024	N6264 N LAWSON DR		GREEN LAKE	WI	54941	
006001980000	W591 THOMAS RD	WILKE CARL H	00624010	POWTS Failure	Tank not Watertight	5/18/2022	W591 THOMAS RD		RIPON	WI	54971	8660
006010220701	W1740 SANDSTONE AVE	WOOD MAUREEN ; WOOD SIMON	000159178	POWTS Failure	Tank not watertight	10/22/2019	120 LAKEWOOD CIRCLE		WILLO WBRO OK	IL	60527	
006010221104	N5107 SANDSTONE AVE	VANDERVELDE NANCY	00624041	POWTS Failure	Tank not watertight	6/29/2023	387 SCOTT ST		GREEN LAKE	WI	54941	
006010221105	N5113 SANDSTONE AVE	VANDERVELDE NANCY	00624042	POWTS Failure	Tank not watertight	6/16/2023	387 SCOTT ST		GREEN LAKE	WI	54941	
008005940000	W6521 W NORTH ST	BARKER RHONDA K	000000011	POWTS Failure	Tank Failure	10/27/2021	PO BOX 114		KINGST ON	WI	53939	
014001720000	W5156 PINE RD N	HEINECKE RANDAL R ET AL	26724	POWTS Failure	Tank Failure	11/8/2019	5531 ST ANTHONY RD		WEST BEND	WI	53090	
016000090000	N6123 SWAMP RD	HEBBE JAMES A	01624006	POWTS Failure	Tank not Watertight	4/26/2022	W1531 BLUFFTON RD		GREEN LAKE	WI	54941	
016004630000	N4487 MAPLE LN	KLEIN JUSTIN T	58848	POWTS Failure	Tank not Watertight	8/5/2022	1623 E SUNSET DR	APART MENT 103	WAUKE SHA	WI	53189	
016007700000	W5897 STATE ROAD 23	HAZELWOOD WANETTA ET AL	26752	POWTS Failure	Tank Failure	8/13/2019	7849 N EDGEWORTH DR		MILWA UKEE	WI	53223	
016008010300	N5587 LOCK RD	WEIHBRECHT JEREMY WAYNE; WEIHBRECHT TAMI LYNN	000037516	POWTS Failure	Tank not Watertight	8/26/2022	2385 KEY WAY		GREEN BAY	WI	54313	
016008320000	N5528 COUNTY ROAD T	WEIR LAVERNE J	01624079	POWTS Failure	Tank not Watertight	12/12/2023	C/O BARBARA MORRISON	535 FENTO N ST	RIPON	WI	54971	
016009230000	W5894 WALTER WILLIAMS RD	PROG ROD- GUN CLUB	010024095	POWTS Failure	Tank unsound	6/24/2020	TREASURER	PO BOX 288940	CHICAG O	IL	60628	
016009230000	W5886 WALTER WILLIAMS RD	PROG ROD- GUN CLUB	010024249	POWTS Failure	Tank unsound	6/24/2020	TREASURER	PO BOX 288940	CHICAG O	IL	60628	
016009230000	N4922 RAY SHORTER RD	PROG ROD- GUN CLUB	010024256	POWTS Failure	Tank Failure	5/29/2021	TREASURER	PO BOX 288940	CHICAG O	IL	60628	
016009230000	N4904 RAY SHORTER RD	PROG ROD- GUN CLUB	010024259	POWTS Failure	Tank compromised	6/24/2020	TREASURER	PO BOX 288940	CHICAG O	IL	60628	
016015530000	N4164 NANCY DR	RUBACH RYAN W	000018212	POWTS Failure	Effluent discharging to ground surface	9/13/2023	N4164 NANCY DR		MARKE SAN	WI	53946	

Ingenuity, Integrity, and Intelligence.

April 26, 2024

Gerald Stanuch
GIS Specialist/LIO
Green Lake County
920-294-4174
gstanuch@greenlakecountywi.gov

Dear Gerald:

Thank you for the opportunity to submit a proposal for orthoimagery for Green Lake County as a part of the Wisconsin Regional Orthoimagery Consortium (WROC). We understand that Green Lake County would like to obtain new 4-band digital orthoimagery to enhance and update the County's GIS base mapping layers and to support its land information needs and the needs of its partners. This letter describes the project approach and fees for 6-inch pixel orthoimagery across the County. The Wisconsin-based WROC contracting team of Ayres Associates and NV5 Geospatial will provide the following services.

Proposed Project Services – Orthoimagery

We understand Green Lake County's need to update its orthoimagery base layer, and its desire to do this as part of WROC. Aerial imagery acquisition, processing, and ortho delivery will occur in 2025. We are proposing a county-wide 6-inch pixel orthoimagery project, with options for 3-inch buy-ups for the municipalities and towns that are interested in higher resolution orthos.

Scope of Work

The Ayres team will provide the County with 3-band and 4-band orthoimagery at 6-inch pixel resolution across 380 square miles which is countywide coverage. See Exhibit A for a map of the entire project area. The 4-band orthoimagery will be developed from aerial imagery that is acquired using a calibrated, digital photogrammetric camera, during spring leaf-off spring conditions.

The delivered orthoimagery will consist of GeoTIFF tiles based on PLSS sections (or other tile format agreed upon). Additionally, we will provide MrSID compressed tiles and a project-wide mosaic. The 6-inch orthoimagery will conform to ASPRS Level 2 standards for 1" = 100' scale mapping with an orthoimage ground sample distance (GSD) of less than 6 inches. The orthoimagery will be produced to meet or exceed a horizontal accuracy of 1.4-feet RMSE.

Orthoimagery DEM

We will use a digital elevation model (DEM) derived from the countywide LiDAR collected in 2018, which is suitable to achieve the stated accuracy standards for 6-inch orthoimagery. Our technicians will carefully review the DEM and make updates where necessary.

Ground Control

The Ayres team will collect airborne GNSS and an inertial measurement unit (IMU) data from equipment that is tightly coupled with the digital camera sensor. In addition, we will perform ground control survey for the project at existing control locations or photo-identifiable points.

4-band Orthoimagery

As part of our aerial imagery collection, the near-infrared (NIR) band will be captured along with the RGB natural color bands. We are proposing 4-band stacked GeoTIFF and MrSID files in our standard delivery. These datasets can be viewed in either natural color or color infrared (CIR) band configurations in a single file, rather than creating multiple datasets. Optional 3-band (RGB) .sid tiles and countywide mosaic is being included for this project.

Orthoimagery Project Deliverables:

Deliverable products included in the proposal are as follows:

- 4-band ortho tiles in uncompressed GeoTIFF format
- 4-band ortho tiles in G4 MrSID format
- 3-band ortho tiles in G3 MrSID format
- 4-band project-wide mosaic in G4 MrSID format
- 3-band project-wide mosaic in G3 MrSID format
- Ortho tile index in vector format
- Ground control locations in vector format
- Metadata, FGDC compliant

Municipal Buy-up Options:

Municipalities have the option to buy up to 3-inch pixel resolution orthos as part of your countywide project. Under this approach, any buy-up areas are extended favorable WROC pricing because the aircraft and sensor system will be in the County for the 6-inch countywide flight. In return, the County gains access to higher resolution orthos over the urban areas or other townships of interest. We can provide WROC unit pricing for municipal buy-up areas upon your request.

Partner Funding:

Partner funding assistance to consortium members has proven as an effective way to aid in the funding of WROC projects. Established relationships with partners from previous consortium efforts present the opportunity of continued funding assistance to WROC program members.

Additionally, by starting our WROC efforts early, our team is successfully securing new partners at the local, regional, and state levels to provide a larger, more diverse group of funding partners. In the end, organizations of all sizes, from the public and private sector will contribute to the funding assistance success of WROC. Partner cost shares will be disbursed to the county after completion of the project.

Additional Services – Digital Surface Modeling

Ayres can produce a countywide DSM from the County’s 2018 lidar with the high vegetation and unclassified points removed. The resulting raster DEM would be created using ground and building classes. We will review and cleanup and significant anomalies in the building classification. However, minor anomalies will remain in the classification across the county. The resulting DSM would be delivered in tiles and a countywide mosaic in GeoTIFF format.

Proposed Fees – Orthoimagery and Additional Services:

The following orthoimagery fee is a not-to-exceed amount that is calculated using WROC unit pricing. The proposed fees do not include cost shares from WROC partners. Partner funding that is secured through WROC will be provided to the County to help reduce the overall cost of this project.

Geospatial services:

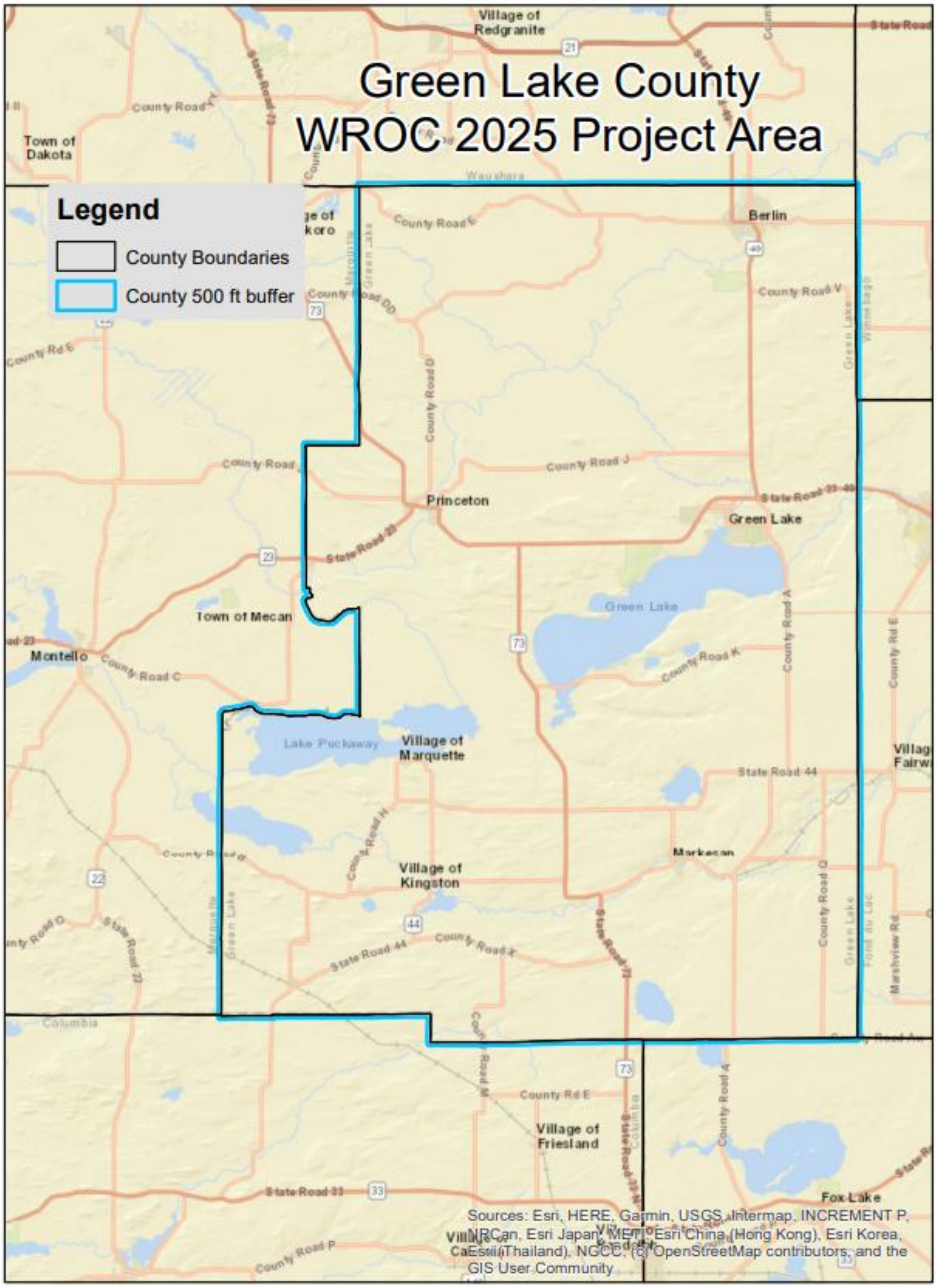
County-wide 4-band orthos, 6-inch pixel resolution:	$ 28,880.00
Lidar generated DSM with vegetation removed:	$ 3,500.00
Total not-to-exceed fees:	$ 32,380.00

I hope that we have provided the information you require to proceed with planning for your WROC project in 2025. In the event that you require additional information or clarification on the proposal details, please feel free to contact me at 608.443.1207.

Sincerely,

Ayres Associates Inc
Zachary Nienow, GISP
Manager – Aerial Mapping
NienowZ@AyresAssociates.com

Exhibit A



Green Lake County
WROC 2025 Project Area
Legend
County Boundaries
County 500 ft buffer
Village of Redgranite
Town of Dakota
Berlin
Princeton
Green Lake
Town of Mecan
Montello
Lake Puckaway
Village of Marquette
Village of Kingston
Markesan
Village of Friesland
Fox Lake
Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

GREEN LAKE COUNTY
BUDGET REQUEST FOR LINE ITEM TRANSFER

Date: 4/29/2024
Department: Land Use Planning & Zoning
Amount: $ 2,199.46
Budget Year Amended: 2023

Recording information
Batch no:
Date:

From Account

Account #	Account Name	Current Budget	Transfer Amount	YTD Expenditures	New Budget
23-100-10-53610-151-000	Social Security	$ 24,701.00	$ 2,013.73	$ 22,134.87	$ 22,687.27
					$ -
23-100-10-53610-310-000	Office Supplies	$ 1,290.00	$ 24.92	$ 1,159.80	$ 1,265.08
					$ -
23-100-10-53610-210-003	Miscellaneous Fees	$ 300.00	$ 160.81	$ 80.00	$ 139.19
					$ -
					$ -
Total Transfer			$ 2,199.46		

To Account

Account #	Account Name	Current Budget	Transfer Amount	YTD Expenditures	New Budget
23-100-10-53610-154-000	Health Insurance	$ 65,459.00	$ 1,910.58	$ 67,369.58	$ 67,369.58
23-100-10-53610-155-000	Life Insurance	$ 321.00	$ 103.15	$ 424.15	$ 424.15
					$ -
23-100-10-53610-242-000	Print Management	$ 300.00	$ 24.92	$ 324.92	$ 324.92
					$ -
23-100-10-56310-352-000	Vehicle Maintenance	$ 838.00	$ 160.81	$ 9,988.81	$ 998.81
Total Transfer			$ 2,199.46		

Explanation for Transfer:
Transfer funds to cover accounts that went over budget in 2023.

Department Head Approval: [signature] **Date:** 4-30-24
Finance Director Approval: [signature] **Date:** 5/1/2024
County Administrator Approval: [signature] **Date:** 5/2/2024
Governing Committee Approval: **Date:**

Revised 02/2024

GREEN LAKE COUNTY
BUDGET CARRYOVER DOCUMENTATION

Carryover Fund: Land Information
Department: LUPZ - Land Information
Name: Gerald Stanuch

Recording information
Batch no:
Date:

Carryover type: ☑ Restricted ☐ Committed ☐ Assigned

Purpose of the Carryover:

These funds can only be used for certain types of tasks: PLSS (survey markers for sections); Find ways for public to access land information; Land information training. Funds come from state grants and the revenue from RoD. The grants run for two years and oftentimes the expenses carry beyond year end.

What accounts impact the remaining balance in the carryover account?

	Account #	Account Name	Amount	
Beginning Balance	23-101-20-51711-999-000	Land Information (Restricted)	$	157,971.41
Revenue Accounts	23-100-20-43691-301-000	WLIP Education Grant	$	1,000.00
	23-100-20-43691-000-000	Land Info Bd (Base) Grant	$	65,152.00
	23-100-20-43691-301-001	WLIP Strategic Grant	$	70,000.00
	23-100-20-46131-000-000	County Land Records (from RoD)	$	28,377.00
			$	-
Expenditure Accounts	23-100-20-51711-240-000	Base Grant	$	70,378.53
	23-100-20-51711-301-000	Strategic Grant	$	60,000.00
	23-100-20-51711-246-000	Education Grant	$	1,776.05
	23-100-20-51711-120-000	Retained Fees	$	34,352.57
			$	-
End of Year Balance	23-101-20-51711-999-000	Land Information (Restricted)	$	155,993.26

Subject Matter Expert: Gerald Stanuch **Date:** 4-30-2024

Department Head Approval: Matt Kirkman **Date:** 4-30-2024

Finance Director Approval: Kenneth J Stephens **Date:** 5/1/2024

County Administrator Approval: [signature] **Date:** 5/2/2024

Governing Committee Approval: **Date:**

Revised 02/2024

GREEN LAKE COUNTY
BUDGET CARRYOVER DOCUMENTATION

Carryover Fund: **Non-Metallic Mining**
Department: **Land Use Planning & Zoning**
Name: **Matt Kirkman**

Recording information

Batch no:	
Date:	

Carryover type: ☑ Restricted ☐ Committed ☐ Assigned

Purpose of the Carryover:

Per NR 135.39 Fees (4)(b)1: Fees collected by the regulatory authority under this section shall be used only for reasonable expenses associated with the administration of this chapter. Land Use Planning and Zoning tracks there time and materials used on the non-metallic mining work and documents that revenue and expenditures annually. An entry to record the allocated costs is posted in the GL each year.

What accounts impact the remaining balance in the carryover account?

	Account #	Account Name	Amount
Beginning Balance	23-101-10-53610-999-000	Carryover - Non-Metallic Mining	$ 15,000.00
Revenue Accounts	23-100-10-44409-000-000	Non-Metallic Mining Revenue	$ 19,550.00
Adjustement to get the	total to the calculated rollover amount	- adjustment from 2022-23 carryover	$ 43,787.74
			$ -
Expenditure Accounts	23-100-10-53610-312-001	Non-Metallic Mining Expense	$ 11,029.74
			$ -
			$ -
End of Year Balance	23-101-10-53610-999-000	Carryover - Non-Metallic Mining	$ 67,308.00

Subject Matter Expert: Matt Kirkman **Date:** 5-1-24

Department Head Approval: Matt Kirkman **Date:** 5-1-24

Finance Director Approval: Kemit Ketter **Date:** 5/1/2024

County Administrator Approval: **Date:** 5/2/2024

Governing Committee Approval: **Date:**

Revised 02/2024

GREEN LAKE COUNTY

BUDGET CARRYOVER DOCUMENTATION

Carryover Fund: Professional Services - Land Development

Department: Land Use Planning & Zoning

Name: Matt Kirkman

Recording information

Batch no:	
Date:	

Carryover type: ☐ Restricted ☐ Committed ☑ Assigned

Purpose of the Carryover:

Used to pay for Comprehensive Plan and Farmland Preservation Plan updates. Update occur every 10 years. Being updated for 2026. Fund come from Levy dollars, however, we are not currently levy any funds for this project.

What accounts impact the remaining balance in the carryover account?

	Account #	Account Name	Amount
Beginning Balance	23-101-10-53610-999-004	Professional Services - Land Development	$ 38,445.07
Revenue Accounts	none		$ -
			$ -
Expenditure Accounts	none		$ -
	should allocate costs to wages in 2024		$ -
	because Matt Kirkman is doing the		
	Comprehensive Plan and the		
	Farmland Presevation Plan for 2026		$ -
End of Year Balance			$ 38,445.07

Subject Matter Expert: Matt Kirkman **Date:** 5-2-24

Department Head Approval: Matt Kirkman **Date:** 5-2-24

Finance Director Approval: Kermott J. Stetan **Date:** 5-2-2024

County Administrator Approval: [signature] **Date:** 5/3/2024

Governing Committee Approval: **Date:**

Revised 02/2024

NOTICE OF PUBLIC HEARING

The Green Lake County Land Use Planning and Zoning Committee will hold a public hearing in County Board Room #0902 of the Green Lake County Government Center, 571 County Road A, Green Lake, WI, on ***Friday June 14, 2024, at 9:30 a.m.*** related to the following requests:

Item #1: Owner: Kyle M. Miller, **Location:** W2786 County Road I, **Parcel:** 012-00211-0300. **Legal Description:** Part of the E ½ of SW ¼ , located in Section 12, T14N, R12E, Town of Manchester, ±14.1 acres. **Request:** The owners are requesting a Conditional Use Permit for a commercial greenhouse to grow, store, and sell trees and shrubs.

Item #2: Owner: Dennis R. Moldenhauer & Kelly L. Moldenhauer, **Location:** Toledo Road and County Highway H, **Parcel:** 014-00854-0000. **Legal Description:** Lot 1 of CSM 1137, located in Section 34, T15N, R12E, Town of Marquette, ±10.5 acres. **Request:** The owners are requesting a rezone from A1, Farmland Preservation District, to A2, General Agriculture District.

Item #3: Owner: Nancy L. Hynes, **Agent:** Melanie Cody, **Location:** Irving Park Road and Hickory Road, **Parcel:** 004-00723-0000. **Legal Description:** Lot 1 of CSM 205, located in Section 30, T16N, R13E, Town of Brooklyn, ±.55 acres. **Request:** The owners are requesting a rezone from R1, Single-Family Residence District, to RC, Recreation District.

Item #4: Applicant: Green Lake County Land Use Planning & Zoning Committee, **Request:** The committee is requesting an amendment to the Code of Green Lake County, Chapter 350, Zoning Ordinance; more specifically, to amend Section 350-65B., requiring a rural address or fire number prior to Land Use Permit issuance.

Item #5: Applicant: Green Lake County Land Use Planning & Zoning Committee, **Request:** The committee is requesting an amendment to the Code of Green Lake County, Chapter 350, Zoning Ordinance; more specifically, to amend Section 350-77 by adding the definition of ***caretaker***.

Item #6: Owner: Christopher D. & Ruth M. Retzlaff, **Agent:** Michael McConnell, Kopplin & Kinas Co. Inc., **Location:** County Highway K and Searle Road, **Parcels:** 004-00789-0000 & 004-00792-0000. **Legal Description:** NE ¼ of SE ¼ and SE ¼ of SE ¼ , located in Section 36, T16N, R13E, Town of Brooklyn, ±80.0 acres. **Request:** The owners are requesting a Conditional Use Permit for a limestone quarry.

Item #7: Owner: Christopher D. & Ruth M. Retzlaff, **Agent:** Michael McConnell, Kopplin & Kinas Co. Inc., **Location:** County Highway K and Searle Road, **Parcels:** 004-00789-0000 & 004-00792-0000. **Legal Description:** NE ¼ of SE ¼ and SE ¼ of SE ¼, located in Section 36, T16N, R13E, Town of Brooklyn, ±80.0 acres. **Purpose:** The owners have submitted a Non-metallic mining reclamation permit application.

All interested persons wishing to be heard at the public hearing are invited to attend. For further detailed information concerning this notice and for information related to the outcome of public hearing items, contact the Green Lake County **Land Use Planning and Zoning Department** at (920) 294-4156.

Publish: May 30, 2024

Item #1: Owner: Kyle M. Miller, **Location:** W2786 County Road I, **Parcel:** 012-00211-0300. **Legal Description:** Part of the E ½ of SW ¼ , located in Section 12, T14N, R12E, Town of Manchester, ±14.1 acres. **Request:** The owners are requesting a Conditional Use Permit for a commercial greenhouse to grow, store, and sell trees and shrubs.

Land Use Planning and Zoning Committee Staff Report

Public Hearing June 14, 2024

Item I: Conditional Use Permit (CUP)

Owner:	**Applicant:**
Kyle Miller	Same

Request: The owner/applicant is requesting a conditional use permit to grow, store, and sell trees and shrubs through a nursery.

Parcel Number/ Location: The request affects parcel 012-00211-0300 (±14.10 acres). The parcel is in the E ½ of the SW ¼ of Section 12, T14N, R12E, Town of Manchester. The site is located at W2786 County Road I.

Existing Zoning and Uses of Adjacent Area: The parcel referenced above are zoned A-1, Farmland Preservation District makes up ±14.10 acres. The property currently is undeveloped and used as farm field. Almost every parcel surrounding the subject property is zoned A-1. One parcel to the west is zoned as A-2, General Agriculture District. A parcel to the south is zoned as R-4, Rural Residence District. Most of the surrounding parcels are used agriculturally as farm field. There are some parcels that are used residentially with large open spaces of vacant land due to the Grand River floodplain and associated wetlands.

Additional Information/Analysis: The applicant wants to build a greenhouse with storage for plants and operational equipment. The green house would also contain an office. The applicant's plan is to be open to sell plants through the months of April to June. The applicant plans to slowly transition from farm field to nursery growth over a handful of years by slowly reducing the farm field size to grow more plants for sale through the nursery. The south side of the parcel is bordered by the Grand River so there is some wetland and floodplain areas on the property. These areas would have no structures. Shoreland and Floodplain ordinances apply to the subject parcel.

General Standards for Review of Conditional Use Requests: It is important that the Committee maintain the purpose and intent of the County Zoning Ordinance when reviewing and approving a request of this nature. The Committee shall take into consideration, among other things, the recommendation of the affected town and the particular facts and circumstances of each proposed use in terms of the standards found in Section 350-56 "Review of permit application; standards and conditions" of the County Zoning Ordinance. The Committee need not consider requirements that would apply to the local Town, other County, State or Federal entities of jurisdiction.

County Staff Comments: This request should be reviewed by the Committee to determine if it meets the general criteria for review as listed above. If the Committee wishes to approve this request, the following conditions may be appropriate:

1. No additional expansion or addition of structures and/or uses relating to this conditional use permit shall occur without review and approval through future conditional use permit(s).

2. With the exception of plants, shrubs, trees or other related items offered for sale, no outside storage of materials and other items is allowed.
3. Any outdoor lighting shall comply with Section 350-23 of the County Zoning Ordinance.
4. The applicant must obtain a Land Use Permit before any building construction starts.
5. A copy of the State-approved commercial building plans, if applicable, shall be provided to the LUP& Z Department prior to land use permit issuance.

Town of Manchester: The Town Board Action request for the Conditional Use Permit was sent to the Town Clerk on April 10, 2024.

Fee Received (Non-Refundable) 375 Date 2/26/24

By signing and submitting this completed application with public hearing fee, the applicant or agent requests the Land Use Planning & Zoning Committee consider the conditional use permit request at the next available public hearing.

PROPERTY OWNER / APPLICANT

Name Kyle Miller

Mailing Address 843 Barbara St Sun Prairie WI 53590

Phone Number 608 577 7951 Email kylemarkmiller@gmail.com

Signature [signature] Date 2/27/24

AGENT IF OTHER THAN OWNER

Name ______

Mailing Address ______

Phone Number ______ Email ______

Signature ______ Date ______

PROPERTY INFORMATION

Town of Manchester Location of Property W2786 County Rd I

Section 12 Town 14 N Range 12 E

Affected Parcel Number(s) 012-00211-0300 Affected Acres 14.1

Subdivision ______ Lot ______ Block ______

CSM ______ Lot ______ or COS ______

Legal Description ______

Current Zoning Classification A1

Present Use of Property: (List all current uses and improvements, i.e. home, store, farm field, wooded, etc.)

Farm Field with Creek on southern boarder.

PROPOSAL - Use separate or additional sheet(s) IF necessary

Describe **specifically** the nature of this request (List all proposed uses of the parcel.) What do you plan to do? Property will be used to grow, store and sell trees and Shrubs.

If this application is for a use that will be contained to a part of the parcel, specify the exact dimensions of the affected area. About 10 acres are currently Farmed by a local farmer. We will continue to allow this at smaller sizes each year

☐ If this box is checked, provide the following information:

Proposed use has additional minimum development standards in Section ______________.
Explain how your proposal meets or exceeds these requirements.

OPERATIONAL PLAN NARRATIVE

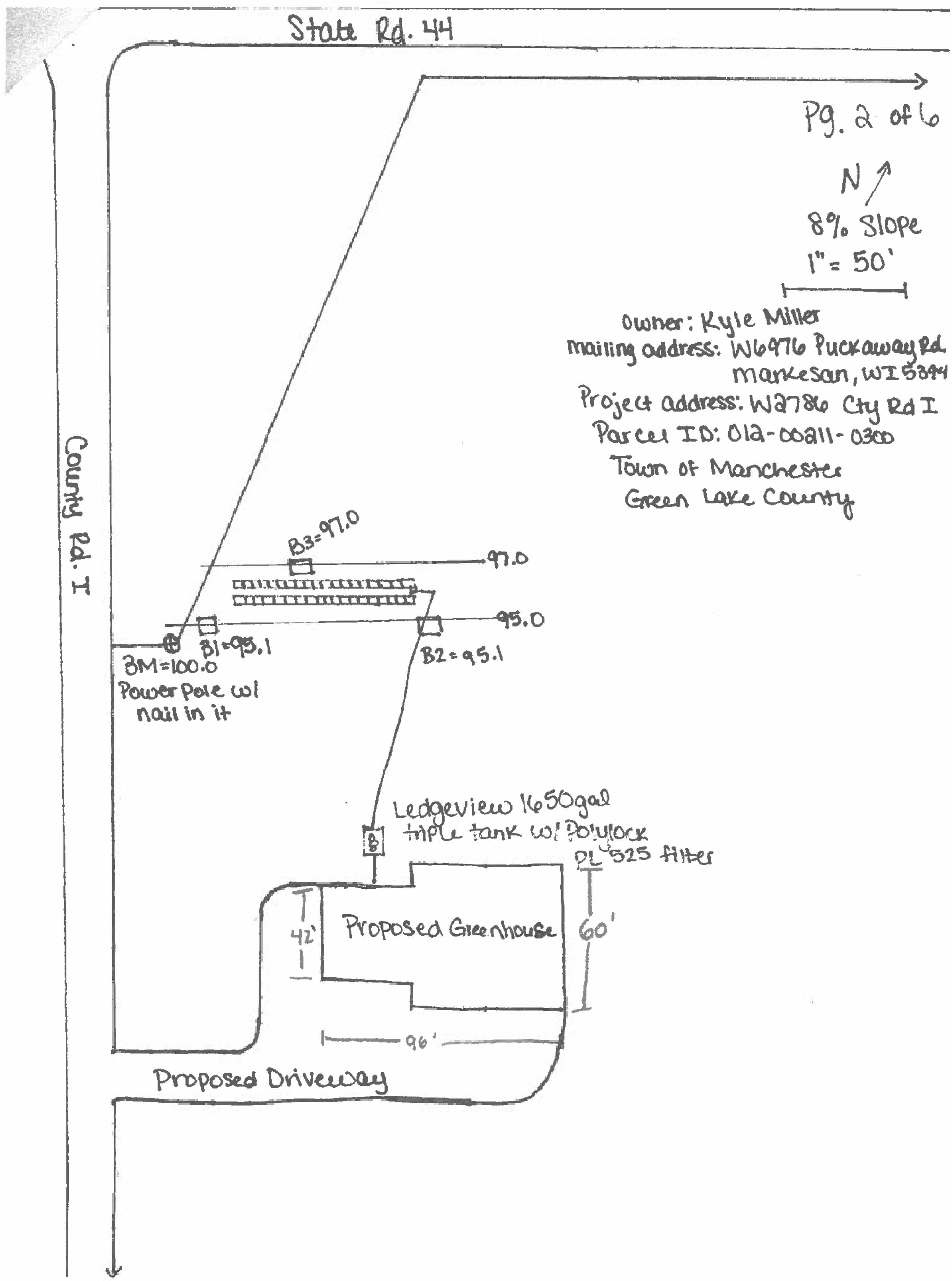
My wife and I run a small business - Tree Nursery. We had been looking for a small piece of land to run the business off of while expanding our offering and growing more plants. We intend to build a building to store our tractor/Equipment along with a refridgerated storage area for plant Material and an office area for my wife. She will work from the location during the week. We will be open each spring to sell plants April-June.

Our plan with the land is start planting trees/Shrubs this spring throughout the lowland and parts of the field. We will likely leave about 7-8 acres in Farm crops to start, working it down each year while We expand the area we grow product in.

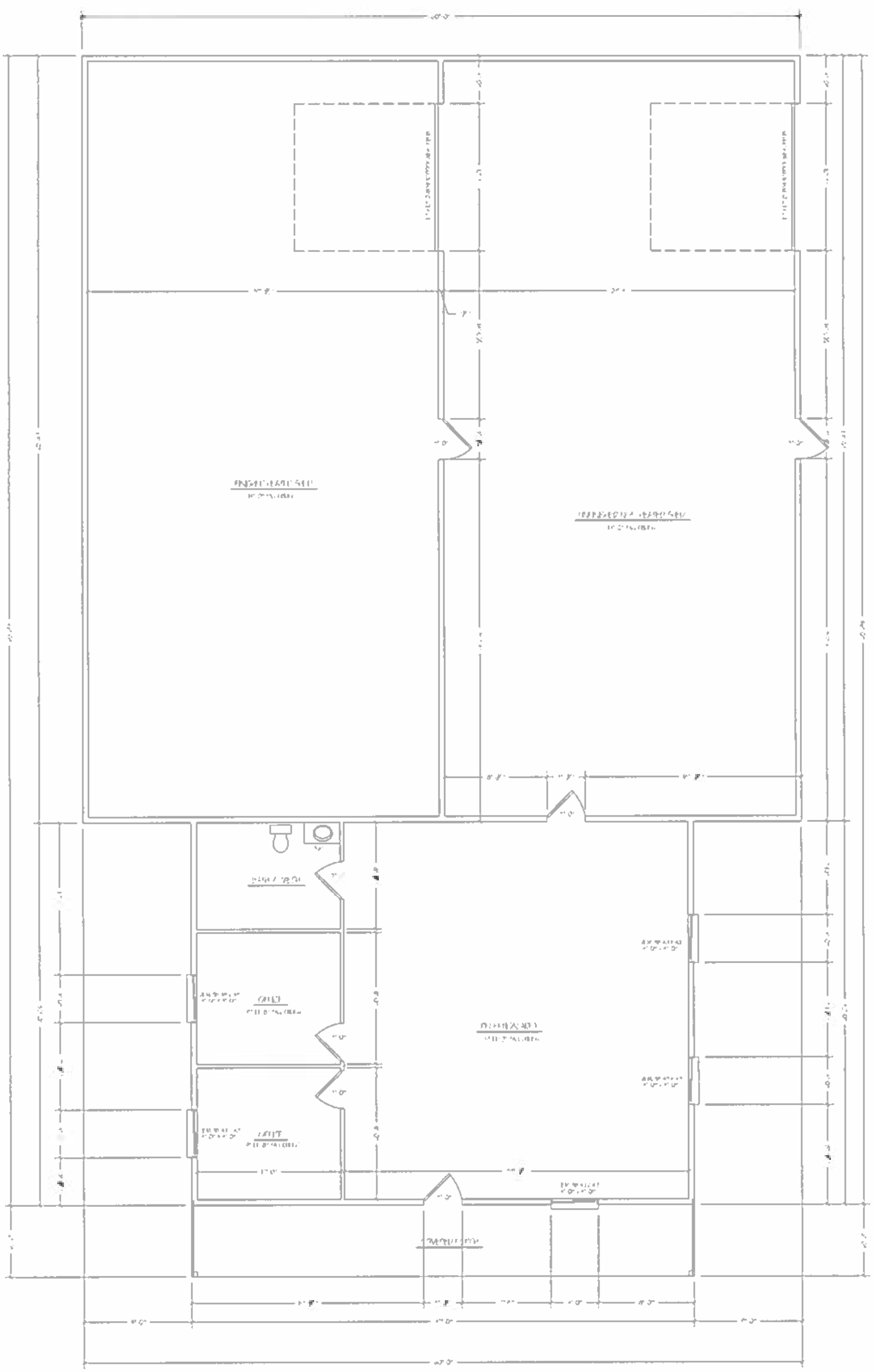
OPERATIONAL PLAN NARRATIVE (continued)

We choose the location as we wanted to be close to markesan and easy for people to access. We purchased it from our neighbor to the south, Darwyn Kelm. He knows our intentions and is excited to see product start to grow.

I don't believe thier will be any negatives to the area or community. In addition to growing product we also will be planting lots of native trees and shrubs to decorate the property and show people what mature examples of our product look like. The property will be well maintained and clean.



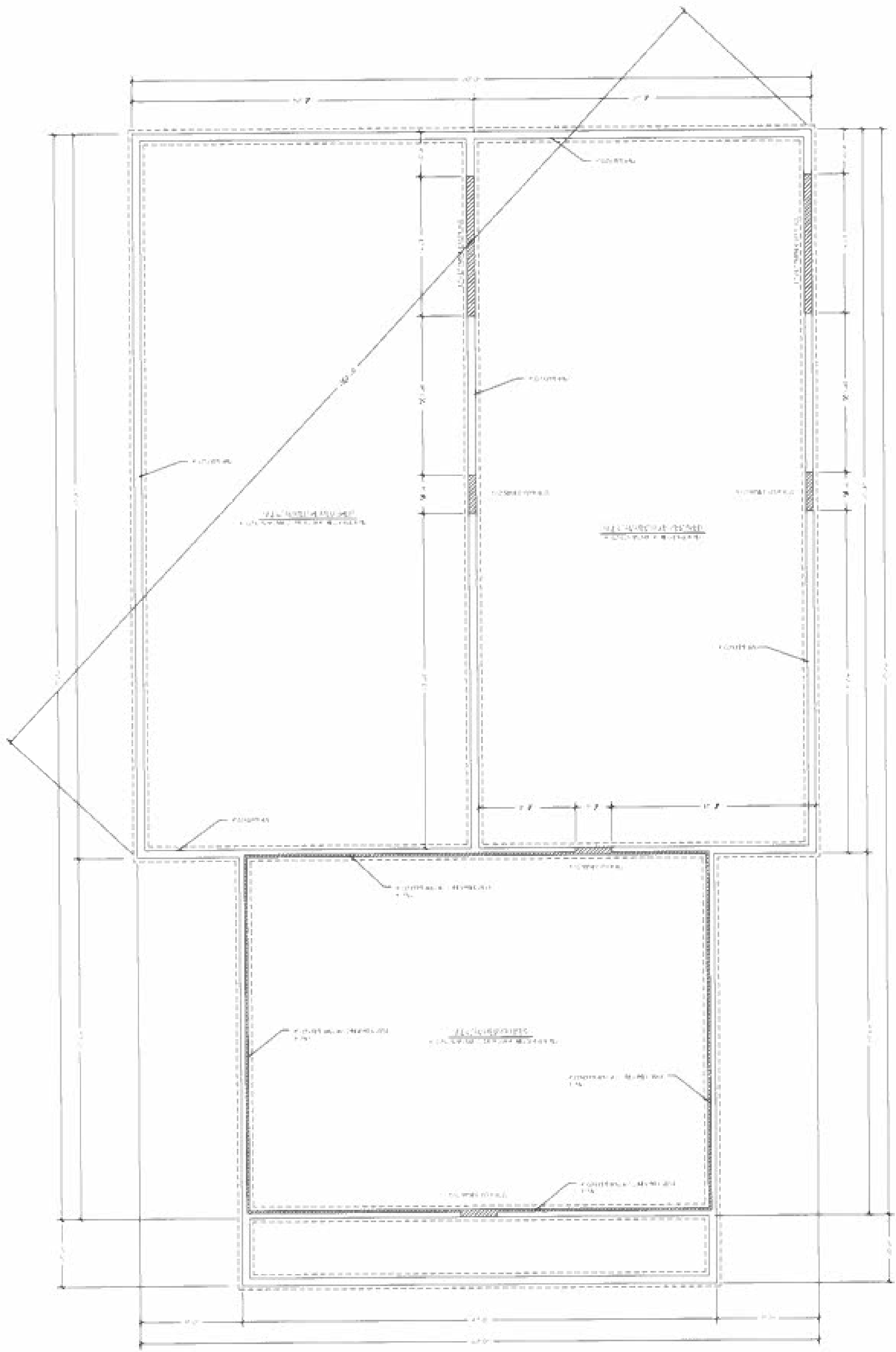
State Rd. 44
Pg. 2 of 6
N
8% Slope
1" = 50'
Owner: Kyle Miller
mailing address: W6976 Puckaway Rd
Markesan, WI 5394
Project address: W2786 Cty Rd I
Parcel ID: 012-00211-0300
Town of Manchester
Green Lake County
County Rd. I
B3=97.0
97.0
95.0
B1=95.1
B2=95.1
BM=100.0
Power Pole w/
nail in it
Ledgeview 1650gal
triple tank w/ Polylock
PL 525 filter
Proposed Greenhouse
42'
60'
96'
Proposed Driveway



PROJECT TITLE AND ADDRESS

Kyle Miller Shed Plan

NOTICE TO CONTRACTOR



PROJECT TITLE AND ADDRESS

Kyle Miller Shed Foundation

NOTICE TO CONTRACTOR

Kyle Miller Ag Shed Project

12/13/2023, 9:28:37 AM

Address Corner

TaxParcel

Section

SUB

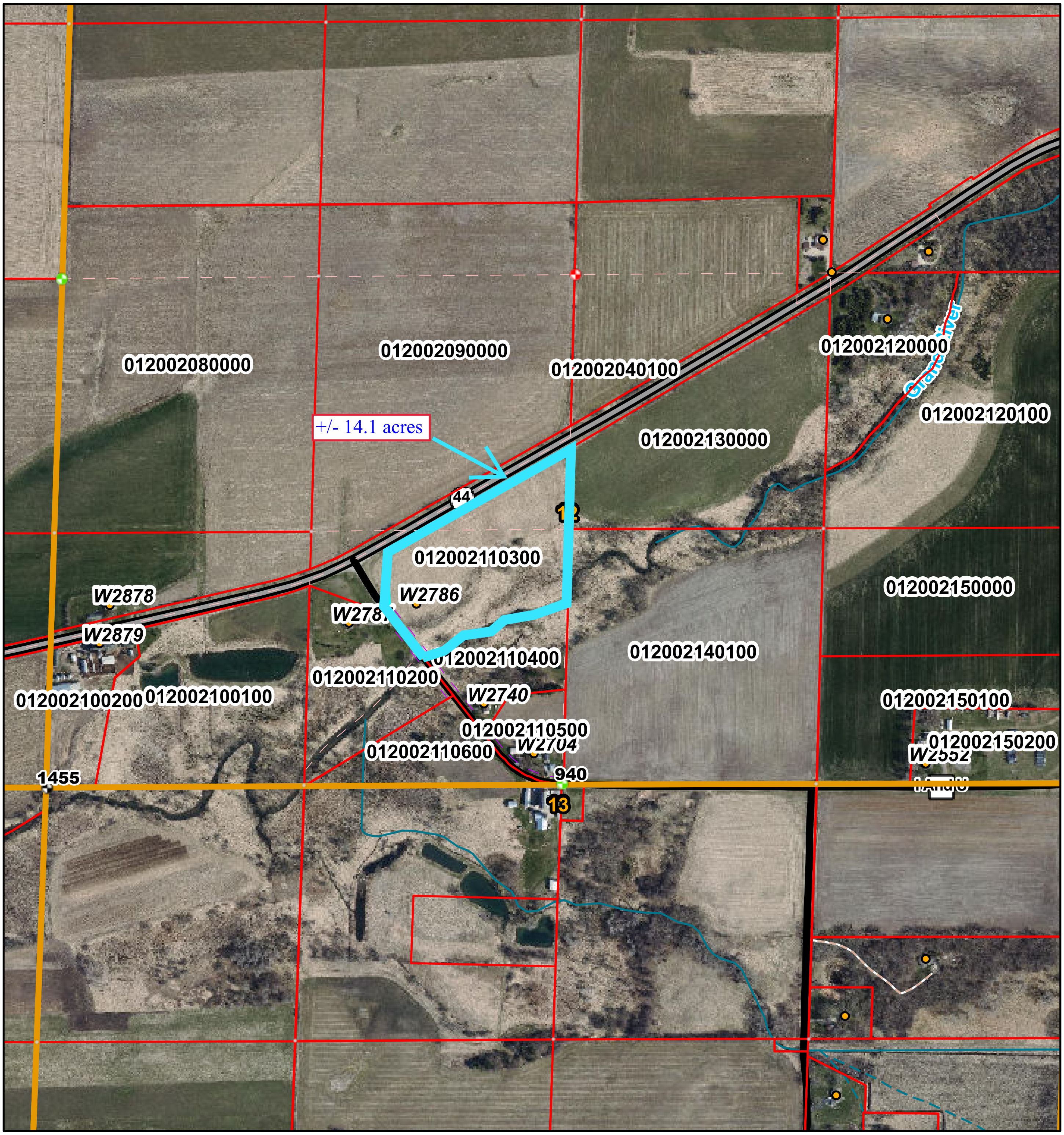
1:2,257

0 0.02 0.04 0.07 mi

0 0.03 0.06 0.12 km

Green Lake County, WI
www.greenlakecountywi.gov

Miller CUP Aerial Map



4/10/2024, 12:10:40 PM

Address Corner
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TaxParcel

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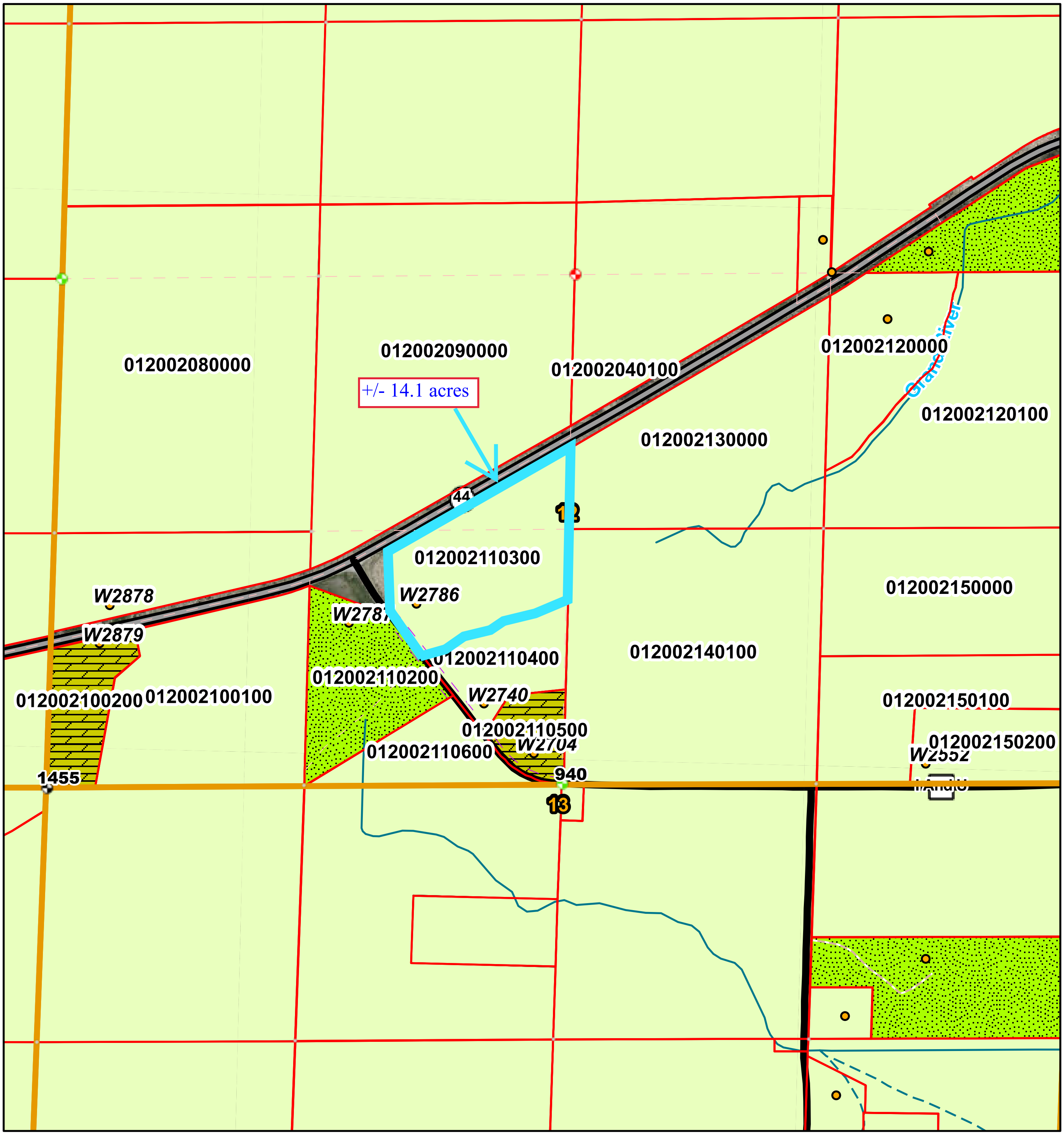
0 0.1 0.2 0.4 km

Green Lake County, WI
www.greenlakecountywi.gov

Miller CUP Zoning Map



4/10/2024, 12:21:04 PM

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TaxParcel

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Green Lake County, WI
www.greenlakecountywi.gov

DETERMINATION OF THE LAND USE PLANNING AND ZONING COMMITTEE

Public Hearing Date: June 14, 2024

Owner: Kyle M. Miller

Agent: same

Parcels: 012-00211-0300

Request: Conditional Use Permit for a commercial greenhouse to grow, store, and sell trees and shrubs.

Land Use Planning and Zoning Committee:

______________________ Chuck Buss, Chair	______________________ Harley Reabe
______________________ William Boutwell, Vice Chair	______________________ Curt Talma
______________________ Gene Thom	

Date signed: June 14, 2024

Committee vote: Ayes ____ Nays____ Abstain____ Absent____

☐ **Approve**

☐ **With the conditions (listed on page 2)**

☐ **Deny.**

☐ **Modify as follows:**

Conditions of Approval:

General Conditions:

1. No additional expansion or addition of structures and/or uses relating to this conditional use permit shall occur without review and approval through future conditional use permit(s).
2. With the exception of plants, shrubs, trees or other related items offered for sale, no outside storage of materials and other items is allowed.
3. Any outdoor lighting shall comply with Section 350-23 of the County Zoning Ordinance.
4. The applicant must obtain a Land Use Permit before any building construction starts.
5. A copy of the State-approved commercial building plans, if applicable, shall be provided to the LUP& Z Department prior to land use permit issuance.

Item #2: Owner: Dennis R. Moldenhauer & Kelly L. Moldenhauer, **Location:** Toledo Road and County Highway H, **Parcel:** 014-00854-0000. **Legal Description:** Lot 1 of CSM 1137, located in Section 34, T15N, R12E, Town of Marquette, ±10.5 acres. **Request:** The owners are requesting a rezone from A1, Farmland Preservation District, to A2, General Agriculture District.

LAND USE PLANNING AND ZONING COMMITTEE STAFF REPORT

PUBLIC HEARING June 14, 2024

ITEM II: ZONING CHANGE

OWNER:
Dennis R. & Kelly L. Moldenhauer

APPLICANT:
Same as Owner

REQUEST: The owners are requesting a zoning change for ±10.50 acres from A-1, Farmland Preservation District, to A-2, General Agriculture District.

PARCEL NUMBER / LOCATION: The request affects parcel number 014-00854-0000 (±10.50 acres). The parcel is located in the NE ¼ of the SW ¼ Section 34, T15N, R12E, Town of Marquette. The parcel is Lot 1 of Certified Survey Map 1137 V4 SEC 34.

EXISTING ZONING AND USES OF ADJACENT AREA: The current zoning of parcel 014-00854-0000 is A-1 Farmland Preservation and is used recreationally. The surrounding parcels are zoned A-1 Farmland Preservation and are used for agriculture and rural residential use. Within 1 mile there are two parcels zoned R-4 Rural Residential and one parcel zoned I – Industrial. There are several A-2 General Agricultural parcels within 2 miles of the property. About ±6 acres (57%) of the parcel are WI DNR mapped wetlands. About ±7.8 acres (74%) of the property falls under shoreland zoning due to a stream (WBIC 158800) running through the parcel. The proposed rezone area does not fall within floodplain jurisdiction. All the soils on the parcel as classified as type 2 soils, however they would require drainage to farm.

ADDITIONAL INFORMATION / ANALYSIS: The current use of the proposed rezone area is for forestry and recreation. The intention is to establish a residence on the parcel while maintaining the recreation and forestry uses on the rest of the property.

STATUTORY CRITERIA PER 91.48(1): Land may be rezoned out of a farmland preservation zoning district if all of the following are found after public hearing: **(Staff comments in bold)**

a) The land is better suited for a use not allowed in the farmland preservation zoning district. **±6 acres (or so) of this parcel are mapped as wetlands and have never been farmed. Farming these lands would require drainage of WI DNR mapped wetlands. It is clear that those lands are not suited to agriculture. The remaining ±4.5 acres of uplands have never been farmed and have no crop history. When examined as a whole (±10.5 acres), it could be argued that these lands are not suited to agricultural pursuits.**

b) The rezoning is consistent with any applicable comprehensive plan. **The proposed rezone is consistent with the county's comprehensive plan as it upholds the goals and objectives of the comprehensive plan, most prominently the goal to preserve the rural characteristic of the county. Further, there is no concern that valuable farmland will fall out of production as these lands have never been farmed nor should they be.**

c) The rezoning is substantially consistent with the county certified farmland preservation plan. **The overall goal of the county certified Farmland Preservation Plan is to maintain the integrity and viability of county agriculture…without damaging the economic and social environment or the natural resources..." Due to A-2's uses being agricultural in nature and not in conflict with agricultural lands and uses, it is staff's belief that the request does not negatively impact the integrity or viability of county agriculture and is, therefore, <u>substantially consistent with the county's certified Farmland Preservation Plan</u>.**

d) The rezoning will not substantially impair or limit current or future agricultural use of the surrounding parcels of land that are zoned for or are legally restricted to agricultural use. **The A-2, General Agriculture District is intended to preserve and enhance land for agricultural uses. The A-2 district is intended <u>not to impair or limit future agricultural use of surrounding parcels.</u>**

<u>TOWN OF Marquette</u>: An Action Form requesting the Town's input related to this zoning change request was sent to the Town Clerk on 4/10/2024.

Please type or use black ink

Return to: Green Lake County
Planning & Zoning Department
571 County Road A
Green Lake, WI 54941
(920) 294-4156

GENERAL APPLICATION

Fee 375.00 (not refundable) Date 3-20-2024

Zone Change from A1 to A2

Conditional Use Permit for ——

Other ——

PROPERTY OWNER / APPLICANT (1)

Name Dennis R. Moldenhauer

Mailing Address W5073 Cowgill Rd. Rio, WI 53060

Phone Number 1-608-445-7602

Signature [signature] Date 3-19-2024

PROPERTY OWNER / APPLICANT (2)

Name Troy E. Moldenhauer

Mailing Address 373 Conkey St. Burlington WI 53105

Phone Number 1-262-210-4841

Signature [signature] Date 3/19/24

PROPERTY INFORMATION

Town of Marquette Parcel Number(s) 014-00854-0000

Acres 10.5 Lot 1 Block — Subdivision CSM 1137

Section 34 Town 15 North Range 12 East

Location of Property Toledo Rd

Legal Description Lot 1 of CSM 1137, Town of Marquette

Current Zoning Classification A1 Current Use of Property Undeveloped Wooded parcel.

Detailed Description of Proposed Use Owner intends on building a home on the property. Zoning ordinance requires a "farm" if in A1; A2 zoning does not.

PLEASE PROVIDE A DETAILED SITE PLAN WITH THE APPLICATION

Fees: Zone Change $375.00
Conditional Use Permit $375.00
Special Exception $375.00
Variance/Appeal $375.00

PZZ-311 (12/03)

Moldenhauer Property

2/26/2024, 10:55:25 AM

Address Corner
SUB
Section
CENTER
TaxParcel

1:2,257

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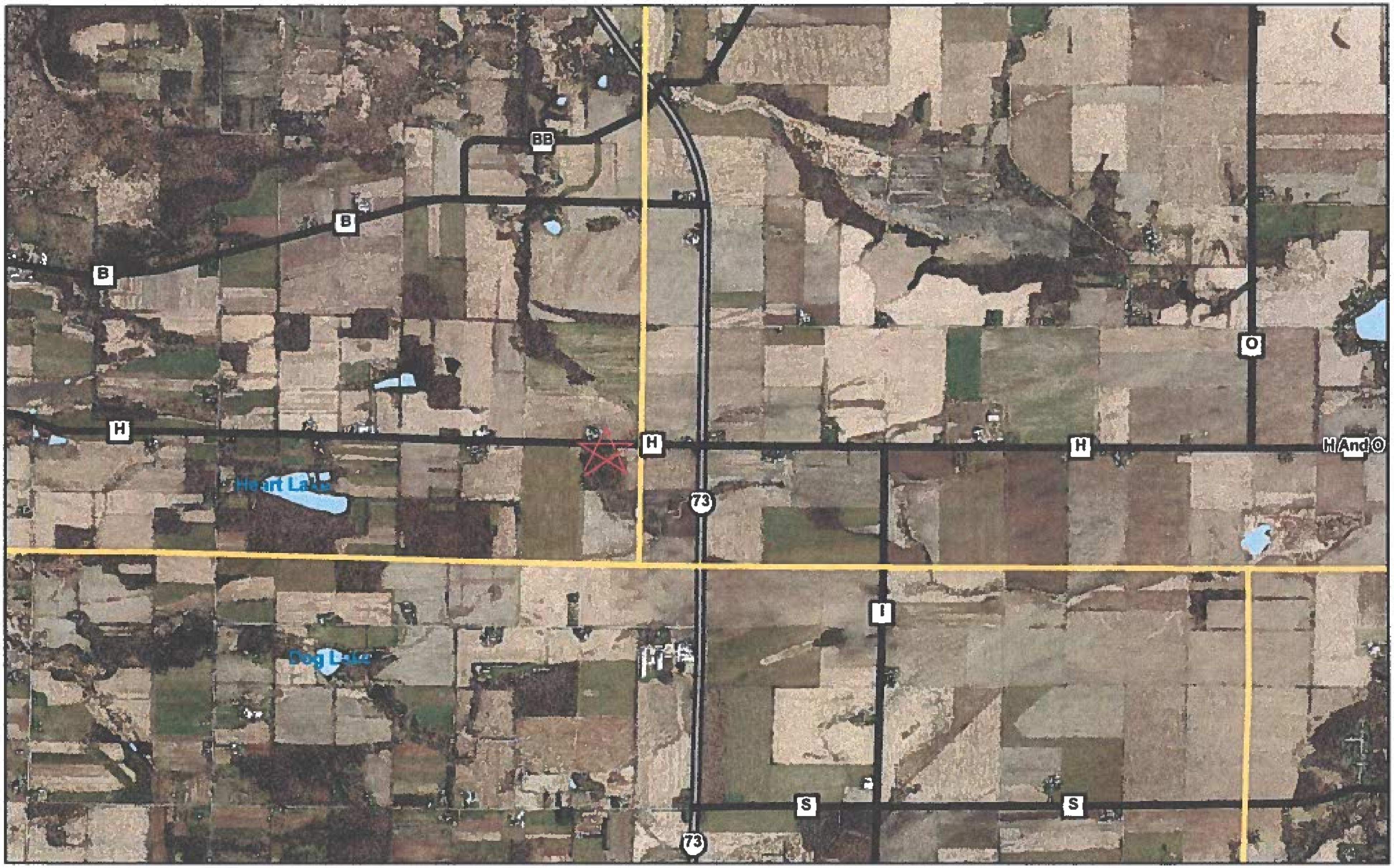
0 0.03 0.06 0.12 km

Green Lake County, WI
www.greenlakecountywi.gov

Moldenhauer Property



2/26/2024, 11:04:41 AM

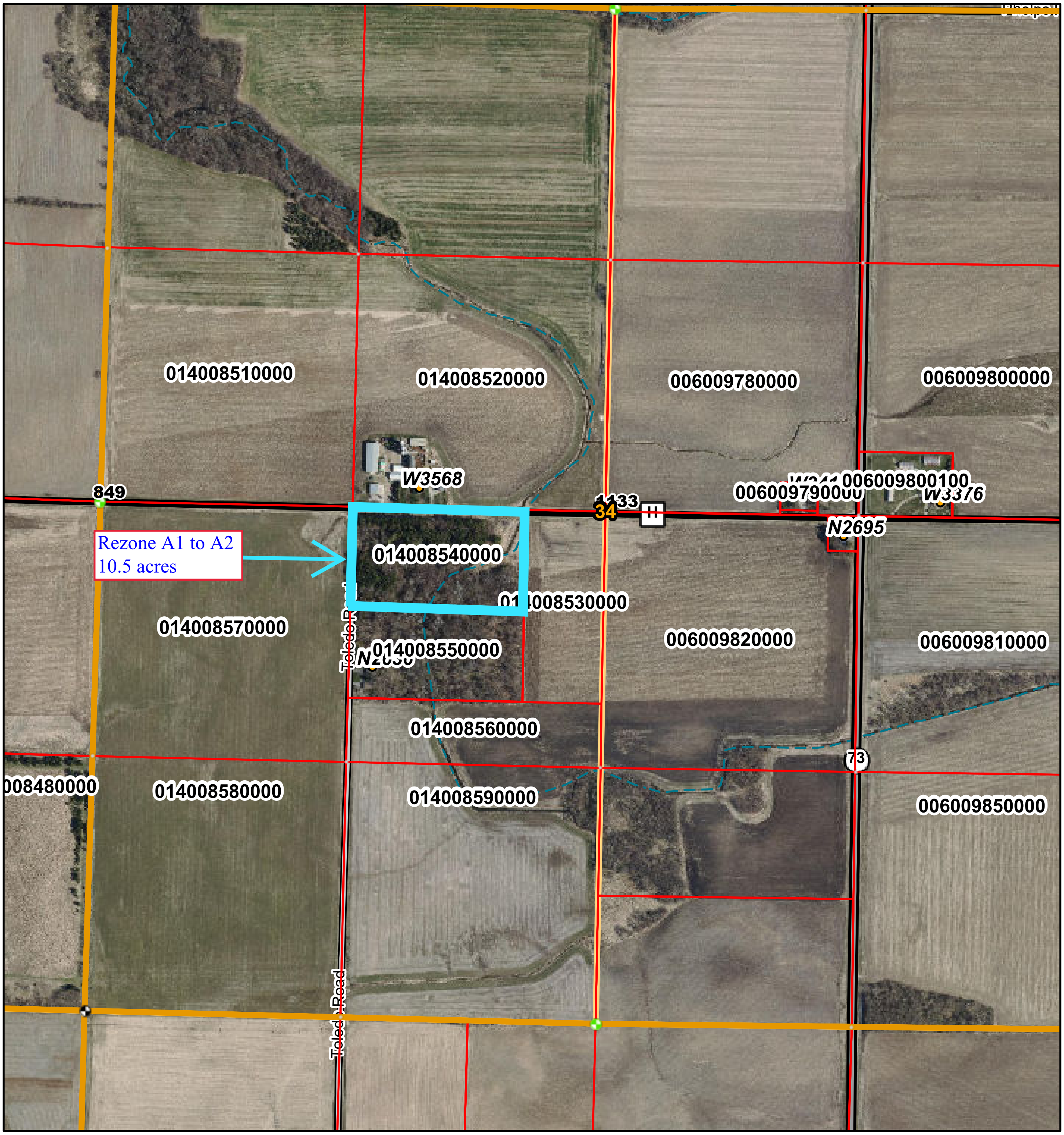
1:36,112

0 0.3 0.6 1.2 mi

0 0.5 1 2 km

Green Lake County, WI
www.greenlakecountywi.gov

Moldenhauer Rezone Aerial Map



4/10/2024, 1:39:12 PM

Address Corner · QUARTER · Section · SECTION · CENTER · TaxParcel · SUB

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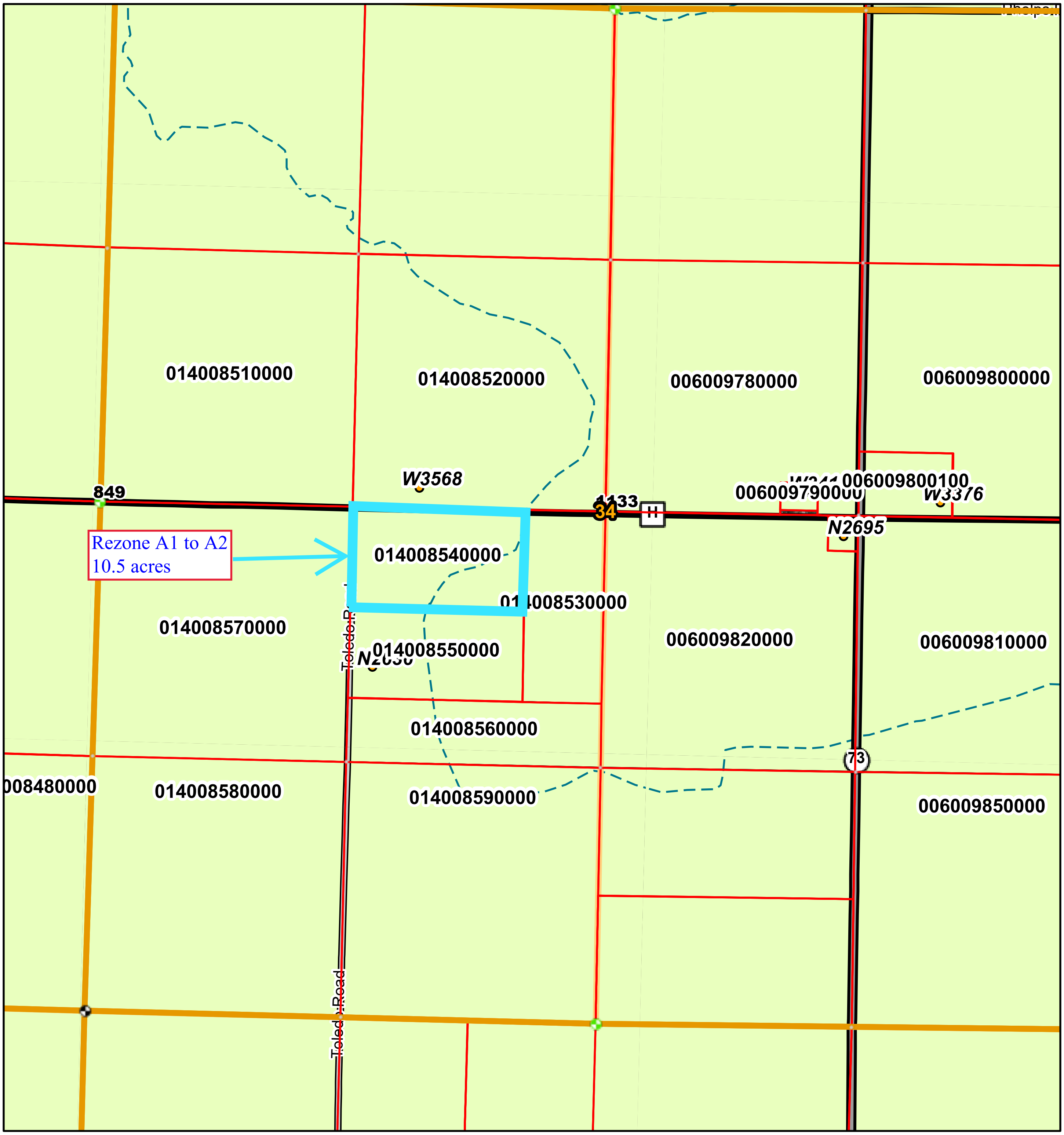
Green Lake County, WI
www.greenlakecountywi.gov

Moldenhauer Rezone Zoning Map



4/10/2024, 1:43:36 PM

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TaxParcel

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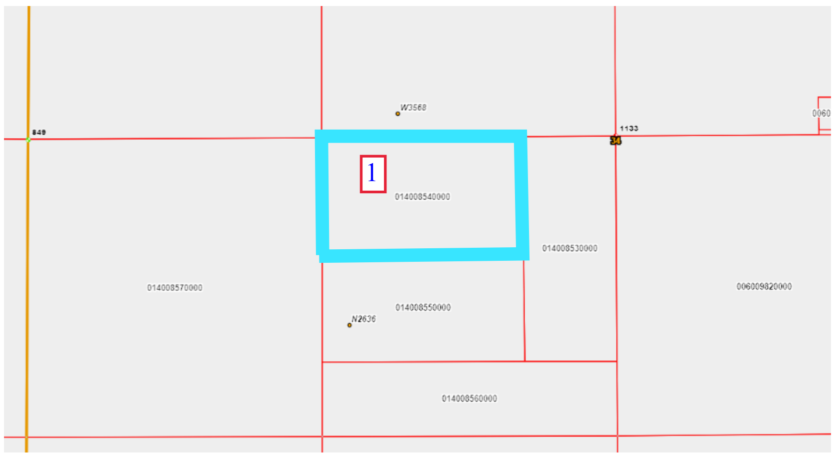
0 0.1 0.2 0.4 km

Green Lake County, WI
www.greenlakecountywi.gov

Dennis R. & Troy E. Moldenhauer
Town of Marquette
Toledo Road, Parcel #014-00854-0000
Lot 1 of CSM 1137 in Section 34, T15N, R12E

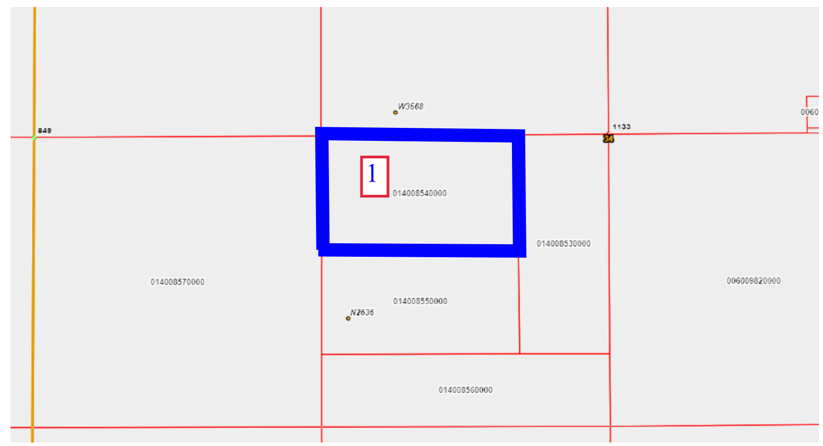
Existing Configuration

1 = 10.5-acre parcel zoned A1, Farmland Preservation District.



Proposed Configuration

1 = 10.5-acre parcel zoned A2, General Agriculture District.



Land Use Planning & Zoning Public Hearing 6/6/2024

ORDINANCE NO. –2024

Relating to: Rezone in the Town of Marquette
Owner: Dennis R. Moldenhauer & Kelly L. Moldenhauer

The County Board of Supervisors of Green Lake County, Green Lake, Wisconsin, duly assembled at its regular meeting begun on the 18th of June 2024, does ordain as follows:

NOW, THEREFORE, BE IT ORDAINED that the Green Lake County Zoning Ordinance, Chapter 350 as amended, Article IV Zoning Districts, Section 350-26 Official Map, as relates to the Town of Marquette, shall be amended as follows:

Owner: Dennis R. Moldenhauer & Kelly L. Moldenhauer, **Location:** Toledo Road and County Highway H, **Parcel:** 014-00854-0000. **Legal Description:** Lot 1 of CSM 1137, located in Section 34, T15N, R12E, Town of Marquette, ±10.5 acres. **Request:** The owners are requesting a rezone from A1, Farmland Preservation District, to A2, General Agriculture District.

BE IT FURTHER ORDAINED, that this ordinance shall become effective upon passage and publication.

Roll Call on Ordinance No. -2024

Ayes , Nays , Absent , Abstain

Passed and Adopted/Rejected this 18th Day of June 2024.

County Board Chairman

ATTEST: County Clerk
Approve as to Form:

Jeffrey Mann , Corporation Counsel

Submitted by Land Use Planning & Zoning Committee:

Chuck Buss, Chair

William Boutwell, Vice Chair

Harley Reabe

Gene Thom

Curt Talma

Item #3: Owner: Nancy L. Hynes, **Agent:** Melanie Cody, **Location:** Irving Park Road and Hickory Road, **Parcel:** 004-00723-0000. **Legal Description:** Lot 1 of CSM 205, located in Section 30, T16N, R13E, Town of Brooklyn, ±.55 acres. **Request:** The owners are requesting a rezone from R1, Single-Family Residence District, to RC, Recreation District.

LAND USE PLANNING AND ZONING COMMITTEE STAFF REPORT

PUBLIC HEARING June 14, 2024

ITEM III: ZONING CHANGE

OWNER:
Nancy L Hynes Green Lake Property Trust

APPLICANT:
Melanie Cody

REQUEST: The applicant is requesting a zoning change for ±0.55 acres from R-1, Single-Family Residence District to RC, Recreation District.

PARCEL NUMBER / LOCATION: The request affects parcel number 004-00723-0000 (±0.55 acres). The parcel is located in the SE ¼ of the NE ¼ Section 30, T16N, R12E, Town of Brooklyn. There is no site address for the proposed zoning change.

EXISTING ZONING AND USES OF ADJACENT AREA: The current zoning of parcel 004-00916-0800 is Single-Family Residence. The parcel directly North is zoned A-1, Farmland Preservation and is used agriculturally as farm fields. All other surrounding parcels are zoned R-1 and used residentially. The proposed rezone area falls within shoreland jurisdiction.

ADDITIONAL INFORMATION / ANALYSIS: The current use of the property is recreational in nature due to a tennis court on the parcel. There are also forested areas surrounding the tennis court. The parcel is proposed to be rezoned to make the zoning of the parcel conform to the current use.

REZONING CRITERIA PER §350-75.A.: Land may be rezoned if all of the following are found after public hearing: **(Staff comments in bold)**

The amendment is consistent with community land use plan (comprehensive plan). **It can be argued that the rezone is consistent with the comprehensive plan due to recreation districts supporting residential districts.**

The amendment will not be detrimental to property in the immediate vicinity or to the community as a whole. **The rezone will not change the use of the property as it has been utilized as a tennis court for many years.**

The amendment will not have a significant adverse impact on the natural environment (i.e., air, water, noise, stormwater management, soils, wildlife, vegetation, etc.), or the impact could be mitigated by management practices on the site or in the immediate vicinity. **The rezone will not have a significant adverse impact on the natural environment.**

The amendment will not have a significant adverse impact on the ability to provide adequate public facilities or services (i.e., highways, streets, water, sewage, drainage, schools, emergency services, etc.). **Rezoning this parcel should not adversely impact the ability to provide adequate public**

facilities or services. Nearby parcels that are already being provided adequate public facilities or services.

The amendment allows a more viable transition to planned land uses on adjacent properties than the current zoning designation**. Residential uses are already located around the parcel. Recreational uses and residential uses normally go hand in hand.**

The amendment will not result in inappropriate spot-zoning (i.e., use is inconsistent with surrounding properties and serves only a private, rather than public interests). **Spot-zoning could be argued to occur due to no recreational zoned properties. However, properties zoned near the subject parcel are zoned residential and would be fitting to be near a recreational zoned parcel.**

TOWN OF BROOKLYN: An Action Form requesting the Town's input related to this zoning change request was sent to the Town Clerk on 4/10/2024. The Town took no action at this time.

Please type or use black ink

Return to: Green Lake County
Planning & Zoning Department
571 County Road A
Green Lake, WI 54941
(920) 294-4156

GENERAL APPLICATION

Fee 375 (not refundable)

Date 3/20/24

Zone Change from R-1 to RC

Conditional Use Permit for

Other

PROPERTY OWNER / APPLICANT (1)

Name NANCY L. HYNES GREEN LAKE PROPERTY TRUST, MELANIE CODY TRUSTEE

Mailing Address 862 FOXDALE AVE., WINNETKA, IL 60093-1910

Phone Number (312) 731-4518

Signature Melanie C. Cody Trustee Date 3/20/24

PROPERTY OWNER / APPLICANT (2)

Name

Mailing Address

Phone Number

Signature Date

PROPERTY INFORMATION

Town of BROOKLYN Parcel Number(s) 004007230000

Acres Lot Block Subdivision

Section 30 Town 16N North Range 13E East

Location of Property

Legal Description LOT 1 OF CSM 205 AS RECORDED IN THE OFFICE OF THE REGISTER OF DEEDS FOR GREEN LAKE COUNTY, WISCONSIN ON SEPTEMBER 23, 1963 IN VOLUME 1 CERTIFIED SURVEY MAP PAGE 205.

Current Zoning Classification R-1 Current Use of Property TENNIS COURT AND OAK FOREST.

Detailed Description of Proposed Use TENNIS COURT AND UNDEVELOPED FOREST

PLEASE PROVIDE A DETAILED SITE PLAN WITH THE APPLICATION

Fees: Zone Change $375.00
Conditional Use Permit $375.00
Special Exception $375.00
Variance/Appeal $375.00

PZZ-311 (12/03)

GIS Viewer Map

3/20/2024, 8:33:59 AM

Override 1

Section

TaxParcel

1:1,128

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CERTIFIED SURVEY MAP NUMBER 205

STATE OF WISCONSIN)
COUNTY OF GREEN LAKE) SS

I, George E. Phillips, Green Lake County Surveyor, do hereby certify that by the order of Nancy Cody Hynes, owner, I have made a survey of a part of Government Lots 1 and 2, Section 30, Town 16 North, Range 13 East of the Fourth Principal Meridian, Town of Brooklyn, Green Lake County, State of Wisconsin, which is more particularly described as: Beginning at the Northeast corner of Lot 1, Plat of "Lake Side"; thence South 319.60 feet to the Government meander corner between Government Lots 1 and 2, Section 30, T16N, R13E; thence on a meander line S.83°00'E. 100.25 feet; thence North 601.80 feet; thence N.89°08'W. 106.10 feet; thence S.00°07'20"W. 276.30 feet; thence N.89°08'E. 6.70 feet to the point of beginning. I further certify that the within drawing is a correct representation of the boundaries surveyed and the divisions made and that I have fully complied with the provisions of Chapter 236 of the Revised Statutes of the State of Wisconsin in surveying and mapping the same.

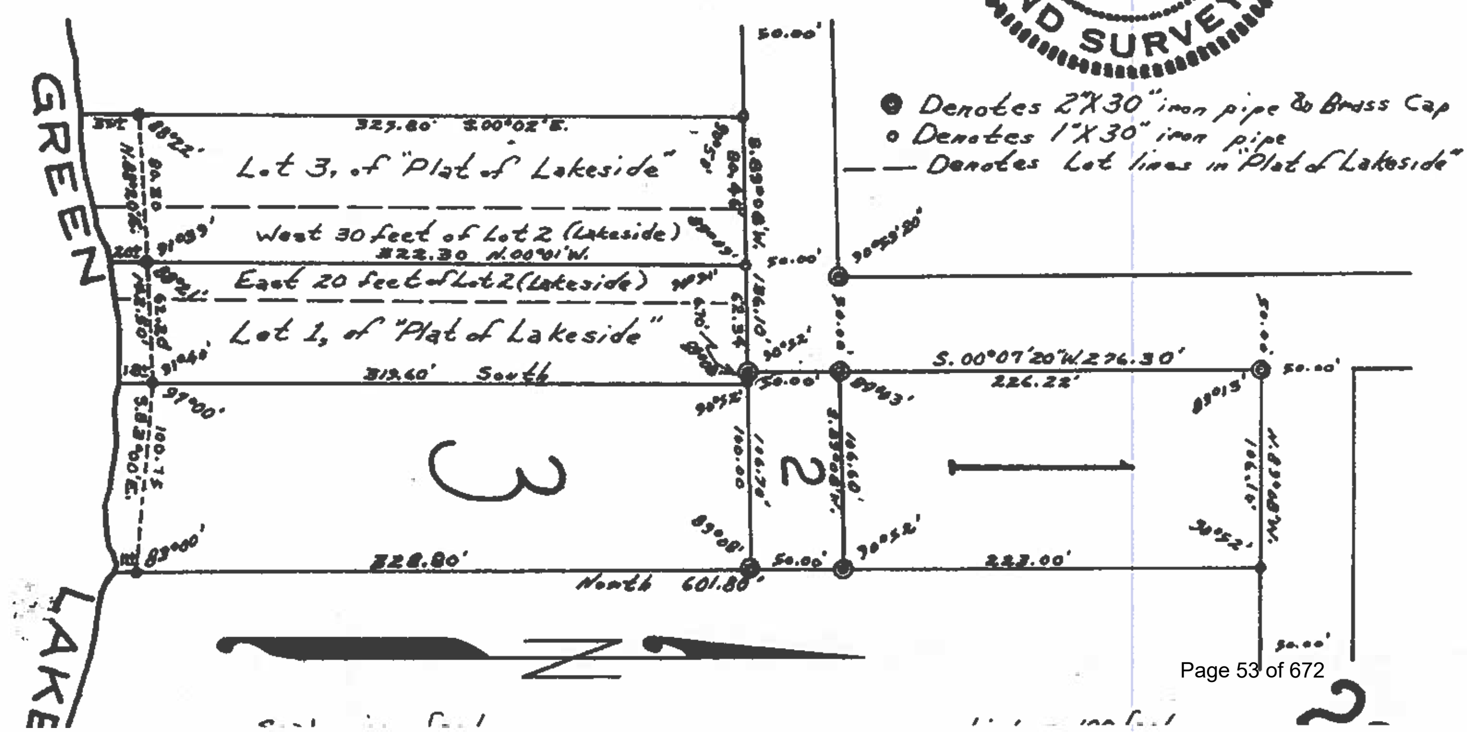
George E. Phillips, Registered
Land Surveyor, Certificate S-176

STATE OF WISCONSIN)
COUNTY OF GREEN LAKE) SS

Received for record this 23rd day of September, 1963, at 8:30 o'clock A.M. and recorded in Volume One of Certified Survey Maps for Green Lake County on page 205.

Floyd W. Kallas, Register of Deeds

WISCONSIN
GEORGE E.
PHILLIPS
Green Lake,
WIS.
LAND SURVEYOR



State Bar of Wisconsin Form 7-2003
TRUSTEE'S DEED

Document Number

Document Name

420451
RECORDED ON:
08/21/2023 12:49:01 PM

REC FEE: 30.00

RENEE A. THIEM-KORTH
REGISTER OF DEEDS
GREEN LAKE, WI
TRANSFER FEE:
EXEMPT #: 9
PAGES: 1

The above recording information verifies that this document has been electronically recorded and returned to the submitter.

Recording Area

Name and Return Address
Sondalle Law Office, LLC
PO Box 236
Princeton WI 54968

004-01002-0000; 004-00723-0100; 004-00723-0000
Parcel Identification Number (PIN)

THIS DEED, made between Robert C. Cody as Trustee of Nancy L. Cody Hynes Trust UA 03-22-84 a/k/a Nancy L. Hynes Trust dated March 22, 1984, as amended and restated ("Grantor," whether one or more), and Nancy L. Hynes Green Lake Property Trust ("Grantee," whether one or more).

Grantor conveys to Grantee, without warranty, the following described real estate, together with the rents, profits, fixtures and other appurtenant interests, in Green Lake County, State of Wisconsin ("Property") (if more space is needed, please attach addendum):

Lot One (1) and Lot Two (2) of Certified Survey Map No. 205 as recorded in the Office of the Register of Deeds for Green Lake County, Wisconsin, on September 23, 1963, in Volume 1 of Certified Survey Maps on Page 205, as Document No. CSM205, Town of Brooklyn, Green Lake County, Wisconsin.

Lot One (1) and the East 20 feet of Lot Two (2), Block A Lakeside Plat.
Town of Brooklyn, Green Lake County, Wisconsin.

Dated August 14, 2023.

_______________ (SEAL) Robert C. Cody (SEAL)
* _______________ * Robert C. Cody, Trustee

_______________ (SEAL) _______________ (SEAL)
* _______________ * _______________

AUTHENTICATION

Signature(s) Robert C. Cody

authenticated on August 14, 2023.

Justin Sondalle
* Justin Sondalle
TITLE: MEMBER STATE BAR OF WISCONSIN
(If not, _______________
authorized by Wis. Stat. § 706.06)

THIS INSTRUMENT DRAFTED BY:
Sondalle Law Office, LLC - Justin Sondalle
PO Box 236, Princeton WI 54968

ACKNOWLEDGMENT

STATE OF WISCONSIN)
) ss.
_______________ COUNTY)

Personally came before me on _______________,
the above-named _______________
to me known to be the person(s) who executed the foregoing instrument and acknowledged the same.

* _______________
Notary Public, State of Wisconsin
My Commission (is permanent) (expires: _______________)
☐ This notarial act involved the use of communication technology.

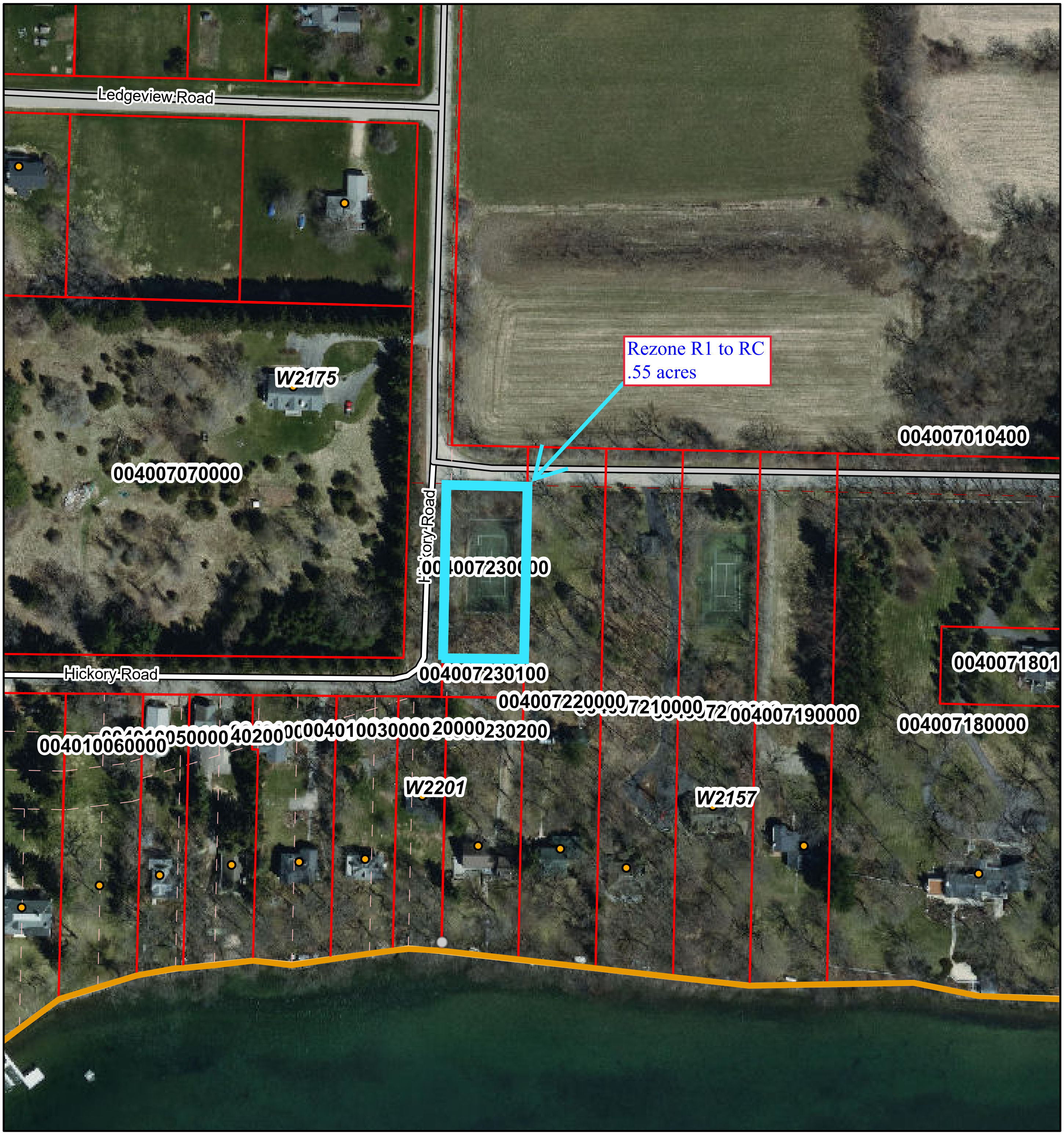
(Signatures may be authenticated or acknowledged. Both are not necessary.)

NOTE: THIS IS A STANDARD FORM. ANY MODIFICATIONS TO THIS FORM SHOULD BE CLEARLY IDENTIFIED.

TRUSTEE'S DEED
Type name below signatures.

FORM NO. 7-2003
(REV. 2020)

Hynes Rezone Aerial Map



4/10/2024, 2:18:05 PM

1:2,189

0 0.02 0.04 0.07 mi

0 0.03 0.06 0.11 km

Address

Corner

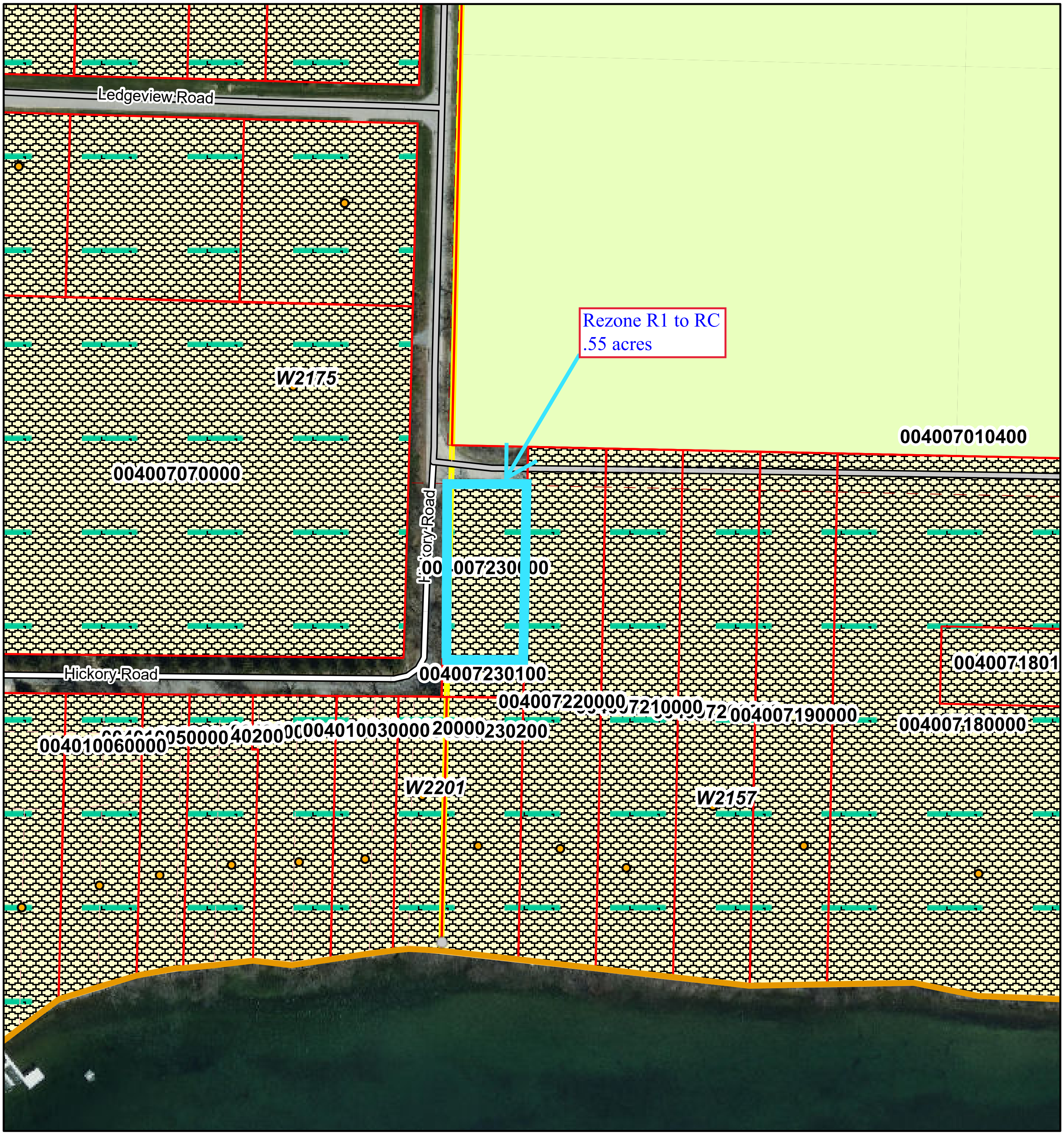
GOVLOT

Section

TaxParcel

Green Lake County, WI
www.greenlakecountywi.gov

Hynes Rezone Aerial Map



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Address

Corner

GOVLOT

Section

TaxParcel

1:2,189

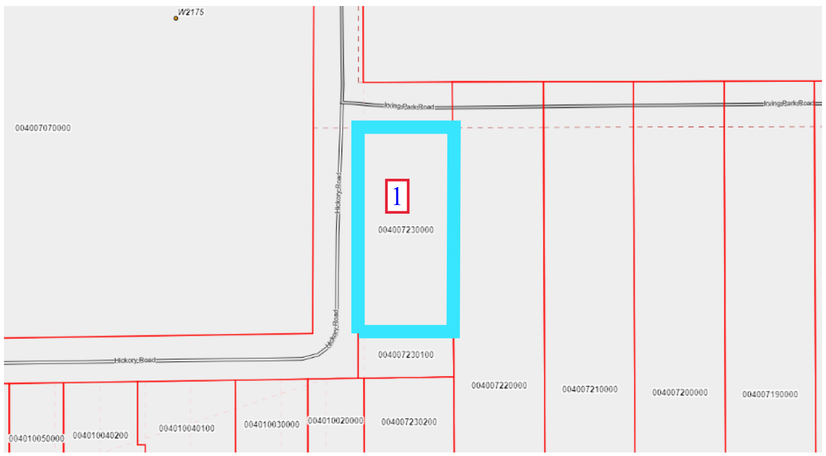
0 0.02 0.04 0.07 mi

0 0.03 0.06 0.11 km

Nancy L. Hynes Green Lake Property Trust, Melanie Cody-Trustee
Town of Brooklyn
Irving Park Road & Hickory Road, Parcel #004-00723-0000
Lot 1 of CSM 205 in Section 30, T16N, R13E

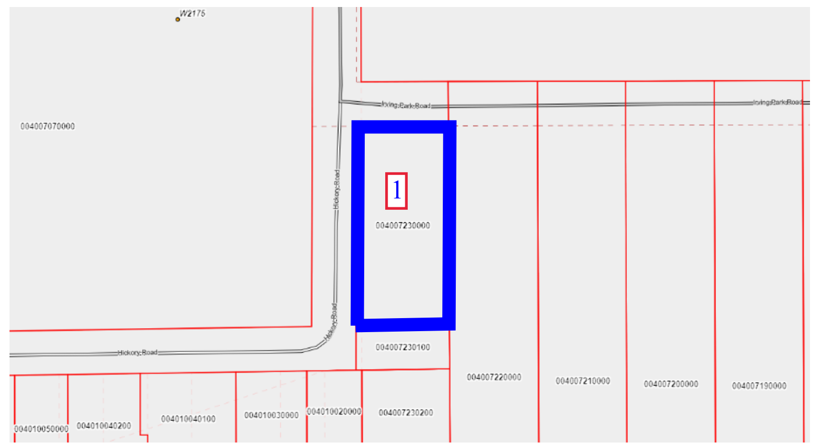
Existing Configuration

1 = .55-acre parcel zoned R1, Single-Family Residence District.



Proposed Configuration

1 = .55-acre parcel zoned RC, Recreation District.



Land Use Planning & Zoning Public Hearing 6/6/2024

TOWN BOARD ACTION

Dear Land Use Planning and Zoning Committee:

Please be advised that the Town Board of Brooklyn, County of Green Lake, took the following action on – (Date) ______________________.

Owner/Applicant: Nancy L.Hynes/Melanie Cody

Site Location: Irving Park Road & Hickory Road

General legal description: Parcel #004-00723-0000, Lot 1 of CSM 205 in Section 30, T16N, R13E, Town of Brooklyn, ±.55 acres

Request: Rezone ±.55 acres zoned R1, Single-Family Residence District, to RC, Recreation District.

Planned public hearing date for the above requests: June 6, 2024

_____ **Town Does Not object to and Approves of request**

__X__ **No action taken**

_____ **Objects to and requests denial of request**

NOTE: If denial – please enclose Town Resolution of denial.

If no action taken – please include reason for inaction.

- Reason(s) for objection/inaction:

TOWN OF BROOKLYN
N5988 COUNTY ROAD A
GREEN LAKE WI 54941

______________________ Town Representative

5-15-2024 **Date Signed**

NOTES: ______________________

Please return this form to the Land Use Planning & Zoning Office by: May 24, 2024

ORDINANCE NO. –2024

Relating to: Rezone in the Town of Brooklyn
Owner: Nancy L. Hynes

The County Board of Supervisors of Green Lake County, Green Lake, Wisconsin, duly assembled at its regular meeting begun on the 18th of June 2024, does ordain as follows:

NOW, THEREFORE, BE IT ORDAINED that the Green Lake County Zoning Ordinance, Chapter 350 as amended, Article IV Zoning Districts, Section 350-26 Official Map, as relates to the Town of Brooklyn, shall be amended as follows:

Owner: Nancy L. Hynes, **Agent:** Melanie Cody, **Location:** Irving Park Road and Hickory Road, **Parcel:** 004-00723-0000. **Legal Description:** Lot 1 of CSM 205, located in Section 30, T16N, R13E, Town of Brooklyn, ±.55 acres. **Request:** The owners are requesting a rezone from R1, Single-Family Residence District, to RC, Recreation District.

BE IT FURTHER ORDAINED, that this ordinance shall become effective upon passage and publication.

Roll Call on Ordinance No. -2024

Ayes , Nays , Absent , Abstain

Passed and Adopted/Rejected this 18th Day of June 2024.

County Board Chairman

ATTEST: County Clerk
Approve as to Form:

Jeffrey Mann , Corporation Counsel

Submitted by Land Use Planning & Zoning Committee:

Chuck Buss, Chair

William Boutwell, Vice Chair

Harley Reabe

Gene Thom

Curt Talma

Item #4: Applicant: Green Lake County Land Use Planning & Zoning Committee, **Request:** The committee is requesting an amendment to the Code of Green Lake County, Chapter 350, Zoning Ordinance; more specifically, to amend Section 350-65B., requiring a rural address or fire number prior to Land Use Permit issuance.

ORDINANCE NO. –2024

Amending § 350-65 B., Land Use Permit Applications to Require Fire Number

The County Board of Supervisors of Green Lake County, Green Lake Wisconsin, duly assembled at its regular meeting begun on the 18th day of June, 2024, does ordain as follows:

WHEREAS, the Planning and Zoning Committee has deemed it advantageous and in the interest of safety for fire numbers to be issued as early as practical in the improvement of properties located within the County.

WHEREAS, designating fire numbers contemporaneously with the issuance of land use permits will assist in a more efficient delivery of emergency services.

NOW, THEREFORE, THE COUNTY BOARD OF SUPERVISORS OF THE COUNTY OF GREEN LAKE DOES ORDAIN AS FOLLOWS:

Green Lake County Ordinance § 350-65 B. shall be amended as follows:

Roll Call on Ordinance No. -2024

Ayes , Nays , Absent , Abstain

Passed and Adopted/Rejected this 18th day of June, 2024.

County Board Chairman

ATTEST: County Clerk
Approve as to Form:

Corporation Counsel

Submitted by Planning & Zoning Committee:

Chuck Buss, Chair

Bill Boutwell, Vice-Chair

Curt Talma

Harley Reabe

Gene Thom

All applications for land use permits shall be accompanied by a location sketch drawn to scale, showing the location, actual shape and dimensions of the lot to be built upon, the exact size and location of the building on the lot, the existing and intended use of the building, the number of families to be accommodated, its situation with reference to the highway, the distance between the nearest point on the building and the center line of the highway, and such other information with regard to the proposed building and neighboring lots or buildings as may be called for on the application or may be necessary to provide for the enforcement of this chapter. Additionally, all applications shall require a rural address and/or fire number assigned by the Real Property Lister as referenced in Chapter 217. The Land Use Planning and Zoning Department may require satisfactory evidence of actual lot line location, including a surveyor's certificate and map where necessary.

BE IT FURTHER ORDAINED, that this ordinance shall become effective upon passage and publication.

BE IT FURTHER ORDAINED, that the amendment of this chapter herein shall not have any effect on existing litigation and shall not operate as an abatement of any action or proceeding then pending or by virtue of the repealed or amended sections.

Item #5: Applicant: Green Lake County Land Use Planning & Zoning Committee, **Request:** The committee is requesting an amendment to the Code of Green Lake County, Chapter 350, Zoning Ordinance; more specifically, to amend Section 350-77 by adding the definition of ***caretaker***.

ORDINANCE NO. –2024

Amending § 350-77, Word Usage and Definitions.

The County Board of Supervisors of Green Lake County, Green Lake Wisconsin, duly assembled at its regular meeting begun on the 18th day of June, 2024, does ordain as follows:

WHEREAS, the Planning and Zoning Committee has deemed it advantageous to provide definitions whenever doing so will assist the reader in understanding the meaning and intent of an ordinance.

NOW, THEREFORE, THE COUNTY BOARD OF SUPERVISORS OF THE COUNTY OF GREEN LAKE DOES ORDAIN AS FOLLOWS:

Green Lake County Ordinance § 350-77 shall be amended to add the following definition:

Caretaker: A person who is employed to perform maintenance on a property, but whom neither owns nor manages the operations of said property.

Roll Call on Ordinance No. -2024

Ayes , Nays , Absent , Abstain

Passed and Adopted/Rejected this 18th day of June, 2024.

County Board Chairman

ATTEST: County Clerk
Approve as to Form:

Corporation Counsel

Submitted by Planning & Zoning Committee:

Chuck Buss, Chair

Bill Boutwell, Vice-Chair

Chuck Buss

Harley Reabe

Gene Thom

BE IT FURTHER ORDAINED, that this ordinance shall become effective upon passage and publication.

BE IT FURTHER ORDAINED, that the amendment of this chapter herein shall not have any effect on existing litigation and shall not operate as an abatement of any action or proceeding then pending or by virtue of the repealed or amended sections.

Item #6: Owner: Christopher D. & Ruth M. Retzlaff, **Agent:** Michael McConnell, Kopplin & Kinas Co. Inc., **Location:** County Highway K and Searle Road, **Parcels:** 004-00789-0000 & 004-00792-0000. **Legal Description:** NE ¼ of SE ¼ and SE ¼ of SE ¼ , located in Section 36, T16N, R13E, Town of Brooklyn, ±80.0 acres. **Request:** The owners are requesting a Conditional Use Permit for a limestone quarry.

Land Use Planning and Zoning Committee Staff Report

Public Hearing June 14, 2024

Item VI: Conditional Use Permit (CUP)

Owner:	**Applicant:**
Christopher D and Ruth M Retzlaff	Kopplin & Kinas Co.,Inc Michael McConnell

Request: The owner/applicant is requesting a conditional use permit to operate a non-metallic mine.

Parcel Number/ Location: The request affects parcels 004-00789-0000 (±40.56 acres) and 004-00792-0000 (± 38.86 acres). The parcels are located in the NE and SE ¼ of the SE ¼ of Section 36, T16N, R13E, Town of Brooklyn. The site is located on County Rd K at the Fond Du Lac County Border.

Existing Zoning and Uses of Adjacent Area: The parcel referenced above is zoned A-1, Farmland Preservation District. The property is currently being used as a farm field. With 58.87 acres currently used for crop production. A total of 20.55 acres are not currently used for crop production. Most of the surrounding lands are also zoned as A-1. Directly to the West is a parcel zoned Industrial. The surrounding lands appear to be predominantly used for farm crops. There are three rural residences within 600ft of the subject parcel. The adjacent lands in Fond Du Lac County are zoned farmland preservation and rural residential.

Additional Information/Analysis: Kopplin & Kinas Co., Inc has been operating mines in Green Lake County and surrounding areas for almost 100 years. Currently Kopplin & Kinas operates six other non-metallic mines in Green Lake County.

The A-1 district allows for non-metallic mining operations as a conditional use. The mine is required to have a minimal impact on the surrounding Ag lands, and the agricultural land is to be restored back to an agricultural use in the final reclamation.

The proposed mined area will maintain a 100-foot buffer from all property lines. The mine would impact about 80 acres. The topsoil and overburden already on the site will be stripped and stored as screening berms around the property. The mine will focus on extracting limestone starting on the Northeast corner of the property. To extract the limestone, it will be “intermittently drilled and blasted” according to the Mine Safety and Health Administration Code. Limestone will be extracted down to ten feet above the depth of the high ground water elevation. Occasionally there may be portable processing equipment on site. There will also be a portable scale stored onsite and a gate will be built across the entrance. There will also be a portable sanitary station for customers/employees. The operator would like to have the mine open from 5:30am to 6:30pm Monday through Friday and 6:00am to 3:00pm on Saturday. They would also like the opportunity to occasionally work extended hours and at night.

Some major hazards for this facility are open mines/pits, aesthetics, noise, air quality, groundwater & surface water quality, and blasting. The safety aspects of a mine are regulated by the Wisconsin Department of Natural Resources, the Occupational Safety and Health Administration, the Wisconsin Department of Safety and Professional Standards, the Mine Safety and Health Administration, and the Bureau of Alcohol, Tobacco, Firearms, and Explosives. The mine will also have a gate across the entrance and signs posted around the mine's perimeter stating, "No Trespassing" and "Danger Active Quarry". To address the aesthetics of the mine it will be conducted below grade and the screening berms, with two staggered rows of Norway Spruce trees, will be built in a way to help block the view of the mine. To limit the impact of noise the operator will be using mufflers (as applicable), maintaining their equipment, and strategically placing material stockpiles in-between exterior parcels and processing equipment. To address air quality, they plan on following a fugitive dust control plan found in Appendix G of the Operation, Environmental Control, and Reclamation Plan. To address Groundwater & Surface water quality concerns they plan on following the Pollution Prevention Best Management Practices Plan found in Appendix F of the Operation, Environmental Control, and Reclamation Plan. To address blasting Kopplin and Kinas will record each blast with a seismograph, log it, and make it available upon request. The seismograph will be used to make sure that vibration levels meet State and Federal limits.

It is important that the Committee maintain the purpose and intent of the County Zoning Ordinance when reviewing and approving a request of this nature. The following criteria are to be used by the Committee when making conditional use permit decisions:

General Standards for Review of Conditional Use Requests: When reviewing a conditional use permit, the Committee shall take into consideration, among other things, the recommendation of the affected town and the particular facts and circumstances of each proposed use in terms of the following standards:

a) If an applicant meets or agrees to meet all of the requirements specified in this chapter and any conditions imposed by the Committee, based on substantial evidence, the Committee shall grant the conditional use permit.
b) Any condition imposed must be related to the purpose of the ordinance and be based on substantial evidence.
c) The requirements and conditions must be reasonable and, to the extent practicable, measurable, and may include conditions such as the permit's duration, transfer, or renewal.
d) The applicant must demonstrate that the application and all requirements and conditions related to the conditional use, are or shall be satisfied, and supported by substantial evidence. The Committee's decision to approve or deny the conditional use permit must be supported by substantial evidence.

Substantial evidence is defined as: facts and information, other than merely personal preferences or speculation, directly pertaining to the requirements and conditions an applicant must meet to *obtain a conditional use permit and that reasonable persons would accept in support of a conclusion.*

No conditional use permit for a non-metallic mine in the A-1 Farmland Preservation District shall be issued or approved with conditions by the Committee unless it shall find the conditional use:

a) Will not have a negative effect upon the health, safety, and general welfare of occupants of surrounding lands; and
b) Will be designed, constructed, operated, and maintained so as to be harmonious, be appropriate in appearance with the existing or intended character of the general vicinity, and that such use will not change the essential character of the same area; and
c) Will not be hazardous or disturbing to existing or future neighboring uses; and
d) Will not be detrimental to property in the immediate vicinity or to the community as a whole; and
e) Will be served by essential public facilities and services such as highways, streets, police and fire protection, drainage structures, and schools; the persons or agencies responsible for the establishment of the proposed use shall be able to provide, adequately, any such service; and
f) Will have vehicular approaches to the property that shall be so designed as not to create an interference with traffic on surrounding public or private streets or roads.
g) Will comply with Subchapter I of Chapter 295, Wisconsin Statutes, and rules promulgated under that subchapter, with applicable provisions of local ordinances under § 295.14, Wis. Stats. and with any applicable requirements of the Wisconsin Department of Natural Resources concerning the restoration of non-metallic mining sites.
h) Operation and Its location in the farmland preservation zoning district is consistent with the purposes of the farmland preservation zoning district.
i) Operation and its location in the farmland preservation zoning district is reasonable and appropriate, considering alternative locations outside the farmland preservation zoning district, or is specifically approved under state or federal law.
j) Operation is reasonably designed to minimize the conversion of land around the extraction site from agricultural use or open space use.
k) Operation does not substantially impair or limit the current or future agricultural use of surrounding parcels of land that are zoned for or legally restricted to agricultural use.
l) Owner agrees to restore the land to agricultural use, consistent with any required reclamation plan, when extraction is completed.
m) Will comply with Green Lake County Code Chapter 323 (Non-Metallic Mining Reclamation).

County Staff Comments: The Committee should review this request to determine if it meets the general criteria for review as listed above. If the Committee wishes to approve this request, the following conditions may be appropriate:

1. No additional expansion or addition of structures, mined area, and/or uses relating to this conditional use permit shall occur without review and approval through future conditional use permit(s).
2. The site shall obtain a fire number prior to the start of mining operations.
3. Any outdoor lighting shall comply with Section 350-23 of the County Zoning Ordinance.
4. Any restroom facilities/POWTS located on site must be compliant with Wisconsin Administrative code SPS 381-387 or SPS 391 as applicable.
5. Hours of Operation are from Monday- Friday from 5:30am to 6:00pm and Saturday from 6:00am to 3:00pm. Blasting may only occur Monday through Friday 9:00am to 3:00pm.
6. All mining equipment must have mufflers (when applicable).
7. That the owners/applicants are responsible for obtaining permits and licenses from any other regulatory agency.
8. Owner must obtain and follow an Erosion control and Storm Water Management Plan from the Wisconsin Department of Natural Resources.
9. Owner must receive and follow a Non-Metallic Mining Reclamation Permit from Green Lake County.
10. Owner must remain current with annual Non-Metallic Mining Fees and Financial Assurance requirements.
11. No excavation or blasting of materials shall occur within a 100ft buffer of all property lines excluding the property line separating parcels 004-00792-0000 and 004-00789-0000. Construction, maintenance, or removal of the following features shall not be considered excavating or blasting for the purpose of this condition: quarry entrance, exterior berms, stormwater basin, and diversion of unnamed stream (WBIC 5027058).
12. The Green Lake County Land Use Planning and Zoning Department shall be contacted prior to the use of a wash plant on site. All byproducts of the wash process shall be disposed of in a manner following the current applicable regulations and so as not to contaminate ground or surface water quality.
13. Any well, constructed or abandoned on site must be in compliance with NR 141 and done in a manner that prevents substantial contamination of ground water quality.
14. The elevation of groundwater within the proposed mining site shall be determined. This shall be accomplished by installing four groundwater monitoring wells, two in the Northern edge, one on the western edge, and the other in the SE corner of the proposed site. Each well shall be constructed into the groundwater table.
15. No material shall be removed below the aquifer or within 10 feet of the high ground water elevation as determined in condition 14 of this permit.

16. No material extraction shall occur within five feet of any feature that could substantially harm human health, ground water quality, surface water quality, or neighboring properties.
17. The Green Lake County Land Use Planning and Zoning Department must be contacted immediately if mining operations disturb a feature that could pose a serious risk to: human health, ground water, surface waters, or neighboring properties.
18. The Green Lake County Land Use Planning and Zoning Department shall be notified at least 24 hours prior to any blasting operations.
19. Information about blasting seismograph data as required by WI State Administrative code SPS 307.31(4)(18) shall be made public upon request by a member of the public, an employee of: Green Lake County, the State of Wisconsin, or the United States Federal Government.

Town of Brooklyn: An Action Form requesting the Town's input related to this CUP request was emailed to the Town Clerk on March 13, 2024. The town of Brooklyn took no action.

Please type or use black ink

Return to: Green Lake County
Planning & Zoning Department
571 County Road A
Green Lake, WI 54941

GENERAL APPLICATION

Fee $375.00 (not refundable) Date 02/29/2024

Zone Change from ________ to ________

Conditional Use Permit for Non-Metallic Mineral Extraction

Other ____________

PROPERTY OWNER / APPLICANT

Name Christopher D. & Ruth M. Retzlaff

Mailing Address W14445 Retzlaff Dr, Ripon, WI 54971

Phone Number (920) 229-2853

Signature Christopher D. Retzlaff Ruth M. Retzlaff Date 02/29/2024

AGENT IF OTHER THAN OWNER

Name Michael C McConnell, Kopplin & Kinas Co., Inc.

Mailing Address W1266 N Lawson Dr., Green Lake, WI 54941

Phone Number (920) 294-6451

Signature ____________ Date 02/29/2024

PROPERTY INFORMATION

Town of Brooklyn Parcel Number 004-00789-0000 004-00792-0000 Acres 80

Lot ___ Block ______ Subdivision ____________

Section 36 Town 16 North Range 13 East

Location of Property CTH K & Searle Rd

Legal Description The Northeast Quarter of the Southeast Quarter (NE 1/4 SE 1/4) and the Southeast Quarter of the Southeast Quarter (SE 1/4 SE 1/4) of Section Thirty Six (36),Township Sixteen (16) North, Range Thirteen (13) East, Town of Brooklyn, GreenLake County, Wisconsin.

Current Zoning Classification A-1 Current Use of Property Ag/Non-Ag

Detailed Description of Proposed Use Limestone quarry. See attached documentation.

PLEASE PROVIDE A DETAILED SITE PLAN WITH THE APPLICATION

Fees: Zone Change $375
Conditional Use Permit $375.00
Variance $375.00
Special Exception $375.00
NMM Reclamation Permit $450

PZP-010 (04/09)

KOPPLIN & KINAS CO., INC.

GREEN LAKE, WISCONSIN

NONMETALLIC MINING OPERATION & RECLAMATION PLAN

FOR THE

K QUARRY

SECTION 36
TOWN OF BROOKLYN, GREEN LAKE COUNTY

December 2023

SITE & CONTACT INFORMATION

SITE LOCATION:	SE ¼ OF THE SE ¼, SECTION 36, T16N-R13E TOWN OF BROOKLYN GREEN LAKE COUNTY, WISCONSIN TAX PARCEL NUMBERS: 004-00789-0000, 004-00792-0000
CURRENT SITE ADDRESS:	THE NORTH SIDE OF CTH K AT THE EAST COUNTY LINE
OPERATOR:	KOPPLIN & KINAS CO., INC. W1266 NORTH LAWSON DRIVE GREEN LAKE, WI 54941 PHONE: (920)294-6451 FAX: (920)294-6489 https://kkci.us DONALD E. KINAS, JR. – PRESIDENT CHRISTOPHER KINAS – AGGREGATE OPERATIONS MIKE MCCONNELL - PROJECT MANAGER
PROPERTY OWNER:	CHRISTOPHER D. & RUTH M. RETZLAFF W14445 RETZLAFF DR. RIPON, WI 54971

1 Table of Contents

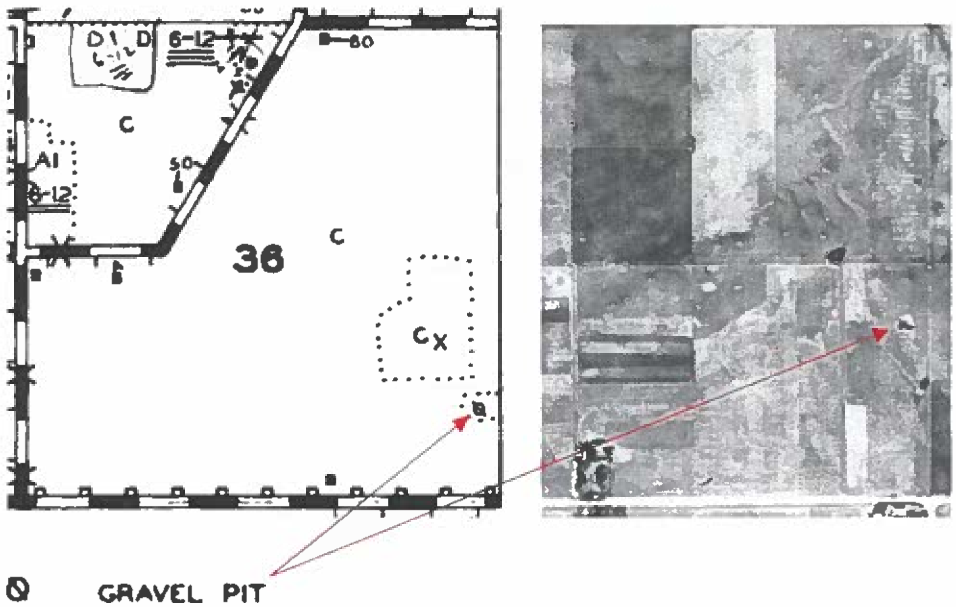
2 INTRODUCTION

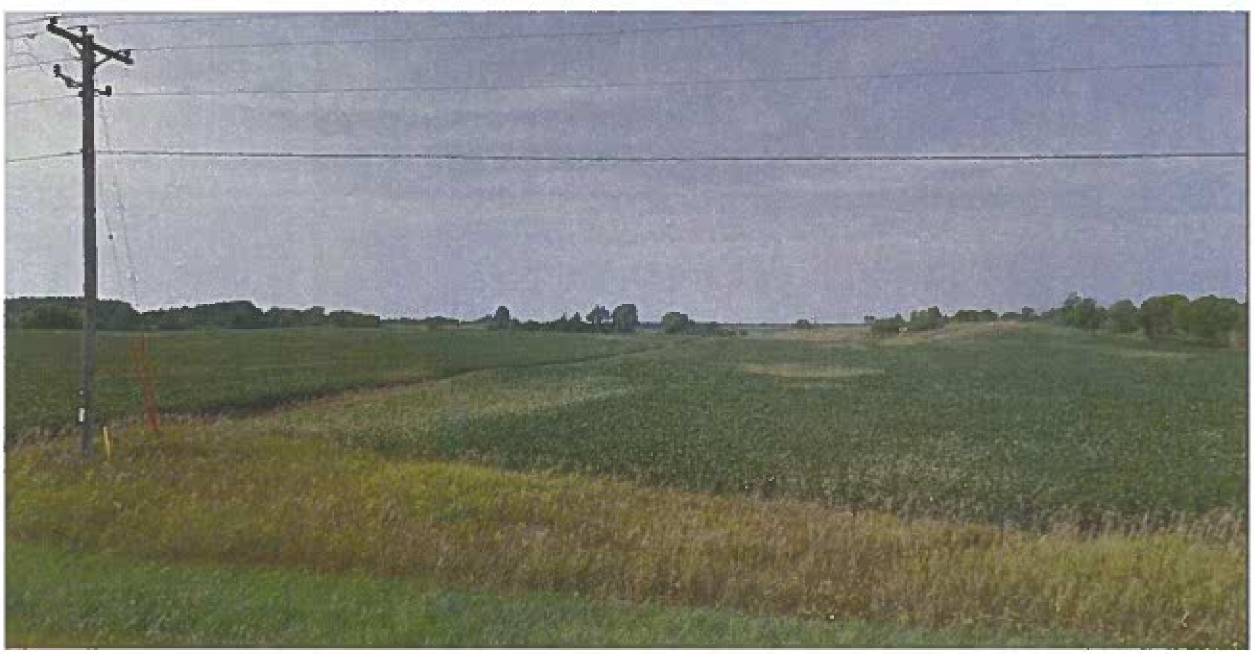
Kopplin & Kinas Company Incorporated (KKCI) is an aggregate producer and heavy/civil construction company serving communities in Green Lake and the surrounding counties since 1926. As the cost of transporting aggregates to construction sites steadily increases, KKCI must work to secure new sources of crushed stone, sand, and gravel to meet the needs of their customers by producing aggregates at locations closer to the geographic markets which they serve. The Retzlaff property located on CTH K at the east county line, contains a commercial grade limestone deposit. The site's location is ideal to service customers in Green Lake, Markesan, Fairwater, and Ripon.

This report has been prepared to: (1) fulfill the requirements of NR135, Wisconsin Stats. administered by Green Lake County Nonmetallic Mining Reclamation Code Ch. 323, (2) supplement KKCI's conditional use permit application for Green Lake County and the Town of Brooklyn, and (3) comply with other applicable local, state, and federal laws governing human health and environmental protection.

3 BACKGROUND

The Retzlaff property has historically been an agricultural field. The limestone formation beneath the field averages twelve feet from the surface. The southern forty-acres of the property has had some small-scale mining of glacial deposits in the past, evidenced from historic aerial photography and the Wisconsin Land Economic Inventory Survey (Bordner Survey) conducted in the nineteen-thirties and forties.





4 EXISTING SITE CONDITIONS

This section contains a review of the site's physical location and geographic setting, and information on soils, geology, surface and groundwater, wetlands, and existing biological resources.

4.1 LOCATION AND LAND USE

The 80-acre property is located on the north side of CTH K at the east Green Lake County line, in the Town of Brooklyn, Green Lake County, Wisconsin (See A-1: USGS Quadrangle/Property Overlay, Appendix A). The legal description and parcel number for the property is as follows:

Parcel IDs: 004-00789-0000, 004-00792-0000

Legal Descriptions: NE ¼ of the SE ¼, Sec. 36, SE ¼ of the SE ¼, Sec. 36

Additional parcel information for the property and surrounding area can be found in A-1: USGS Quadrangle/Property Overlay, Appendix A.

The property is zoned A-1 Farmland Preservation and is predominantly neighbored by agricultural zoning and land use, an Industrial use, and small amounts of rural residential housing.

4.2 GEOGRAPHIC SETTING

The topographic features of the property consist of a gradually sloped topography with several moraines, shaped by the recession of the Green Bay Lobe of the Laurentide ice sheet. Natural changes in elevation on the property range from approximately 977' to 1032' above mean sea level (AMSL) (See A-2: Existing Ground, Appendix A).

4.3 DISTRIBUTION, THICKNESS, AND TYPE OF SOILS

The soil types found on the property consist of the Markesan, Mendota, Plano, and LeRoy series. A description of these soil types is provided in A-3: Soil Map, Appendix A.

The predominant soil types found on the property within the proposed area of mineral extraction are the Markesan Silt Loam and the Plano Silt Loam. Commonly found in the glacial till plains of the area, these soils have an average A-horizon depth of six to eleven inches, and the underlying soil is comprised mostly of silt loam, and clay loam. According to the USDA Soil Survey these soils are well drained and contain a high content of calcium carbonate (limestone); limestone bedrock is present at an average depth of twelve feet.

4.4 GEOLOGY & DESCRIPTION OF THE MINERAL RESOURCES

The glacial till that overlays the property is classified as part of the Horicon member of the Holy Hill Formation. The property is underlain by Ordovician aged dolomitic limestone of the Sinnipee Group containing the Galena, Decorah, and Platteville formations. The top of the limestone formation ranges between 965' and 1020' AMSL. The well reports for the immediate area show the Sinnipee group limestone ranging from 53' to 117' in thickness.

4.5 Surface Water, Wetlands & Groundwater

Existing drainage patterns on the property are shown on A-2: Existing Ground, Appendix A. Surface water at the site currently drains to the north through an agricultural drainageway that collects surface water from the property and agricultural lands to the south of the property. The drainageway meanders northwest from the property for approximately 1.31 miles where it flows into Dakin Creek.

There are no known or mapped wetlands on the property.

Groundwater flow across the property runs at approximately a 1% grade based on local well data. The predominate groundwater flow direction is to the north-west, towards Green Lake. Water supply wells in the area are generally installed into the water bearing sandstone aquifer. The groundwater elevation at the property is estimated to range from 937' AMSL at the south end of the property to 916' AMSL at the north end of the property based on local well logs. The residential wells in the area surrounding the property range from approximately 140' to 220' in depth and are cased anywhere from 42' to 178' in depth.

4.6 LOCAL WELL CONSTRUCTION SUMMARY

Well Owner Name** & Address	Casing Length	Depth of Well	Static Water Level	Water Elevation AMSL
Roy Voss (1977) N7251 Searle Rd	75'	215'- Limestone/Dolomite	100'	930'
Edward Manske (1965) W103 CTH K	48.5'	158'-Sandstone	*83'	939'
Art Herschberger (1997) W208 CTH K	103'	177'-Sandstone	85'	937'
Richard Hahn (1975) W244 CTH K	75'	190'-Sandstone	79'	940'
Gloria Kemnitz (2009) W241 CTH K	178'	218'-Sandstone	85'	935'
John Limboch (1959) W14310 Prairie Rd	42'	200'-Sandstone	60'	924'
Eric Godfrey (1990) W14411 Prairie Rd	62'	220'- Limestone/Dolomite	64'	901'
August Quick (1950) W239 Prairie Rd	75'	140'-Sandstone	52'	902'
Steve Machkovich (2004) Well Log & (2013) WGNHS Log W235 Prairie Rd Irrigation Well	61'	415'-Sandstone	92'	896'

**** Owner at the time of construction, year of construction is in parentheses.**

***Static water level on well report incorrectly recorded as 38'.**

4.7 Agricultural Vegetation & Wildlife

Approximately 59.45 acres of the property is used as an agricultural field. Row crops such as corn or soybeans are planted on an annual basis. The remaining 20.55 acres of the property is not suitable for agricultural use and is covered by grass and brush.

The Retzlaff property provides support for transient species such as Canada Geese and Sandhill Cranes. Year-round wildlife species in the area include hawks, foxes, skunks, White-Tail Deer, rabbits, coyotes, raccoons, and field mice.

4.8 Cultural resources

There are no known sites of cultural significance or catalogued/uncatalogued human burial grounds on the property. The results of several archaeological investigations in Section 36 support this finding. The site will be further reviewed by a Wisconsin Department of Natural Resources archaeologist during the Stormwater/WPDES permitting process.

4.9 Wisconsin Chapter 30 Determination

An agricultural drainageway enters at the southeast corner of the property and runs north along the east side of the property exiting in the northeast corner. In April of 2023 Green Lake County staff performed a navigability determination on the drainageway and found it to be non-navigable. The determination was sent to the Wisconsin Department of Natural Resources for review and concurrence. The Wisconsin Department of Natural Resources concurs with the determination (See Appendix C) and has declared that the drainageway is not regulated as a public watercourse. Permits are not required to work in, near, or to alter the drainageway.

5 PROPOSED OPERATIONS

The following plan of operation has been developed to efficiently utilize the site's natural and agricultural resources, protect human health and the environment, and minimize long-term operational costs. See A-5: Proposed Site & Phasing, Appendix A.

5.1 ACCESS, BUFFER ZONE, SITE PREPARATION & EROSION CONTROL

The site will be accessed from CTH K, approximately 375' west of the intersection with Searle Rd. The existing entrance will be widened to accommodate operations at the site, and will be constructed of crushed stone and paved with asphalt to the inner boundary of the required 100' buffer zone to minimize tracking of debris onto CTH K. The 100' buffer zone will be established from all exterior property boundaries and the right of way of CTH K. No mineral extraction will occur inside of the buffer zone and a screening berm will be constructed in this area. An additional 50' along the north end of the site will not be extracted to provide space for a stormwater basin and facilitate maintenance access to the basin.

The screening berm will serve multiple functions. The berm acts as a safety barrier from mining operations. It also provides an aesthetic buffer from site operations by providing a visual barrier and dampening sounds from day-to-day operations. The berm will also be utilized as topsoil and overburden storage for later use in the reclamation stages of the operation. The berm will range from 10' to 15' in height and have a maximum 3H:1V slope. As construction of the berm is completed, it will be seeded down to establish vegetation and stabilize the berm. Two staggered rows of Norway Spruce trees will be planted on the top third of the exterior side of the screening berm on the southern 40-acre parcel and the rest of the berm will be seeded with native grasses and wildflowers to enhance the screening capability and visual aesthetics of the berm.

The site will be developed incrementally to minimize disturbed areas and allow existing agricultural operations to continue as long as practicable. Topsoil and overburden will be stripped to access the limestone formation. Removed topsoil and overburden will be separated and used to construct the screening berm surrounding the property. Clay soils will be further separated from the overburden and stockpiled for pond liner material for the site stormwater pond and the pond to be built during the reclamation phases of the site. Fill material hauled to the site will also be stockpiled for use in the reclamation process and clay materials hauled to the site will be stockpiled with the onsite clay for use in pond construction. Upon commencement of mining at the site, approximately 10 acres will be stripped to the limestone formation. The overburden from the initial 10 acres will supply the material needed to construct the screening berm around the property.

Surface water runoff from neighboring properties enters the site at three locations. Runoff from lands south of CTH K enter the site through a drainage ditch near the south-east corner of the property. Runoff from lands west of the site enter at two locations on the west property line to the north and south of the center of the property. The three external runoff points will be diverted into a storm sewer network that will run along the west and east property lines and convey the runoff to a stormwater basin that will be constructed in the 150' buffer area on the north end of the site. Surface water flows inside the screening berm but outside the active extraction area will be conveyed through temporary ditches and diversions to either the stormwater basin or to temporary basins and allowed to dissipate naturally. It is anticipated that surface water from precipitation in the active extraction area will infiltrate into the exposed rock, as is common in limestone quarries operating above the water table. If there is a limiting factor such as a clay seam below the terminal elevation of the quarry floor or a major precipitation event that makes allowing the water to dissipate naturally impractical, the surface water from the active area will be pumped to the stormwater basin. All surface water management practices will adhere to the requirements of the site's Wisconsin Pollutant Discharge Elimination System permit and utilize the Pollution Prevention Best Management Practices contained in Appendix F, as well as erosion controls outlined in the Wisconsin Department of Natural Resources, "Wisconsin Construction Site Erosion Control Field Guide". These best management practices will be utilized as needed to prevent sediment loss and stabilize soil during all phases of the site's operational lifespan. Such measures include the utilization of seeding, mulching, stormwater ponds, sediment traps, grassed swales, and crushed stone checks.

5.2 Aggregate Removal & Processing

Extraction of the limestone will begin in the north-east quadrant of the site in area 1-A. The extraction operation will progress incrementally through phase 1 and then through phase 2 ending extraction in the south-west quadrant of the site.

The limestone will be intermittently drilled and blasted. This process involves drilling holes into the limestone and loading the holes with a blasting agent. The blasting agent is detonated by trained and licensed blasters. The blasts are designed to displace the rock from the solid formation, fragmenting it to a size that permits efficient crushing and sizing of the rock. All blasting is performed in accordance with Wisconsin Administrative Code chapter SPS 307 and 30 CFR, Part 56, Sub Part E of the Mine Safety and Health Administration Code.

The limestone will be extracted to a maximum depth of 10' above the groundwater elevation at the site at the time of commencement, to be determined through observations from four monitoring wells that will be installed at the site, and at least 5' above the St. Peter sandstone that lies directly below the limestone formation. The more restrictive elevation of the two will be used. This will ensure that the extraction operation maintains an adequate buffer above groundwater, also allowing for groundwater level fluctuation, and prevent the exposure of the sulfide cement horizon (SCH) which is known to be present at the top of the St. Peter Formation. The location of the SCH is easily identified through test drilling. Test drilling of phases 1-A through 1-D will be performed prior to the initial blast at the site to determine the elevation of the SCH, and periodic test drilling will be performed thereafter as extraction progresses through subsequent phases to ensure the buffer is maintained. Based on local well data, the limestone formation terminates at approximately 900' AMSL, which puts the floor of the quarry at range of 26' to 47' above the St. Peter sandstone and the SCH. It is estimated that the terminal elevation for extraction will range from 947' AMSL at the south end of the extraction area to 926' AMSL at the north end of the extraction area based on data from local well logs.

Portable processing plants will be brought in intermittently to crush and size the blasted limestone into stockpiles of finished products. Portable processing equipment and stockpiles will be staged within the area of extraction and placed to accommodate the working face of the quarry. A list of equipment that could be utilized on-site for aggregate processing is included in Appendix E- Aggregate Processing & Construction Equipment.

5.3 Portable Asphalt & Concrete Batch Plant Operation

There may be local projects from time to time that require enough pavement material to stage a portable asphalt or concrete batch plant at the site. These plants will be operated in accordance with the Wisconsin DNR regulations that pertain to them. There will be no permanent asphalt or concrete production plants at the site.

5.4 Support Structures

There will be no permanent buildings or structures at the site. All the processes conducted at the site utilize completely portable equipment. A gate and proper signage will be at the entrance of the site. A portable scale house and scale will be positioned near the site entrance to weigh products as they leave the site. A portable sanitary station will be provided for employees/customers.

As the site is developed it may be determined that a water supply well is needed to supply water for dust suppression, supplemental water for washing aggregates, or portable pavement plants. A licensed well driller will be hired to construct the well in compliance with Wisconsin Administrative Code and Wisconsin Department of Natural Resources requirements.

5.5 Hours of Operation

The hours of operation at the site will align with agricultural schedules in the area to take advantage of optimum daylight during the construction season. Working hours for processing and material hauling will be from 5:30am to 6:00pm, Monday through Friday and 6:00am to 3:00pm on Saturdays. Blasting will only be performed between 9:00am and 3:30pm, Monday through Friday. Maintenance and equipment repair as well as set-up and tear-down of processing equipment may be performed outside of these times as they generally only require the use of hand tools and minimal amounts of support from heavy equipment.

All operations at the site will occur intermittently based on market demand. It is projected that the site will produce an average of 100,000 to 150,000 tons of finished product a year requiring an average of two processing sessions with a duration of three weeks or less time depending on the products required. The yearly tonnage estimate provides for an average of two trucks per hour hauling product from the site in a 10-hour workday.

6 HUMAN HEALTH & ENVIRONMENTAL PROTECTIONS

Several different features have been incorporated into this plan to protect human health and the environment. They are outlined below.

6.1 SAFETY

The safety aspects of nonmetallic mining are regulated by the Occupational Safety and Health Administration as well as the Mine Safety and Health Administration. The physical safety features proposed for the Retzlaff property are the installation of berms, a locking gate, and proper signage around the site. Posted notices and signs will increase awareness and improve safety. These include:

1. Notice of the required site-specific safety training and KKCI safety policies for those entering the site.
2. Signs with "No Trespassing" and "Danger Active Quarry" posted on the gate, berms, and perimeter of active operations.

KKCI promotes a safety culture within the company. All employees receive new miner training when hired and annual safety refresher training which is required by MSHA. The safety culture is also reinforced through company-wide safety meetings to educate employees on the use of new equipment they may not be familiar with, changes in safety policies, and to identify and correct any areas that need improvement. On-site crews conduct pre-shift team meetings to discuss the tasks that will be performed during their shift, identify potential safety hazards associated with the tasks, and develop a plan to avoid or correct identified hazards.

All site visitors, vendors, and customers are required to receive site specific safety training before entering the site. Any outside contractors performing work at the site are required to have received all MSHA mandated training in addition to site specific safety training.

6.2 AESTHETICS

The site will be developed below the existing grade. A screening berm will be constructed and maintained around the site which will provide a view of natural vegetation from outside the quarry, rather than the quarry operation. Two rows of Norway Spruce trees will be planted towards the top of the berm on the southern 40-acre parcel to enhance the screening effect. The berm will be planted with native grasses and flowers to add visual appeal to the berm and provide a food source for pollinators.

6.3 NOISE

Sound is produced by the various pieces of equipment required to operate the site. The sounds from the operation will be similar to other sounds routinely generated in the area by nearby agricultural operations, industrial operations, and highway traffic. The screening berm around the site will drastically reduce sound levels from site operations. Surrounding the processing area with material stockpiles also effectively dampens sounds from the operation. The use of modern processing equipment contributes to reduced sound levels because most of the units that comprise the plant do not have an engine, instead they are powered by an electric generator. It is common to have only two engines on a processing plant, one on the primary crusher because it requires a lot of power and can function as a stand-alone piece for certain products, and one engine to power the generator which in turn powers the screen units, secondary and tertiary crushers, and all the conveyors. The mobile equipment units that support the plant and load the products into trucks are equipped with mufflers and kept in good running order, which also helps reduce sound levels.

6.4 Air Quality

Dust control is of the utmost importance. Excessive dust generation can create safety issues such as obscured visibility of site operations and potential health impacts if the respirable particles are comprised of silica. The mineral deposit at the Retzlaff property is a limestone formation which is not a siliceous (comprised of silica) mineral. Limestone generally has a quartz content of 5% to 10% or less and is comprised mostly of calcium carbonate and magnesium. Quartz is the most common form of silica in Wisconsin. Industrial sand is comprised of 95% quartz or higher, and igneous rocks such as rhyolite or granite have a quartz content of 20% to 60%. The quartz content of glacial sand and gravel deposits can vary widely depending on which lobe of the glacier they originate from and what other mineralization was mixed into the deposit as the glaciers receded. The low quartz content of limestone means that respirable dust generated from limestone mining operations have a very low likelihood of causing silicosis and other lung diseases associated with the inhalation of respirable crystalline silica particles. KKCI has prepared a Fugitive Dust Control Plan for the K Quarry (Appendix G) which utilizes Wisconsin Department of Natural Resources best management practices for dust control and fugitive dust prevention.

6.5 Groundwater & Surface Water Quality

Limestone extraction at the site will terminate a minimum of 10' above the groundwater level observed at the site upon commencement. **There will be no mining at, into, or below the water table**. The extraction will terminate above groundwater level, meaning there will be no groundwater dewatering occurring and no risk of lowering the local water table or the available amount of water in local wells. Limestone extraction will terminate a minimum of 5' above the sulfide cement horizon (SCH) at the top of the St. Peter sandstone formation, which will prevent the exposure of sulfide mineralization. Exposing and dewatering the SCH can potentially cause the water that is drawn out of it to become acidic and release high amounts of metals which may also be present in the SCH. There will be no chemical processing of aggregates at the site. Blasting will be performed using an ANFO based emulsion which is a highly viscous waterproof compound that prevents degradation, migration and leaching of nitrates to groundwater.

Surface water runoff from the surrounding agricultural lands will not be permitted to flow into the extraction area. This water will be diverted into a storm sewer network where it enters the property and conveyed to the stormwater basin on the north end of the site, which will reduce both the sediment and nutrient loading of the water before it is discharged from the pond. On-site surface water will not be permitted to flow into the extraction area and will be diverted to the stormwater basin on the north end of the property or to temporary basins to reduce the sediment and nutrient loadings of the surface water. Surface water inside the extraction area will be allowed to dissipate naturally or in the case of an extreme precipitation event or a limiting factor below the terminus of the quarry, will be pumped to the stormwater basin. Wisconsin Department of Natural Resources WPDES permitting for the site requires water quality testing and monitoring if surface water from the extraction area is pumped to the stormwater basin. This ensures that water discharged from the site is clean and does not pose a threat to humans or wildlife.

A complete copy of the Pollution Prevention Best Management Practices Plan is included in Appendix F. This plan identifies potential contaminants and provides best management practices for protection and prevention.

6.6 BLASTING

Blasting will be conducted on an intermittent basis, and likely only occur 2 to 4 times a year. All blasting at the site will be performed by licensed professional blasters and result in safely conducted blasts with ground vibration and airblast inside the regulatory safety limits and no damage occurring to surrounding properties. Each blast is recorded by a calibrated seismograph, logged, and made available upon request. The seismograph monitors ground vibration and airblast levels to ensure compliance with State and Federal limits.

7 POST MINING LAND USE & RECLAMATION PLAN

Based upon the amount of limestone reserves on the Retzlaff property, it is expected that the resources will supply area communities for at least seventy years.

When the available resources on the Retzlaff property are fully extracted, the site will be restored for agricultural use to the pre-mining ratio of agricultural and non-agricultural (See A-4: Existing Agriculture, Appendix A) use consistent with the A-1 Farmland Preservation zoning classification of the property. The details of the plan are presented below.

7.1 SITE GRADING & PREPARATION

Grading and site preparation will occur incrementally throughout the life of the quarry. Once the footprint of the quarry is large enough to contain all material stockpiles and allow enough room for processing equipment to continue mineral extraction (approximately Phase 1-F) interim reclamation will begin. The overburden from precedent and subsequent phases, and excess fill from projects in the area will be utilized to raise inactive areas of the quarry to the final elevations shown in A-7: Reclamation Grading Plan, Appendix A. Interim reclamation will progress with extraction, as space requirements allow, through Phase 2 with final reclamation occurring after mineral extraction at the site is complete. The reclaimed site will generally consist of a gently sloping grade towards the pond and slopes no steeper than 3H:1V covering the portions of the highwall that extend above 978'AMSL. The surface water that enters the reclaimed site will be directed to the pond. The pond will be lined with a minimum of 2' of clay materials that were separated during overburden stripping. The pond floor will have a minimum of 4' of separation from bedrock. Any clay materials that were hauled to the site and stockpiled will also be utilized for pond construction. The main body of the pond will range from 25' to 36' in depth and have 3H:1V slopes. The north end of the pond will be substantially shallower, ranging from 8' to 2' in depth. The pond will have a permanent pool elevation of approximately 976' AMSL and utilize the outfall structure from the extraction phase of the site.

7.2 OVERBURDEN & TOPSOIL PLACEMENT

The overburden that was stripped from the site and used to construct the screening berms or placed in temporary stockpiles as well as imported fill material, will be dispersed and graded to a minimum of eight inches below the grades shown on A-7 Reclamation Grading Plan, Appendix A to accommodate for topsoil placement above the proposed pond water elevation.

The topsoil from the site will be spread across the site at a minimum thickness of eight inches to reach the final grades established in the Reclamation Plan.

7.3 Site Revegetation & Erosion Control

The agricultural acreage of the site will be planted as grass hay/pasture ground. It will be seeded with an equine pasture mix consisting of 40% Orchardgrass, 20% Tetraploid Perennial Ryegrass, 15% Kentucky Bluegrass, 15% Timothy, and 10% Intermediate Ryegrass, or the closest equivalent available at the time of seeding. The seed will be planted with a seed drill to a depth of ¼ to ½ inch at a rate of 25 pounds per acre. Soil tests will be performed prior to seeding to determine the type and appropriate application rate for any fertilizer that may be needed.

The pond slopes will be seeded with Canada Wild Rye to stabilize the slopes and provide protection from erosion until the water level reaches the permanent pool elevation. The Canada Wild Rye will be planted with a seed drill to a depth of ¼ to ½ inch at a rate of 10 pounds per acre. As the water level in the pond reaches the elevation of the shallow area on the north end of the pond, the area will be prepared and planted with a wetland emergent mix of seed to be drilled or broadcast at a rate of 4 pounds per acre, to promote a wetland filter area at the outfall of the pond.

Seeding will be conducted in spring, early summer, or fall. Seeding during mid to late summer as well as during exceedingly hot or dry weather will be avoided to maximize the successful germination and survival of the plantings. Mulch and erosion matting will be utilized as necessary to protect the plantings from erosion.

The reclamation work at the site will utilize the existing erosion control measures in place from the extraction phase of the site, as well as additional erosion control BMPs as needed. Additional BMPs may include but are not limited to silt fence, ditch checks, Water diversion berms or channels, mulching, erosion matting, and temporary seeding.

7.4 Interim Reclamation

Interim reclamation at the site will begin as soon as space allows (approximately Phase 1-F). Interim reclamation reduces the amount of time required to reach full reclamation of the site and reduces total reclamation costs. Interim reclamation will begin along the outer edges of the extraction, filling along the highwall and working inward towards the middle of the site following behind extraction as it progresses. Interim reclamation will stop during Phase 2-C to allow adequate room for operations in the final areas of Phase 2 to be extracted. Areas of interim reclamation that meet the final reclamation elevation and vegetation requirements will be reviewed and inspected as they are completed. If the regulatory authority approves the interim areas as complete, they will be treated as fully reclaimed and financial assurance for the approved acreage will be released.

7.5 Estimated Cost of Reclamation

The following cost estimate is provided to establish the proper amount of financial assurance required for the site. The amount of financial assurance will be periodically reviewed and adjusted to meet the regulatory authority's requirements. The total acreage to be disturbed is 79.17 acres of which 58.62 acres will be reclaimed back to agricultural use, and 20.55 acres will be reclaimed to non-agricultural use in accordance with the pre-existing ratio of ag/non-ag acreage on the property. The work and materials required to complete reclamation and the cost per acre for each item are shown in the table on page 16.

It is estimated that there will be approximately 1,600,000 cubic yards of overburden on-site, 85,500 cubic yards of which is topsoil. Approximately 1,440,000 cubic yards of fill material will be hauled into the quarry to reach final reclamation grades.

Fill material sites for excess dirt from civil construction sites are becoming increasingly difficult to locate. Nonmetallic mineral extraction sites are an ideal location to dump excess clean fill materials, as they generally allow for an easily accessible dumping area, they have Wisconsin Department of Natural Resources permits, and they have stormwater and erosion control best management practices in place. Currently KKCI charges customers a per load fee to dump clean fill at sites that can utilize the material for reclamation, and frequently refuses fill material so that reclamation work does not encroach on actively mined areas. Customers with large projects that will generate a substantial amount of excess fill material are generally allowed to dump free of charge or for a reduced fee, provided that the customer levels the fill brought to the site with their own equipment and grades it to KKCI's specifications. KKCI also performs civil construction and frequently hauls excess fill from projects to local aggregate sites and levels the material with its own equipment in exchange for no charge dumping or a reduced dumping fee. As such, if the regulatory authority had to hire a contractor to reclaim the site, imported fill material and the leveling of imported fill material would not be a cost. If the regulatory authority chose to do so, they could generate revenue by charging a small fee to dump and require contractors to level the fill material with their own equipment.

Reclamation Cost Summary Table

Activity/Material	Cost Unit	Total Units	Cost Per Unit	Total Cost	Cost Per Acre
Redistribute & Grade Overburden	Cubic Yard	1,514,500.00	$1.25	$1,893,125.00	$23,912.15
Redistribute & Grade Topsoil	Acre	58.87	$1,891.75	$111,367.32	$1,891.75
Seed & Seeding Hay Ground	Acre	58.87	$103.95	$6,119.54	$103.95
Pond Slope Seed & Seeding	Acre	12.50	$370.00	$4,625.00	$370.00
Wetland Emergent Seed & Seeding	Acre	1.50	$1,826.67	$2,740.01	$1,826.67
Fertilizer Contingency	Acre	58.87	$135.89	$7,999.84	$135.89
Erosion Control Contingency	Acre	79.17	$94.74	$7,500.57	$94.74
Scale Removal	Lump Sum	1	$750.00	$750.00	$9.47
TOTALS				$2,034,227.28	$28,344.62

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7.6 Criteria for Measuring Reclamation Success

Reclamation of the agricultural acreage at the site will be considered complete once it achieves 70% overall vegetative cover. Vegetative cover will be verified by throwing out a square with a 3' by 3' opening (constructed of grade lathe or other suitable material) at randomly selected locations across the site and observing the percent vegetative cover inside the square. At least 2 locations per 5 acres of agricultural acreage will be observed for a total of 12 observations, and the total average of all observations will determine the total percentage of vegetative cover.

Reclamation of the non-agricultural acreage at the site will be considered complete when the water elevation of the pond is within 5' of the permanent pool elevation. Based on the calculated runoff volume of the acreage that drains to the property, it will take approximately 4 years for the pond to fill to the permanent pool elevation with average precipitation.

When KKCI believes the site has been satisfactorily reclaimed, the regulatory authority will be brought in to perform a field inspection and verification.

8 Conclusion

Kopplin & Kinas Company's existing resources will not continue to supply an economical source of construction aggregates to meet local demands. A commercial-grade limestone deposit is present on the Retzlaff property located on CTH K in the Town of Brooklyn. The property contains aggregate suitable, and needed, for local construction. The proposed plan of operation protects human health and the environment and allows for the economic extraction of this resource.

9 Standard of Care

This plan was prepared using generally accepted geologic and hydrogeologic information and practices and is based upon information available at the time of preparation. The scope of this plan is limited to the specific locations described herein.

10 Reclamation Plan Compliance Certification

I hereby certify, as a duly authorized representative or agent, that the reclamation at this nonmetallic mining site will be carried out in accordance with the approved reclamation plan submitted by Kopplin & Kinas Company, Incorporated. I also certify that, as a condition of this permit, financial assurance will be provided as required by NR 135.40 upon granting of this permit and before mining begins. I further certify that the information contained herein is true and accurate and complies with local and statewide nonmetallic mining reclamation standards established in NR 135, Wisconsin Administrative Code.

Donald E. Kinas, Jr.	3-1-24
Donald E. Kinas, Jr. President, Kopplin & Kinas Co., Inc.	Date
Christopher D. Retzlaff	3-1-24
Christopher D. Retzlaff Current Landowner	Date
Ruth M. Retzlaff	3-1-24
Ruth M. Retzlaff Current Landowner	Date

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GREEN LAKE, WISCONSIN

11 REFERENCES

Bedrock Geologic Map of Wisconsin, by M.G. Mudrey, B.A. Brown, J.K. Greenberg, Wisconsin Geological and Natural History Survey, 1982

Quarternary Geology of Columbia, Green Lake, and Marquette Counties, Wisconsin, by Thomas S. Hooyer, William N. Mode, Lee Clayton, Wisconsin Geological and Natural History Survey, 2021

Web Soil Survey, Green Lake County, United States Department of Agriculture, 2023

Well Construction Reports, Well Construction Information System, Wisconsin Department of Natural Resources, 2023

Surface Water Viewer, Wisconsin Department of Natural Resources, 2022

L-THIA Great Lakes Watershed Management System, Purdue University, 2023

Wisconsin Historical Aerial Image Finder, Wisconsin State Cartographer's Office, 2023

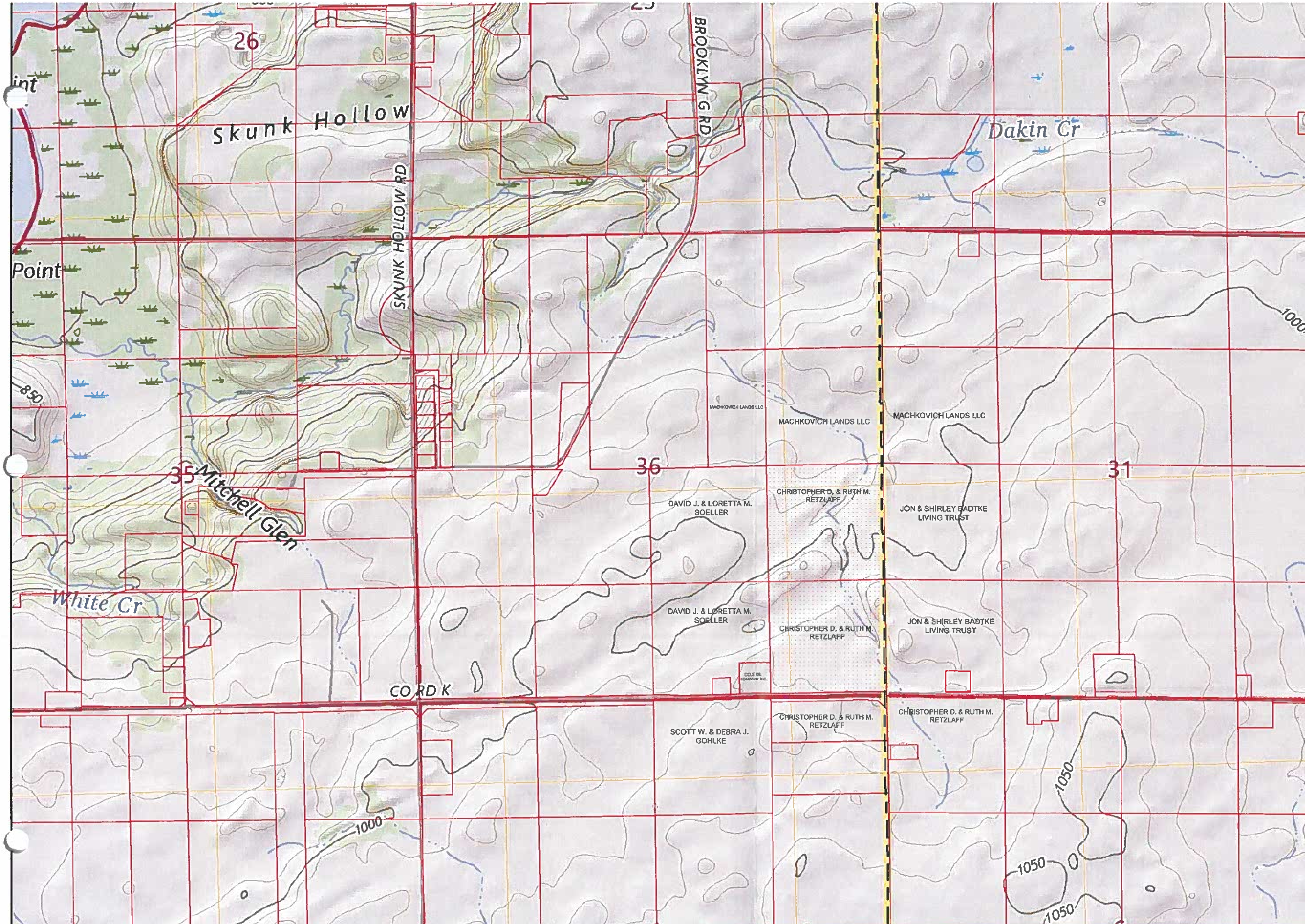
Wisconsin Land Economic Inventory Survey Collection, University of Wisconsin Madison Library, 2023

USGS Maps, United States Geological Survey, 2023

Green Lake County Geographic Information System, Green Lake County, 2023

APPENDIX A – MAPS

A-1 – USGS Quadrangle/Property Overlay



Notes:

HATCHED AREA REPRESENTS THE RETZLAFF PROPERTY

REV:	DESCRIPTION:	BY:	DATE:

STATUS: FINAL

KOPPLIN & KINAS CO., INC.
GREEN LAKE, WISCONSIN

PREPARED FOR:

PREPARED BY:
KOPPLIN & KINAS CO., INC.
W1266 NORTH LAWSON DRIVE
GREEN LAKE, WI 54941
(920)294-6451 HTTPS://KKC.US

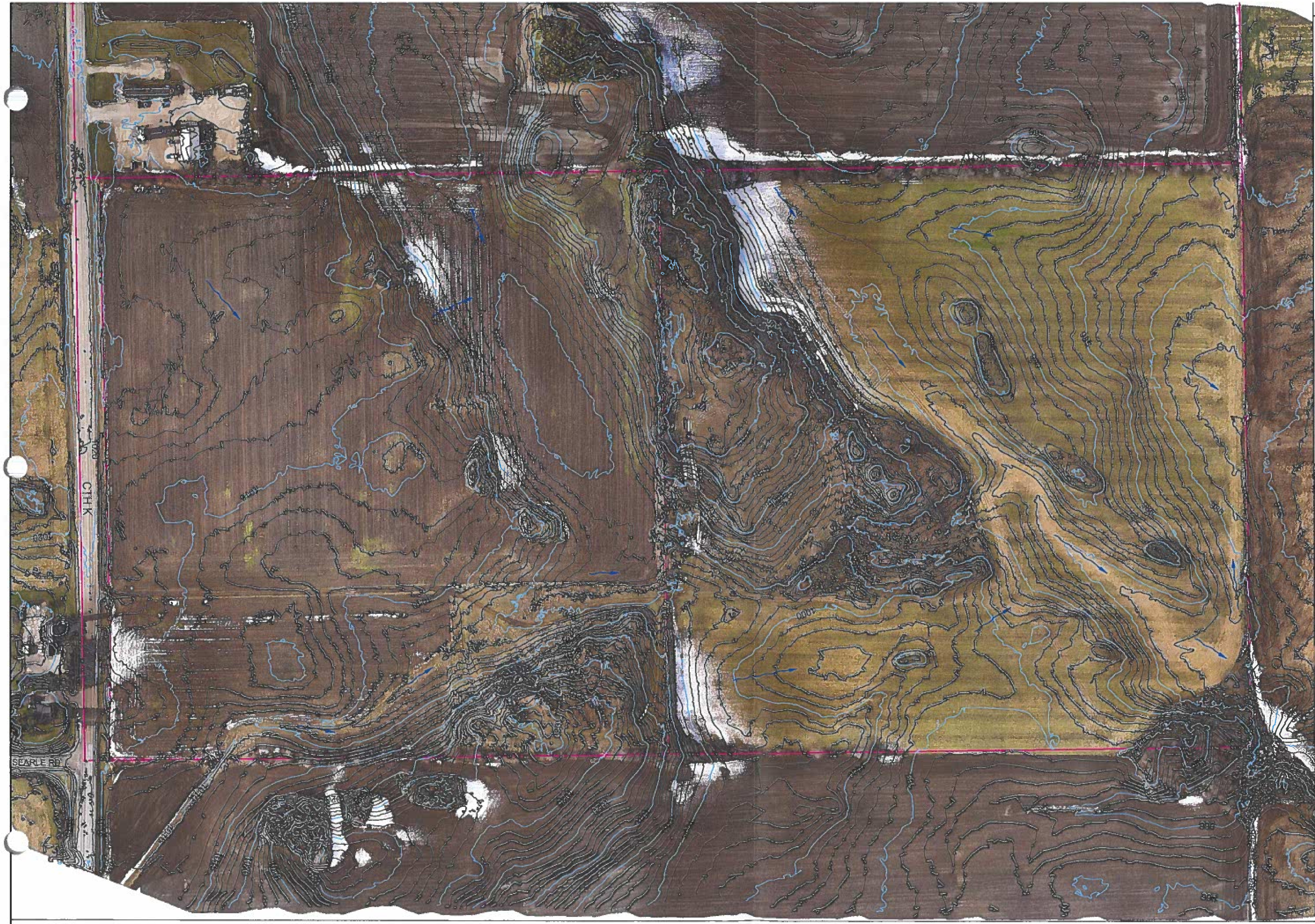
SITE: K QUARRY
NE/SE & SE/SE SEC. 36, 116N.R13E

TITLE: USGS 7.5 MINUTE QUADRANGLE PARCEL OVERLAY

SCALE:	DATE:	DRAWN:
1=1000	12/09/2023	MCM

SHEET NUMBER:	REVISION:
21	

A-2 – Existing Ground



Notes:

1' CONTOURS

DRAINAGE DIRECTION

N

0 100 200

REV:	DESCRIPTION:	BY:	DATE:

STATUS: FINAL

KOPPLIN & KINAS CO., INC.
GREEN LAKE, WISCONSIN

PREPARED FOR:

PREPARED BY:
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GREEN LAKE, WI 54941
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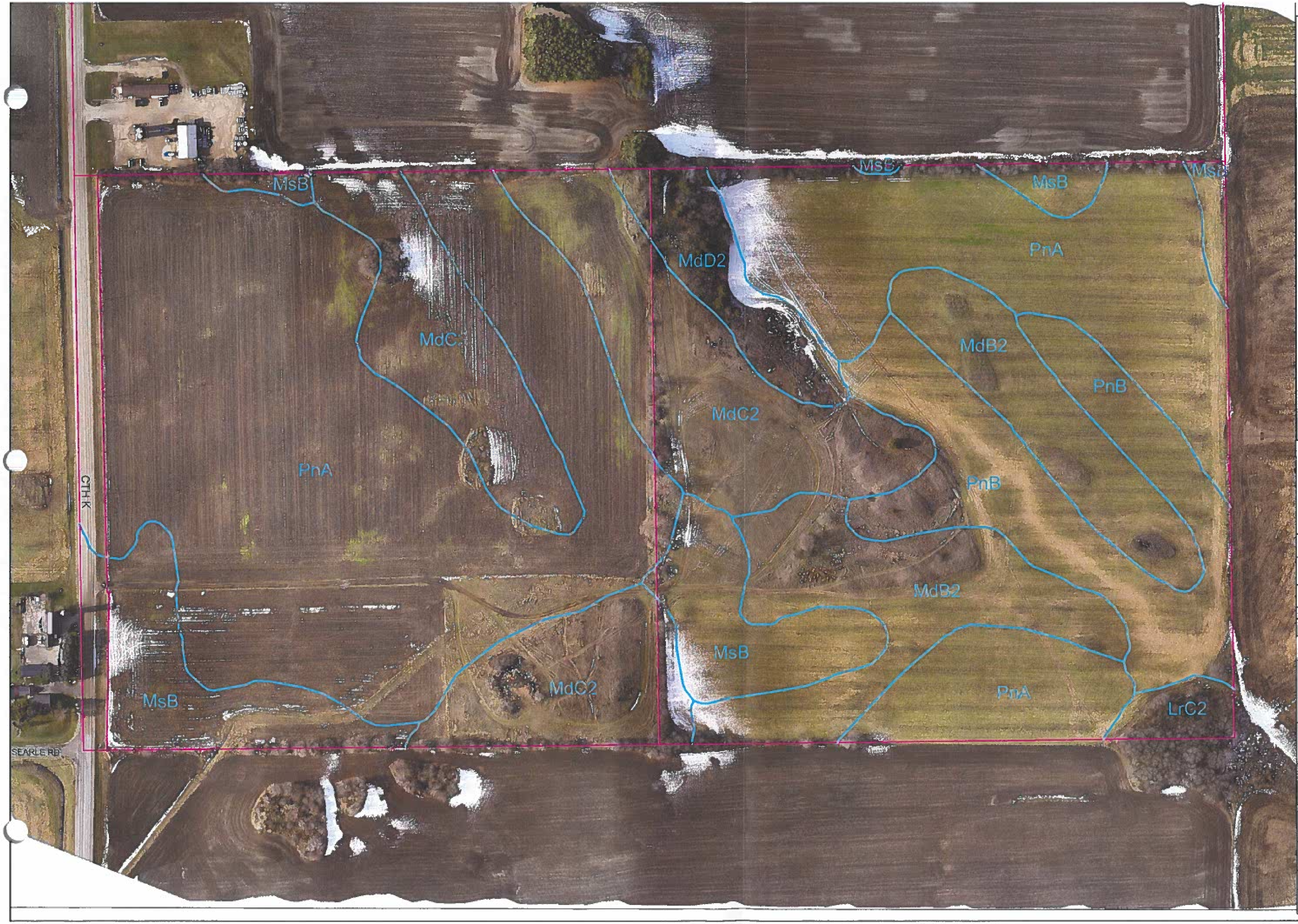
SITE:
K QUARRY
NE/SE & SE/SE SEC. 36, T16N,R13E

TITLE:
EXISTING GROUND
AERIAL SURVEY 12/08/2023

SCALE:	DATE:	DRAWN:
1=200	12/09/2023	MCM

SHEET NUMBER:	REVISION:
22	

A-3 – Soil Map



Notes:

LrC2	LeRoy silt loam, 6 to 12 percent slopes, eroded
MdB2	Markesan silt loam, 2 to 6 percent slopes, eroded MLRA 95B
MdC2	Markesan silt loam, 6 to 12 percent slopes, eroded
MdD2	Markesan silt loam, 12 to 20 percent slopes, eroded
MsB	Mendota silt loam, 2 to 6 percent slopes
PnA	Plano silt loam, till substratum, 0 to 2 percent slopes
PnB	Plano silt loam, till substratum, 2 to 6 percent slopes

REV:	DESCRIPTION:	BY:	DATE:

STATUS: FINAL

KOPPLIN & KINAS CO., INC.
GREEN LAKE, WISCONSIN

PREPARED FOR:

PREPARED BY:
KOPPLIN & KINAS CO., INC.
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GREEN LAKE, WI 54941
(920)294-6451 HTTPS://KKCI.US

SITE:
K QUARRY
NE/SE & SE/SE.SEC. 36, T16N,R13E

TITLE:
USDA SOILS OVERLAY
AERIAL SURVEY 12/08/2023

SCALE:	DATE:	DRAWN:
1=200	12/09/2023	MCM

SHEET NUMBER: 23
REVISION:

A-4 – Existing Agriculture

Notes:

N
0 100 200

REV:	DESCRIPTION:	BY:	DATE:

STATUS: FINAL

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PREPARED FOR:

PREPARED BY:
KOPPLIN & KINAS CO., INC.
W1266 NORTH LAWSON DRIVE
GREEN LAKE, WI 54941
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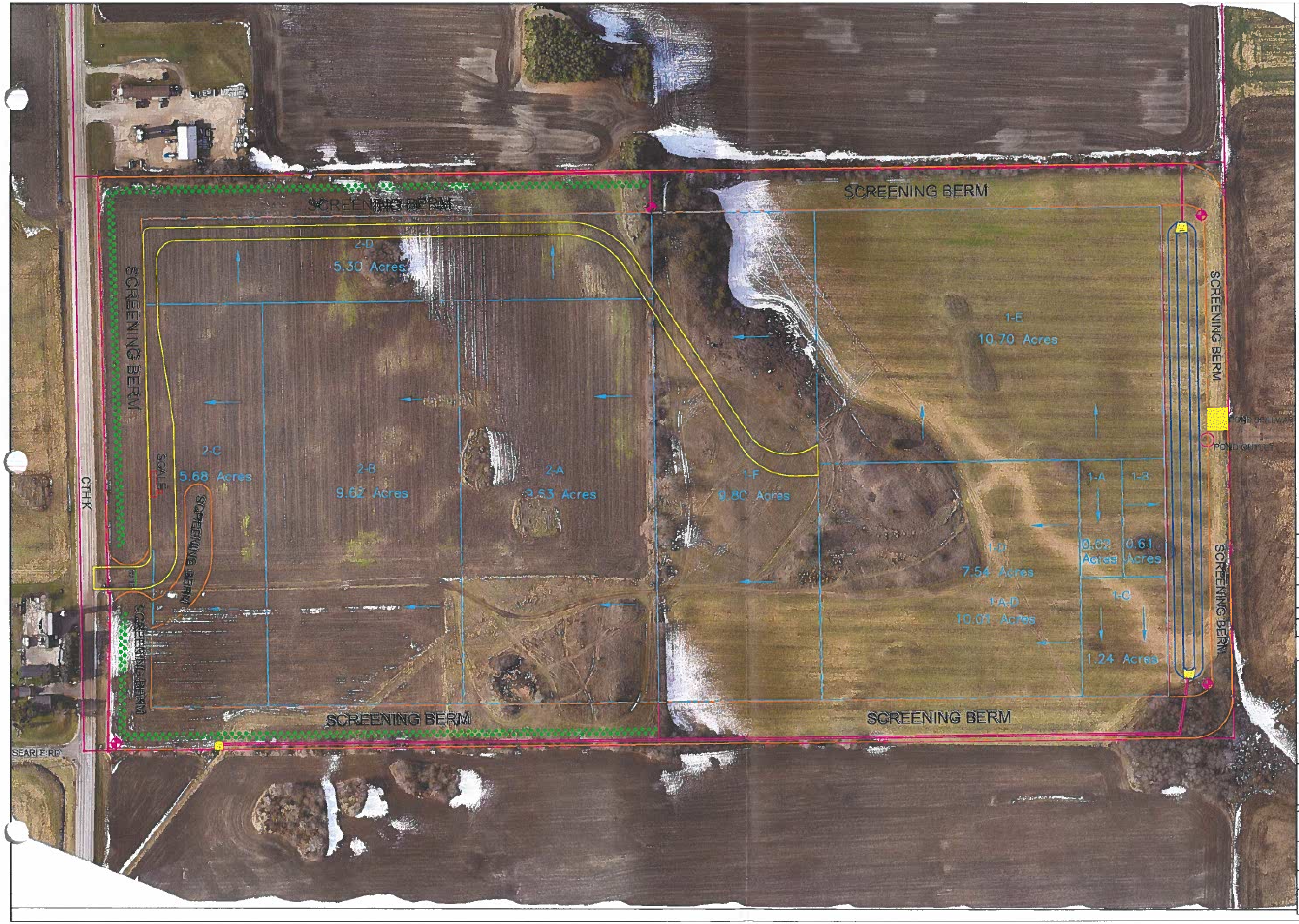
SITE:
K QUARRY
NE/SE & SE/SE,SEC. 36, T16N,R13E

TITLE:
AGRICULTURAL AREA
AERIAL SURVEY 12/08/2023

SCALE:	DATE:	DRAWN:
1=200	12/09/2023	MCM

SHEET NUMBER:	REVISION:
24	

A-5 – Proposed Site & Phasing



Notes:

EROSION CONTROL: STORMWATER BASIN TO BE CONSTRUCTED PRIOR TO ANY OTHER LAND DISTURBING ACTIVITY.

SILT FENCE TO BE INSTALLED AROUND PERIMETER OF SITE WHERE NECESSARY TO PREVENT SEDIMENT FROM LEAVING THE SITE.

ADDITIONAL EROSION CONTROL BMPS ARE TO BE DEPLOYED AS NECESSARY.

POND: POND OUTFALL ELEVATION TO MATCH LOW POINT ON NORTH PROPERTY LINE, APPROXIMATELY 976' AMSL. EMERGENCY SPILLWAY ELEVATION TO BE 2' HIGHER THAN PERMANENT POOL, APPROXIMATELY 978' AMSL.

-GROUNDWATER MONITORING WELL

N

0 100 200

REV:	DESCRIPTION:	BY:	DATE:

STATUS: FINAL

KOPPLIN & KINAS CO., INC.
GREEN LAKE, WISCONSIN

PREPARED FOR:

PREPARED BY:
KOPPLIN & KINAS CO., INC.
W1266 NORTH LAWSON DRIVE
GREEN LAKE, WI 54941
(920)294-6451 HTTPS://KK.CLUS

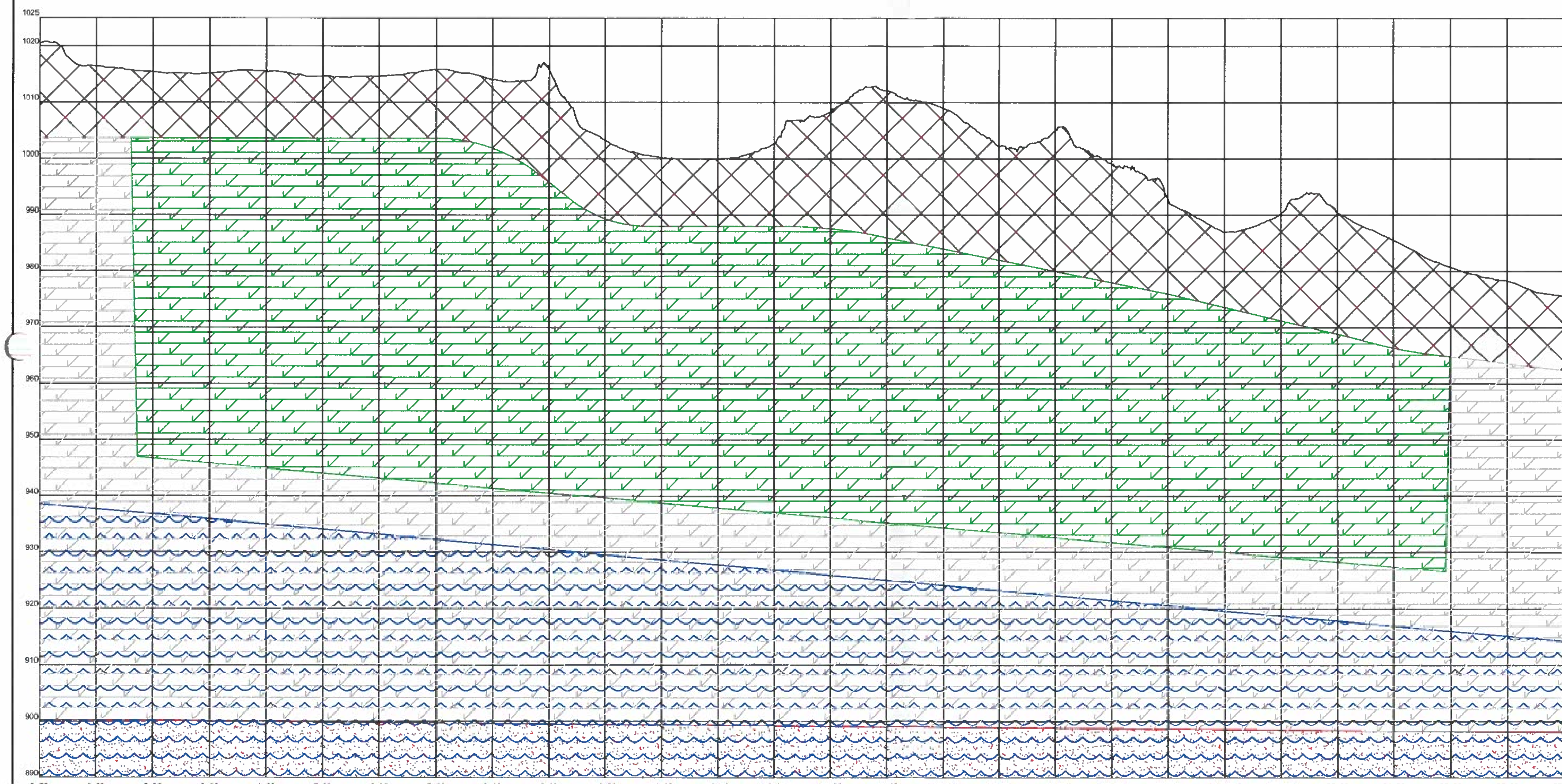
SITE:
K QUARRY
NE/SE & SE/SE,SEC. 36, T16N,R13E

TITLE:
SITE DEVELOPMENT
MINING SEQUENCE

SCALE:	DATE:	DRAWN:
1"=200	12/09/2023	MCM

SHEET NUMBER: 25
REVISION:

A-6 – Geologic Cross-Section



LEGEND:

	OVERBURDEN
	LIMESTONE - TO BE EXTRACTED
	LIMESTONE - NOT EXTRACTED
	SANDSTONE
	GROUNDWATER

GEOLOGIC CROSS-SECTION
FOLLOWS GREEN LINE
SOUTH TO NORTH

REV:	DESCRIPTION:	BY:	DATE:

STATUS: FINAL

KOPPLIN & KINAS CO., INC.
GREEN LAKE, WISCONSIN

PREPARED FOR:

PREPARED BY:
KOPPLIN & KINAS CO., INC.
W1266 NORTH LAWSON DRIVE
GREEN LAKE, WI 54941
(920)294-6451 HTTPS://KKC.US

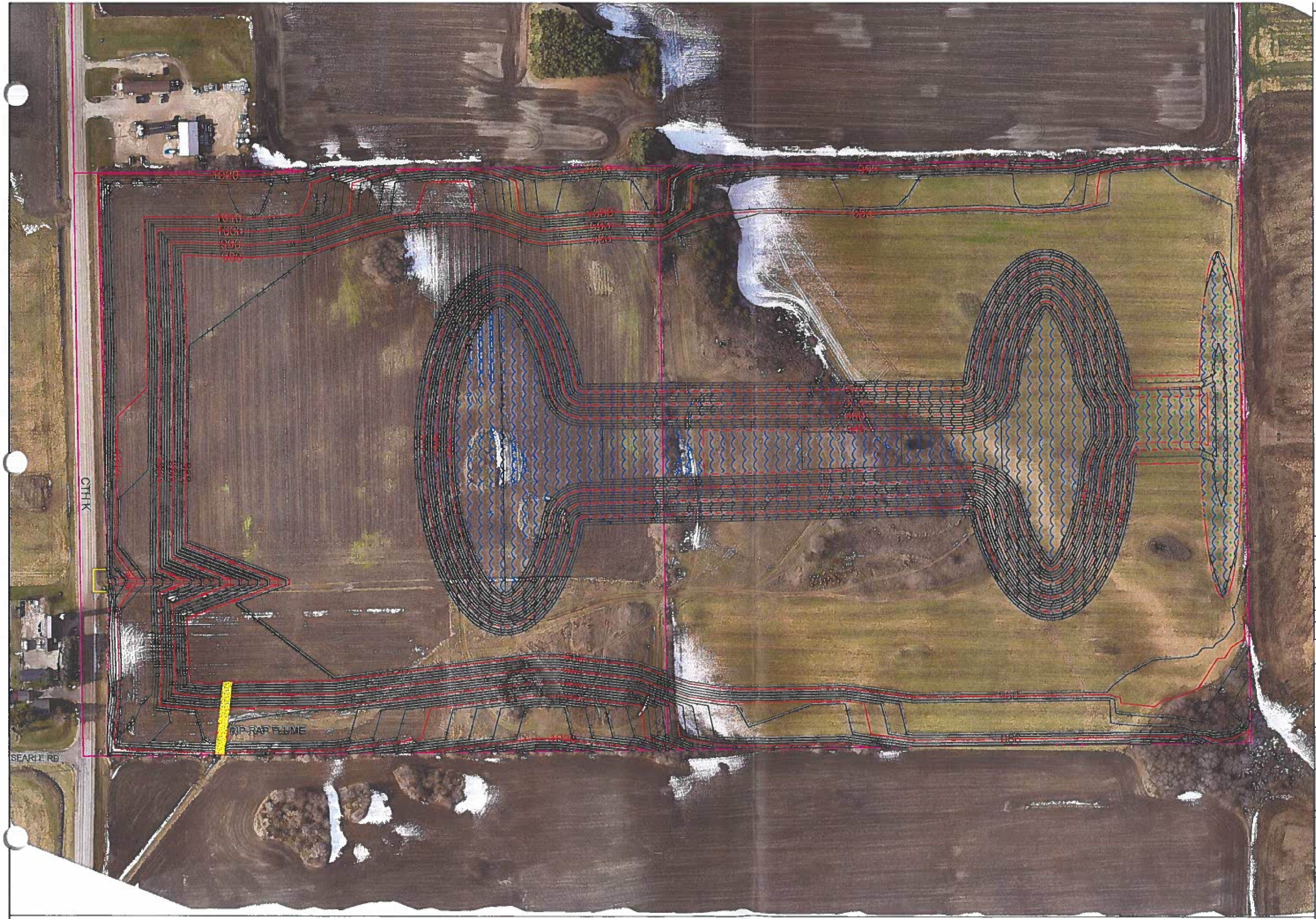
SITE:
K QUARRY
NE/SE & SE/SE, SEC. 36, T16N, R13E

TITLE:
GEOLOGIC CROSS-SECTION
CENTER OF SITE - SOUTH TO NORTH

SCALE:	DATE:	DRAWN:
100H/10V	12/09/2023	MCM

SHEET NUMBER:	REVISION:
26	

A-7 – Reclamation Grading Plan



Notes:

EROSION CONTROL:
ENTIRE SITE IS TO BE GRADED TO DRAIN TO THE POND.

DITCH CHECKS, DIVERSION BERMS, AND ADDITIONAL EROSION CONTROL BMPS ARE TO BE DEPLOYED AS NECESSARY.

POND: POND OUTFALL ELEVATION TO MATCH LOW POINT ON NORTH PROPERTY LINE, APPROXIMATELY 976' AMSL. RECLAIMED POND TO UTILIZE OUTFALL STRUCTURE FROM SITE STORMWATER BASIN. EMERGENCY SPILLWAY ELEVATION TO BE 2' HIGHER THAN PERMANENT POOL, APPROXIMATELY 978' AMSL.

N

0 100 200

REV:	DESCRIPTION:	BY:	DATE:

STATUS: FINAL

KOPPLIN & KINAS CO., INC.
GREEN LAKE, WISCONSIN

PREPARED FOR:

PREPARED BY:
KOPPLIN & KINAS CO., INC.
W1266 NORTH LAWSON DRIVE
GREEN LAKE, WI 54941
(920)294-6451 HTTPS://KKCO.US

SITE:
K QUARRY
NE/SE & SE/SE.SEC. 36, T16N,R13E

TITLE:
RECLAMATION
AERIAL SURVEY 12/08/2023

SCALE:	DATE:	DRAWN:
1=200	12/09/2023	MCM
SHEET NUMBER: 27		REVISION: 0

APPENDIX B – LOCAL WELL CONSTRUCTION REPORTS

State of Wisconsin
Department of Natural Resources
Box 7921
Madison, Wisconsin 53707

NOTE: JUN 15 1977
White Copy – Division's Copy
Green Copy – Driller's Copy
Yellow Copy – Owner's Copy

WELL CONSTRUCTOR'S REPORT
Form 3300–15 Rev. 12-76

COUNTY Fond du Lac | CHECK (✓) ONE: [X] Town [ ] Village [ ] City | Name Metomen

2. LOCATION ¼ Section N.W. | Section 6 | Township 15-N. | Range 14-E

3. NAME [X] OWNER [ ] AGENT AT TIME OF DRILLING CHECK (✓) ONE
Roy Voss

OR – Grid or Street No. | Street Name Searl Rd.

ADDRESS R. 2

AND – If available subdivision name, lot & block No.

POST OFFICE Ripon, Wis.

4. Distance in feet from well to nearest: (Record answer in appropriate block)

Building | Sanitary Bldg. Drain (C.I., Other) | Sanitary Bldg. Sewer (C.I., Other) | Floor Drain Connected To: (C.I. Sewer, Other Sewer) | Storm Bldg. Drain (C.I., Other) | Storm Bldg. Sewer (C.I., Other)

Street Sewer (San., Storm) | Other Sewers (C.I., Other) | Foundation Drain Connected to: (Sewer, Clearwater Dr., Sewage Sump, Clearwater Sump) | Sewage Sump (C.I., Other) | Clearwater Sump | Septic Tank | Holding Tank | Sewage Absorption Unit (Seepage Pit, Seepage Bed, Seepage Trench)

VACANT LOT

Privy | Pet Waste Pit | Pit: Nonconforming Existing (Well, Pump, Tank) | Subsurface Pumproom Nonconforming Existing | Barn Gutter | Animal Barn Pen | Animal Yard | Silo With Pit | Glass Lined Storage Facility | Silo w/o Pit | Earthen Silage Storage Trench Or Pit

Temporary Manure Stack | Watertight Liquid Manure Tank | Solid Manure Storage Structure | Subsurface Gasoline or Oil Tank | Waste Pond or Land Disposal Unit (Specify Type) | Other (Give Description)

5. Well is intended to supply water for: Residence

6. DRILLHOLE

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
8 3/4	Surface	75			
6	75	215			

7. CASING, LINER, CURBING AND SCREEN

Dia. (in.)	Material, Weight, Specification & Method of Assembly	From (ft.)	To (ft.)
6	New, Black Steel	Surface	75
	18.97 lbs.per.ft.		
	ASTM-A-53		
	P.E.		
	Interlake Inc.		

8. GROUT OR OTHER SEALING MATERIAL

Kind	From (ft.)	To (ft.)
Cuttings & Drillmud	Surface	7
Neat Cement	7	75

9. FORMATIONS

Kind	From (ft.)	To (ft.)
Gravel & Clay	Surface	20
Limerock & Shale	20	65
Limerock	65	215

10. TYPE OF DRILLING MACHINE USED

[ ] Cable Tool
[ ] Rotary-air w/drilling mud
[ ] Rotary-w/drilling mud
[X] Rotary-hammer w/drilling mud & air
[ ] Rotary-hammer & air
[ ] Reverse Rotary
[ ] Jetting with [ ] Air [ ] Water

Well construction completed on 5 - 4 1977

Well is terminated 12 inches [X] above [ ] below final grade

Well disinfected upon completion [X] Yes [ ] No

Well sealed watertight upon completion [X] Yes [ ] No

11. MISCELLANEOUS DATA

Yield Test: 1 Hrs. at 10 GPM

Depth from surface to normal water level 100 Ft.

Depth of water level when pumping 105 Ft. Stabilized [X] Yes [ ] No

Madison laboratory on 6 - 7 1977

...ation hazards, information concerning difficulties encountered, and data relating to nearby wells, screens, seals, method of ...t used in grouting, blasting, etc., should be given on reverse side.

FL1290

Signature [signature] Registered Well Driller

Complete Mail Address
Brandon, Wisconsin

WELL CONSTRUCTOR'S REPORT — **WISCONSIN STATE BOARD OF HEALTH** — Wel 6

1. COUNTY: Greenlake
   CHECK ONE: ☒ Town ☐ Village ☐ City — NAME: Greenlake

2. LOCATION (Number and Street or ¼ section, section, township and range. Also give subdivision name, lot and block numbers when available.)
   NE, NE NE, Sec. 1 T16N R13E
   NE, NE, Sec. 1, T 15 N, R 13 E

3. OWNER AT TIME OF DRILLING
   Edward Manske
   Edward Manske

4. OWNER'S COMPLETE MAIL ADDRESS
   Rt. 2, Ripon, Wisconsin

5. Distance in feet from well to nearest: (Record answer in appropriate block)

BUILDING	SANITARY SEWER C. I.	SANITARY SEWER TILE	FLOOR DRAIN C. I.	FLOOR DRAIN TILE	FOUNDATION DRAIN SEWER CONNECTED	FOUNDATION DRAIN INDEPENDENT	WASTE WATER DRAIN C. I.	WASTE WATER DRAIN TILE
6								

CLEAR WATER DRAIN C. I.	CLEAR WATER DRAIN TILE	SEPTIC TANK	PRIVY	SEEPAGE PIT	ABSORPTION FIELD	BARN	SILO	ABANDONED WELL	SINK HOLE
		80			90			100	

OTHER POLLUTION SOURCES (Give description such as dump, quarry, drainage well, stream, pond, lake, etc.)

6. Well is intended to supply water for: Farm

7. DRILLHOLE

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
7 7/8	Surface	48'6"			
5 7/8	48'6"	158			

8. CASING, LINER, CURBING, AND SCREEN

Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
6	Std. steel	Surface	48'6"

9. GROUT OR OTHER SEALING MATERIAL

Kind	From (ft.)	To (ft.)
Drill cuttings	Surface	15
Cement	15	48'6"

10. FORMATIONS

Kind	From (ft.)	To (ft.)
clay	Surface	3
gravel & hardpan	3	20
limerock	20	124
sandstone	124	158

Well construction completed on Nov. 19 1965

Well is terminated 8 inches ☒ above ☐ below final grade

Well disinfected upon completion ☒ Yes ☐ No

Well sealed watertight upon completion ☒ Yes ☐ No

11. MISCELLANEOUS DATA

Yield test: ½ Hrs. at 20 GPM

Depth from surface to normal water level 38 ft.

Depth to water level when pumping 98 ft.

Water sample sent to Madison laboratory on: Nov. 23 1965

Your opinion concerning other pollution hazards, information concerning difficulties encountered, and data relating to nearby wells, screens, seals, type of casing joints, method of finishing the well, amount of cement used in grouting, blasting, subsurface pumprooms, access pits, etc., should be given on reverse side.

SIGNATURE: Richard Berkholtz
Richard Berkholtz, President — Registered Well Driller

COMPLETE MAIL ADDRESS: BERKHOLTZ CO. INC., 1170 Forest Lane, Brookfield, Wisconsin

Please do not write in space below

COLIFORM TEST RESULT	GAS — 24 HRS.	GAS — 48 HRS.	CONFIRMED	REMARKS

2502

1377099

plot

Well Construction Report *WISCONSIN UNIQUE WELL NUMBER*	LX386	Drinking Water and Groundwater - DG/5 Department of Natural Resources, Box 7921 Madison WI 53707	Form 3300-077A

Property Owner	HERSCHBERGER, ART	Phone # (414)295-6220
Mailing Address	W208 CTY RD K	
City RIPON	State WI	Zip Code 54971

County	Co. Permit #	Notification #	Completed
Green Lake			07-03-1997

Well Constructor (Business Name)	Lic. #	Facility ID # (Public Wells)
SAMS ROTARY DRILLERS INC	370	
		Well Plan Approval #
Address PO BOX 150 RANDOLPH WI 53956-0150		Approval Date (mm-dd-yyyy)

Hicap Permanent Well #	Common Well #	Specific Capacity
		0.1

3. Well serves 1 # of BUSINESS

Private,potable

Heat Exchange____# of drillholes

Hicap Well ? No

Hicap Property ? No

Hicap Potable ?

1. Well Location

Town of BROOKLYN		Fire # (if avail.)
Street Address or Road Name and Number		
CTY HWY K		
Subdivision Name	Lot #	Block #

Latitude / Longitude in Decimal Degree (DD)		Method Code
°N	°W	GPS008

SW	SE	Section	Township	Range
or Govt Lot #		36	16 N	13 E

2. Well Type New Well

of previous unique well # constructed in

Reason for replaced or reconstructed well ?

Construction Type Drilled

4. Potential Contamination Sources - ON REVERSE SIDE

5. Drillhole Dimensions and Construction Method

Dia. (in.)	From (ft.)	To (ft.)
8.75	Surface	103
6	103	177

Upper Enlarged Drillhole — Lower Open Bedrock

Rotary - Mud Circulation ....

Yes Rotary - Air ....

Rotary - Air & Foam ....

Drill-Through Casing Hammer

Reverse Rotary

Cable-tool Bit ____in. dia...

Dual Rotary ....

Yes Temp. Outer Casing 10in. dia

Removed? ____depth ft. (If NO explain on back side)

8. Geology

Geology Codes	8. Geology Type, Caving/Noncaving, Color, Hardness, etc...	From (ft.)	To (ft.)
Z	CLAY @ GRAVEL	Surface	3
L	LIMEROCK	3	120
N	SANDROCK	120	177

6. Casing, Liner, Screen

Dia. (in.)	Material, Weight, Specification Manufacturer & Method of Assembly	From (ft.)	To (ft.)
6	STD BLK PIPE 280 WALL WLD JTS A53 SAWHILL	Surface	103
Dia. (in.)	Screen type, material & slot size	From (ft.)	To (ft.)

9. Static Water Level

85 ft. below ground surface

10. Pump Test

Pumping level 120 ft. below surface

Pumping at 2 GP M for 1 Hrs.

Pumping Method ?

11. Well Is

24 in. above grade

Developed ? Yes

Disinfected ? Yes

Capped ? Yes

7. Grout or Other Sealing Material

Method TREMIE PUMPED

Kind of Sealing Material	From (ft.)	To (ft.)	# Sacks Cement
CEMENT	Surface	103	21 S

12. Notified Owner of need to fill & seal ?

Filled & Sealed Well(s) as needed?

13. Constructor / Supervisory Driller	Lic #	Date Signed
SVJ		07-15-1997
Drill Rig Operator	Lic or Reg #	Date Signed
RH		07-15-1997

WELL CONSTRUCTOR'S REPORT
FORM 3300-15

MAR 26 1975

NOTE
WHITE COPY – DIVISION'S COPY
GREEN COPY – DRILLER'S COPY
YELLOW COPY – OWNER'S COPY

APR 8 1975
STATE OF WISCONSIN
DEPARTMENT OF NATURAL RESOURCES
Box 450
Madison, Wisconsin 53701

COUNTY	CHECK ONE	NAME
Green Lake	[X] Town [ ] Village [ ] City	Brooklyn

2. LOCATION – ¼ Section: S, E, | Section: 36 | Township: 16N | Range: 13E

OR Grid or street no. | Street name: Hwy K

AND If available subdivision name, lot & block no.

3. OWNER AT TIME OF DRILLING Richard G. Hahn

ADDRESS Route # 3

POST OFFICE Ripon, Wis.

4. Distance in feet from well to nearest: (Record answer in appropriate block)

BUILDING	SANITARY SEWER C. I.	SANITARY SEWER TILE	FLOOR DRAIN C. I.	FLOOR DRAIN TILE	FOUNDATION DRAIN SEWER CONNECTED	FOUNDATION DRAIN INDEPENDENT	WASTE WATER DRAIN C. I.	WASTE WATER DRAIN TILE
6	36							

CLEAR WATER DRAIN C. I.	CLEAR WATER DRAIN TILE	SEPTIC TANK	PRIVY	SEEPAGE PIT	ABSORPTION FIELD	BARN	SILO	ABANDONED WELL	SINK HOLE
		61			73	67		26	

OTHER POLLUTION SOURCES (Give description such as dump, quarry, drainage well, stream, pond, lake, etc.)

5. Well is intended to supply water for: Farm

6. DRILLHOLE

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
8	Surface	75			
6	75	190			

7. CASING, LINER, CURBING, AND SCREEN

Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
6	New, black steel	Surface	75
	18.97 lbs. per ft.		
	P.E.		

8. GROUT OR OTHER SEALING MATERIAL

Kind	From (ft.)	To (ft.)
Cuttings & Drillmud	Surface	8
Neat Cement	8	75

9. FORMATIONS

Kind	From (ft.)	To (ft.)
Gravel & Clay	Surface	22
Limerock & Shale	22	64
Limerock	64	115
Sandstone	115	190

10. TYPE OF DRILLING MACHINE USED

[ ] Cable Tool [ ] Direct Rotary [ ] Reverse Rotary
[X] Rotary – air w/drilling mud [ ] Rotary – hammer with drilling mud & air [ ] Jetting with [ ] Air [ ] Water

Well construction completed on 2 - 26 19 75

Well is terminated 12 **inches** [X] above [ ] below **final grade**

Well disinfected upon completion [X] Yes [ ] No

Well sealed watertight upon completion [X] Yes [ ] No

11. MISCELLANEOUS DATA

Yield test: 24 **Hrs. at** 10 **GPM**

Depth from surface to normal water level 79 **ft.**

Depth to water level when pumping 84 **ft.**

Water sample sent to Madison **laboratory on:** 2 - 27 19 75

Your opinion concerning other pollution hazards, information concerning difficulties encountered, and data relating to nearby wells, screens, seals, type of casing joints, method of finishing the well, amount of cement used in grouting, blasting, sub-surface pumprooms, access pits, etc., should be given on reverse side.

SIGNATURE [signature] Registered Well Driller

COMPLETE MAIL ADDRESS Brandon, Wisconsin

Please do not write in space below

COLIFORM TEST RESULT	GAS 24 HRS.	GAS 48 HRS.	CONFIRMED	REMARKS

REV. 3-71

Well Construction Report *WISCONSIN UNIQUE WELL NUMBER*	UW527	Drinking Water and Groundwater - DG/5 Department of Natural Resources, Box 7921 Madison WI 53707	Form 3300-077A

Property Owner	KEMNITZ, GLORIA	Phone #	
Mailing Address	W241 CO TRK K		
City RIPON	State WI	Zip Code 54971	
County	Co. Permit #	Notification #	Completed
Green Lake		32619568	05-26-2009

1. Well Location

Town of GREEN LAKE	Fire # (if avail.) W241
Street Address or Road Name and Number	CO RD K
Subdivision Name	Lot # / Block #
Latitude / Longitude in Decimal Degree (DD) °N °W	Method Code

NW	NE	Section	Township	Range
or Govt Lot #		1	15 N	13 E

Well Constructor (Business Name)	Lic. #	Facility ID # (Public Wells)
CENTRAL WELL DRILLING INC	4231	
		Well Plan Approval #
Address PO BOX 405 400 S WOODWARD ST BRANDON WI 53919-0405		Approval Date (mm-dd-yyyy)
Hicap Permanent Well #	Common Well #	Specific Capacity 1.3

2. Well Type Replacement

of previous unique well # constructed in

Reason for replaced or reconstructed well ?

OLD WELL NOT TO CODE

Construction Type Drilled

3. Well serves 1 # of	Hicap Well ? No
Private,potable	Hicap Property ? No
Heat Exchange____# of drillholes	Hicap Potable ?

4. Potential Contamination Sources - ON REVERSE SIDE

5. Drillhole Dimensions and Construction Method

Dia. (in.)	From (ft.)	To (ft.)
8.75	Surface	67
6	67	178
5	178	218

Upper Enlarged Drillhole	Method	Lower Open Bedrock
Yes	Rotary - Mud Circulation	Yes
Yes	Rotary - Air	Yes
	Rotary - Air & Foam	
	Drill-Through Casing Hammer	
	Reverse Rotary	
	Cable-tool Bit ____in. dia...	
	Dual Rotary	
	Temp. Outer Casing ____in. dia	
	Removed? ____depth ft. (If NO explain on back side)	

8. Geology

Geology Codes				8. Geology Type, Caving/Noncaving, Color, Hardness, etc...	From (ft.)	To (ft.)
T	-	C	-	BROWN CLAY	Surface	8
-	-	L	I	MARKESAN LOAM	8	18
-	-	L	-	LIMEROCK	18	44
-	C	-	-	CERVICE	44	46
-	-	H	-	SHALE	46	64
-	-	L	-	LIMEROCK	64	96
-	Q	N	-	SOFT AND CAVING SANDROCK	96	218

6. Casing, Liner, Screen

Dia. (in.)	Material, Weight, Specification Manufacturer & Method of Assembly	From (ft.)	To (ft.)
6	NEW BLACK STEEL ASTM A-53B P.E. MITTAL CANADA	Surface	67
5	NEW BLACK STEEL IPSCO P.E. ASTM A-53B W/K-PACKER	66	178

Dia. (in.)	Screen type, material & slot size	From (ft.)	To (ft.)

7. Grout or Other Sealing Material

Method TREMIE PUMPED

Kind of Sealing Material	From (ft.)	To (ft.)	# Sacks Cement
CEMENT	Surface	67	12 S

9. Static Water Level

85 ft. below ground surface

10. Pump Test

Pumping level 100 ft. below surface

Pumping at 20 GP M for 3 Hrs.

Pumping Method ?

11. Well Is

18 in. above grade

Developed ?	Yes
Disinfected ?	Yes
Capped ?	Yes

12. Notified Owner of need to fill & seal ?

Filled & Sealed Well(s) as needed? Yes

13. Constructor / Supervisory Driller	Lic #	Date Signed
SS		05-26-2009
Drill Rig Operator	Lic or Reg #	Date Signed

WELL CONSTRUCTOR'S REPORT TO WISCONSIN STATE BOARD OF HEALTH

See Instructions on Reverse Side

1. County Fond du Lac — Town ☒ Village ☐ City ☐ Ripon (Check one and give name)
2. Location Sec 31 SW¼ of NE¼ T16N R14E (Name of street and number of premise or Section, Town and Range numbers)
3. Owner ☒ or Agent ☐ John Linsbach (Name of individual, partnership or firm)
4. Mail Address Ripon (Complete address required)
5. From well to nearest: Building 8 ft; sewer ___ ft; drain ___ ft; septic tank 50 ft; dry well or filter bed ___ ft; abandoned well 200 ft.
6. Well is intended to supply water for: Home

RECEIVED
JAN 23 1959
ENVIRONMENTAL SANITATION

7. DRILLHOLE:

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
10	0	42			
6	42	200			

8. CASING AND LINER PIPE OR CURBING:

Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
~~4~~	Steel 19.45	0	42
6	" "	"	"

9. GROUT:

Kind	From (ft.)	To (ft.)
Slurry Cement	0	42

10. FORMATIONS:

Kind	From (ft.)	To (ft.)
Clay	0	5
Sand	5	18
Limestone	18	50
Sandstone	50	200
water bearing		

Construction of the well was completed on: Dec 31 1958

The well is terminated 10 inches ☒ above, below ☐ the permanent ground surface.

Was the well disinfected upon completion? Yes X No ___

Was the well sealed watertight upon completion? Yes X No ___

11. MISCELLANEOUS DATA:

Yield test: 12 Hrs. at 20 GPM.

Depth from surface to water-level: 60 ft.

Water-level when pumping: 70 ft.

Water sample was sent to the state laboratory at: Oshkosh (City) on Jan 6 1959

Signature Wallace Clark (Registered Well Driller) — Oshkosh R3 (Complete Mail Address)

Please do not write in space below

Rec'd ___ No. ___

Ans'd ___

Interpretation ___

	10 ml	10 ml	10 ml	10 ml	10 ml
Gas—24 hrs.					
48 hrs.					
Confirm					
B. Coli					

Examiner ___

FL4329

Well Construction Report *WISCONSIN UNIQUE WELL NUMBER*	CP187	Drinking Water and Groundwater - DG/5 Department of Natural Resources, Box 7921 Madison WI 53707	Form 3300-077A

Property Owner	ERIC GODFREY
Phone #	(414)748-6789
Mailing Address	PRAIRIE RD
City	RIPON
State	WI
Zip Code	54971
County	Fond du Lac
Co. Permit #	
Notification #	
Completed	06-22-1990
Well Constructor (Business Name)	SLAGER LARRY J
Lic. #	140
Facility ID # (Public Wells)	
Well Plan Approval #	
Address	P O BOX 405 BRANDON WI 53919
Approval Date (mm-dd-yyyy)	
Hicap Permanent Well #	
Common Well #	
Specific Capacity	0.8

3. Well serves 1 # of

Private,potable

Heat Exchange____# of drillholes

Hicap Well ?	No
Hicap Property ?	No
Hicap Potable ?	

1. Well Location

Town of RIPON

Fire # (if avail.)

Street Address or Road Name and Number

Subdivision Name	Lot #	Block #

Latitude / Longitude in Decimal Degree (DD)		Method Code
43.82346 °N	-88.88129 °W	GPS008

SW	SW	Section	Township	Range
or Govt Lot #		30	16 N	14 E

2. Well Type New Well

of previous unique well # constructed in

Reason for replaced or reconstructed well ?

NEW HOME

Construction Type Drilled

4. Potential Contamination Sources - ON REVERSE SIDE

5. Drillhole Dimensions and Construction Method

Dia. (in.)	From (ft.)	To (ft.)
8.75	Surface	62
6	62	220

Upper Enlarged Drillhole / Lower Open Bedrock

Yes Rotary - Mud Circulation ....

Rotary - Air ....

Rotary - Air & Foam ....

Drill-Through Casing Hammer

Reverse Rotary

Cable-tool Bit ____in. dia...

Dual Rotary ....

Temp. Outer Casing ____in. dia

Removed? ____depth ft. (If NO explain on back side)

8. Geology

Geology Codes			**8. Geology** Type, Caving/Noncaving, Color, Hardness, etc...	From (ft.)	To (ft.)
		C	CLAY	Surface	6
	B	L	LIMEROCK (BROKEN)	6	30
		L	LIMEROCK	30	220

6. Casing, Liner, Screen

Dia. (in.)	Material, Weight, Specification Manufacturer & Method of Assembly	From (ft.)	To (ft.)
6	NEW BLK STL 18.97#/FT 1780 PSI ASTMA 53 GR BP.E. VENEZUELA	Surface	62
Dia. (in.)	**Screen type, material & slot size**	**From (ft.)**	**To (ft.)**

9. Static Water Level

64 ft. below ground surface

10. Pump Test

Pumping level 82 ft. below surface

Pumping at 15 GP for 3 Hrs.

Pumping Method ?

11. Well Is

12 in. above grade

Developed ?	Yes
Disinfected ?	Yes
Capped ?	Yes

7. Grout or Other Sealing Material

Method PRESSURE

Kind of Sealing Material	From (ft.)	To (ft.)	# Sacks Cement
MUD @ CUTTINGS	Surface	6	
CEMENT	6	62	11

12. Notified Owner of need to fill & seal ?

Filled & Sealed Well(s) as needed?

13. Constructor / Supervisory Driller	Lic #	Date Signed
LJS		06-22-1990
Drill Rig Operator	**Lic or Reg #**	**Date Signed**

WELL CONSTRUCTOR'S REPORT TO WISCONSIN STATE BOARD OF HEALTH
See Instructions on Reverse Side

RECEIVED JAN 31 1950 BUREAU SAN. ENG.

1. County Green Lake — Town [X] Village [ ] City [ ] Brooklyn
Check one and give name

2. Location 'NE, NW N. E. of [redacted] Sec.36 Township 16 north Range13 E
Name of street and number of premise or Section, Town and Range numbers

3. Owner [X] or Agent [ ] August Quick
Name of individual, partnership or firm

4. Mail Address Ripon Route 2
Complete address required

5. From well to nearest: Building ~~32~~ 25 ft; sewer 45 ft; drain ~~85~~ 50 ft; septic tank ~~none~~ 55 ft;
dry well or filter bed 75 ft; abandoned well 200 ft.

6. Well is intended to supply water for: Home & Farm

7. DRILLHOLE:

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
8	0	75			
6	75	140			

8. CASING AND LINER PIPE OR CURBING:

Dia. (in.)	Kind	From (ft.)	To (ft.)
6	Standard Weight		
	steel pipe	0	75

9. GROUT:

Kind	From (ft.)	To (ft.)
Drill cuttings	0	18
cement	18	75

10. FORMATIONS:

Kind	From (ft.)	To (ft.)
clay gravel	0	15
Limestone	15	55
Sand-stone	55	140

Construction of the well was completed on:
Dec. 29 1949

The well is terminated 8 inches
[X] above, below [ ] the permanent ground surface.

Was the well disinfected upon completion?
Yes X No

Was the well sealed watertight upon completion?
Yes X No

11. MISCELLANEOUS DATA:

Yield test: 1 Hrs. at 30 GPM.

Depth from surface to water-level: 52 ft.

Water-level when pumping: 55 ft.

Water sample was sent to the state laboratory at:
Oshkosh on Jan. 18 1950
City

Signature R. J. Schafer & Sons — Fremont Wis.
Registered Well Driller — Complete Mail Address

Please do not write in space below

Rec'd JAN 20 1950 No. 00505

Ans'd

Interpretation Safe

	10 ml	10 ml	10 ml	10 ml	10 ml
Gas—24 hrs.	O	O	O	O	O
48 hrs.	O	O	O	O	O
Confirm					
B. Coli					

Examiner

4429

1377058

Well Construction Report *WISCONSIN UNIQUE WELL NUMBER*	SQ446	Drinking Water and Groundwater - DG/5 Department of Natural Resources, Box 7921 Madison WI 53707	Form 3300-077A

Property Owner: MACHKOVICH, STEVE | Phone #:

Mailing Address: W235 PRAIRIE RD

City: RIPON | State: WI | Zip Code: 54971

County	Co. Permit #	Notification #	Completed
Green Lake			08-20-2004

Well Constructor (Business Name)	Lic. #	Facility ID # (Public Wells)
DANIEL J STEFFES	6109	

Well Plan Approval #: 24-1-0031

Address: BADGER WELL DRLG
FOND DU LAC WI 54935

Approval Date (mm-dd-yyyy): 07-07-2004

Hicap Permanent Well #	Common Well #	Specific Capacity
	2	2.7

3. Well serves # of IRRIGATION

Private, non-potable Irrigation

Heat Exchange____# of drillholes

Hicap Well ? Yes

Hicap Property ? Yes

Hicap Potable ?

1. Well Location | Fire # (if avail.)

Town of BROOKLYN

Street Address or Road Name and Number

Subdivision Name	Lot #	Block #

Latitude / Longitude in Decimal Degree (DD)		Method Code
°N	°W	GPS008

NE	NE	Section	Township	Range
or Govt Lot #		36	16 N	13 E

2. Well Type New Well | YJ585 replaces this well

of previous unique well # | constructed in

Reason for replaced or reconstructed well ?

Construction Type Drilled

4. Potential Contamination Sources - ON REVERSE SIDE

5. Drillhole Dimensions and Construction Method

Dia. (in.)	From (ft.)	To (ft.)
16	Surface	62
12	62	465

Upper Enlarged Drillhole		Lower Open Bedrock
Yes	Rotary - Mud Circulation	No
	Rotary - Air	
	Rotary - Air & Foam	
	Drill-Through Casing Hammer	
	Reverse Rotary	
	Cable-tool Bit ____in. dia...	
	Dual Rotary	
	Temp. Outer Casing ____in. dia	
	Removed? ____depth ft. (If NO explain on back side)	

8. Geology

Geology Codes				8. Geology Type, Caving/Noncaving, Color, Hardness, etc...	From (ft.)	To (ft.)
K	-	I	-	BLACK DIRT	Surface	3
-	-	Y	P	HARDPAN STONES SAND	3	34
-	-	L	-	LIMESTONE	34	87
-	-	N	-	SANDSTONE	87	115
-	-	N	L	SANDSTONE LIMESTONE	115	197
-	-	N	-	SANDSTONE	197	465

6. Casing, Liner, Screen

Dia. (in.)	Material, Weight, Specification Manufacturer & Method of Assembly	From (ft.)	To (ft.)
12	ASTM A53B IPSCO PARAGON 12.750 X .375 EL 21 PLAIN END	Surface	62

Dia. (in.)	Screen type, material & slot size	From (ft.)	To (ft.)

9. Static Water Level

38 ft. below ground surface

10. Pump Test

Pumping level 225 ft. below surface

Pumping at 500 GP M for 1 Hrs.

Pumping Method ?

11. Well Is

24 in. above grade

Developed ? Yes

Disinfected ? Yes

Capped ? Yes

7. Grout or Other Sealing Material

Method TREMIE PIPE PUMPED

Kind of Sealing Material	From (ft.)	To (ft.)	# Sacks Cement
NEAT CEMENT GROUT	Surface	62	45 S

12. Notified Owner of need to fill & seal ?

Filled & Sealed Well(s) as needed?

13. Constructor / Supervisory Driller	Lic #	Date Signed
DJS		08-20-2004
Drill Rig Operator	Lic or Reg #	Date Signed

Wisconsin Geological and Natural History Survey
DIVISION OF EXTENSION
UNIVERSITY OF WISCONSIN-MADISON

BOREHOLE GEOPHYSICAL LOG

WGNHS ID 24000136 SITE NAME Machkovich 2
WUWN SQ446 COUNTY Green Lake DATE 5/24/2013 LOGGED BY PM Chase

LATITUDE 43.818841 LOCATION Ripon, WI - NE1/4, NE1/4, Sec 36 T16N R 13E
LONGITUDE -88.888482 LOC METHOD GPS LOC CONF 30m/100ft

ELEVATION 988 WELL DEPTH 415 CASING DEPTH 61
ELEV. METHOD 10mDEM2017 DEPTH TO WATER 95 CASING STICK UP 1

Comments:

LOGS COLLECTED:

- [X] Gamma
- [X] Caliper
- [X] Single Point Resistivity
- [X] Self Potential
- [X] Normal Resistivity
- [X] Fluid Temperature
- [X] Fluid Conductivity
- [ ] Flow Meter- HeatPulse
- [ ] Flow Meter- Spinner (up is negative; down is positive)
- [ ] Optical Borehole Imager
- [ ] Acoustic Borehole Imager
- [ ] OTHER

Unless noted, (1) all depths are in feet; (2) well depth, casing depth, and depth to water are interpreted from geophysical log; and (3) datum is the top of casing. For more information or to obtain collected data not shown, please contact: data@wgnhs.wisc.edu

File Created on: 2/3/2014
By: AMB

APPENDIX C – WISCONSIN CHAPTER 30 DETERMINATION

State of Wisconsin
DEPARTMENT OF NATURAL RESOURCES
625 E County Rd Y
Oshkosh, WI, 54901

Tony Evers, Governor
Adam N. Payne, Secretary
Telephone 608-266-2621
Toll Free 1-888-936-7463
TTY Access via relay - 711

May 5, 2023

Caleb Edwards
Green Lake County Planning and Development
571 County Road A
Green Lake, WI 54941
[sent electronically]

INF-NE-2023-24-01327

RE: Request for a Navigability Determination Concurrence, for a Tributary to Dakin Creek, located on the Retzlaff Property, in the Town of Brooklyn, Green Lake County.

Dear Caleb::

We have reviewed the navigability determination submitted to the department by Green Lake County after county staff visited this site on April 18, 2023. The site is located in the SE 1/4, SE 1/4 of Section 36, Township 16N, Range 13E. In Wisconsin, the Supreme Court has defined a navigable waterway as one which has a defined bed and banks and carries enough water to float a canoe or other watercraft during the spring high water periods. Based on this definition and the conditions observed at your site, the department concurs with your assessment that the stream on this property has been determined to be non-navigable and so is not regulated as a public watercourse.

While we acknowledge that the wealth of evidence you provided indicates that this reach is non-navigable for Ch. 30 jurisdiction, please do take into consideration that this watershed collects water from roadway ditches and an agricultural area, and it eventually drains into a navigable waterway and trout stream (Dakin Creek), so any development plans along this reach should carefully consider any activities which may alter or impact the watershed and runoff, and the water quality further downstream.

According to Chapter 30, Wis. Stats., permits are not needed for work in and near this waterway. Information on these regulations and application materials are available on the DNR waterways website at https://dnr.wisconsin.gov/topic/Waterways.

Certain activities may also require permits from the local county zoning department and/or the federal office Army Corps of Engineers (ACOE). It's beneficial for the property owner to reach out and contact those offices before beginning any construction at this site.

If you have any questions about your determination, please call me at (920) 267-1739 or you can reach me by email at Dale.Rezabek@wisconsin.gov.

Sincerely,

Dale H Rzbk

Dale Rezabek
Water Management Specialist (Shoreland)

Email cc: U.S. Army Corps of Engineers
Lane Loveland, WDNR WMS NMM
Eric Stadig, WDNR WMS
Alison Masek, WDNR WMS
Brad Latza WDNR Conservation Warden

Enclosure: Map of navigability determination concurrence

APPENDIX D – PRODUCT LIST

Kopplin & Kinas Co., Inc. Product List

Shot Rock

Rip-Rap- Various Sizes

Breaker Run

Dense Base- Various Sizes

Clear Stone- Various Sizes

Screenings

Ag-Lime

Asphalt & Concrete Aggregate

Recycled Concrete

Recycled Asphalt

Crushed Chips- Various Sizes

Crushed Granular Fill

APPENDIX E – AGGREGATE PROCESSING & CONSTRUCTION EQUIPMENT

Kopplin & Kinas Co., Inc.

Aggregate Processing & Construction Equipment

Site Development

Dozers
Scrapers
Excavators
Haul Trucks
Graders

Processing & Material Transport

Drill Rigs
Crushing Units (Primary, Secondary, Tertiary)
Screening Units
Washing Units
Conveyors
Wheeled Loaders
Skid-Loaders
Service Trucks
Crane
Haul Trucks
Generators
Pumps

Aggregate & Product Transport

Truck Scale
Scale House
Dump Trucks
Forklifts

Equipment for Environmental Control

Tractor & Seed Drill
Roller
Water Truck
Sweeper

Appendix F – Pollution Prevention Best Management Practices

Kopplin & Kinas Company Inc.
Pollution Prevention Best Management Practices

1 Introduction & Purpose

Kopplin & Kinas Company Incorporated (KKCI) is an aggregate production and heavy/civil construction company serving the communities of Green Lake and the surrounding counties since 1926.

KKCI's business is reliant upon an available supply of sand and crushed stone to complete their projects and service their customers. Crushed stone and sand and gravel are intermittently excavated from local stone and glacial deposits. They are processed and delivered using one or more combinations of stripping, excavating, crushing, screening, washing, and load-out equipment.

KKCI has prepared the following plan to identify potential pollutants at these work sites and minimize their exposure to sensitive waters of the State through employee education, sound planning, and the best management practices (BMPs) described herein.

2 Responsibility & Training

It is the responsibility of all employees to recognize and respond to potential environmental concerns. Pollution prevention plans are reviewed annually by executive and field personnel and updated as needed to protect surface water and groundwater resources. Field crews are trained in the importance of pollution prevention at routine tailgate safety meetings. Topics for discussion include good housekeeping practices, safe petroleum product handling, and proper maintenance and inspection procedures.

Erosion control measures outside of plant and equipment work areas may be identified by field personnel. In these situations, company officials are notified so that site specific BMPs can be implemented.

3 Potential Pollutants & Best Management Practices

There are two general types of pollutants at every crushed stone or sand and gravel facility. These include: (1) Sediment, and (2) petroleum products such as fuels and/or lubricants. The following section describes potential pollutant sources and BMPs for prevention of their release to sensitive waters of the State.

4 BMPs for Soil Erosion & Sediment Control

Site preparation activities at new nonmetallic mine sites or previously undisturbed portions of an existing nonmetallic mine site can release sediments, allowing their capture into storm water. These activities include topsoil and/or overburden stripping, berm construction, and the establishment of an access drive. Soils containing a high percentage of silt or clay, and those located near waterways or on steep slopes pose the highest risk for erosion and sediment runoff, particularly during periods of high precipitation.

Proper site planning is the best approach to prevention. For new and existing sites, KKCI will implement the following BMPs as necessary for storm water control under changing site conditions:

- Develop the site incrementally, preserving vegetation (where Possible) along the perimeter of the excavation.
- Divert surface water away from disturbed areas.
- Prevent tracking of sediment from the entrance of the site. This can be done several ways: (1) Restricting on-road vehicles to stabilized areas, (2) Diverting surface water runoff from the roadway into the facility, (3) Constructing a gravel tracking pad, or (4) Inspecting and cleaning up any residual material tracked onto adjacent roadways.
- Contain surface water runoff within the overall excavation (below grade) so sediments in surface water will be captured and filtered before they are discharged to groundwater.
- Construct berms with stable slopes (typically 3:1 or less), away from sensitive wetlands or waterways.
- Stabilize berm areas upon construction with perennial vegetative cover, mulching as needed.
- Evaluate runoff at outfalls, near wetlands and waterways, or areas of steep slopes to evaluate the need for additional erosion controls such as those outlined in the Wisconsin Construction Site Erosion Control Field Guide, and Wisconsin DOT handbook. These controls may include but are not limited to the temporary erection of silt fence, sediment traps, straw bales or natural or synthetic matting or netting, or the permanent construction of sediment retention ponds.

5 BMPs for Material Processing & Loading

Aggregate processing requires the physical reduction, sizing and/or washing of natural earth materials. Portable processing equipment is used to produce various sized material stockpiles. The equipment is used intermittently at KKCI's facilities to produce the needed construction aggregates. In general, processing is conducted below grade within the area of extraction. KKCI may elect to implement the following BMPs as necessary to minimize risk from sediment to storm water and nearby surface water bodies during processing and loading:

- Consider environmental impacts when selecting plant sites. Site all processing equipment away from surface water bodies; preferably below grade within the area of extraction.
- Maintain internal drainage of the site for the duration of the processing cycle.
- Construct berms or dikes around processing equipment and/or wash ponds if surface water runoff is not adequately contained onsite.
- Use conveying equipment to stockpile sand and crushed stone products away from major transportation routes within the facility.
- Manage bulk storage piles following the BMPs described in Wisconsin DNR publication "Storage Pile Best Management Practices" WT-468-96, When placed outside of the internally drained limits of the excavation.
- Size wash ponds to have sufficient storage capacity for wash out purposes, as well as a 25-year storm event.
- Routinely remove fine material generated from crushing, screening, or conveying operations to prevent buildup and off-site tracking.
- Loadout within the area of extraction, being careful to avoid spilling from trucks.

6 BMPs for Maintenance of Roads, Erosion Controls, & Wash Ponds

Roadways, temporary and permanent erosion control structures, and wash ponds need to be maintained to ensure optimum performance. Routine Maintenance is scheduled on an as needed basis and may include any one or more of the following:

- Refresh the tracking pad and/or sweep sediment from paved roadways.
- Remove silt fence, straw bales, or other temporary erosion controls when surface soils have been stabilized.
- Clean out sediment from retention and/or wash ponds as needed and store in a secure area of the site within the area of extraction.

7 BMPs for Mobile Fueling of Generators, Engines, and Heavy Equipment

Fuel is delivered to KKCI work sites as it is in other rural areas. A local supply truck arrives during working hours to fuel necessary equipment and fuel transfer tanks. BMPs associated with fueling may include:

- Assisting delivery drivers as needed to provide safe and effective transfer of fuels.
- Monitoring fuel deliveries at all times to prevent overfilling.
- Providing spill containment and recovery equipment in the event of a spill.

8 BMPs for Maintenance & Repair of Equipment

Petroleum fluids such as oil lubricants and grease can impact sensitive waters of the State. The Following BMPs have been provided as a means of prevention:

- Avoid overfilling gearboxes and crankcases.
- Follow manufacturer's specifications when greasing bearings and wear surfaces.
- Repair leaking seals on mechanical equipment.
- Prevent spills during oil changes.
- Maintain an adequate supply of absorbent material and spill kits for routine maintenance and petroleum spills.
- Properly store and secure petroleum products to avoid their contact with storm water.
- Store waste oil in spill proof containers for offsite disposal.
- Discard soiled towels in receptacles provided.
- Fully service and inspect engines and gearboxes in the off-season to eliminate leaking seals, fuel lines, and gaskets; annual repairs such as these are to be conducted in the shop or other appropriate facility.

APPENDIX G – FUGITIVE DUST CONTROL PLAN

Fugitive Dust Control Plan for the K Quarry
Section 36, Town of Brooklyn
Green Lake County, Wisconsin

The control of fugitive dust is required under section NR 415.04, Wisconsin Administrative Code, for all affected facilities. Section NR 415.075(2), Wis. Adm. Code, has specific requirements for fugitive dust control for rock quarries and industrial sand mines. **The standard for fugitive dust emission quantification is by visual observation. If visible dust emissions are observed, they need to be suppressed.**

1 SITE ROADWAYS

A. The dust on the site roadways shall be controlled by applications of water. Applications of water shall be performed when conditions exist that will likely produce fugitive dust (long periods of low precipitation, low humidity, high winds, high site traffic) and whenever fugitive dust is observed. After application, a follow-up observation shall be performed to ensure the effectiveness of the control measures.

B. All paved travel ways shall be swept whenever there is an accumulation of debris or fugitive dust is observed. Any material spillage on roads shall be cleaned up immediately. After control measures are taken, a follow-up observation shall be performed to ensure the effectiveness of the control measures.

C. Speed limits shall be kept within the quarry and haul roads to 10 miles per hour or less. Speed limits shall be posted on haul roads. (Section NR 415.075, Wis. Adm. Code)

D. Fugitive emissions from haul roads will not exceed 20% opacity at the source. (Section NR 415.075, Wis. Adm. Code). Even though some equipment and activities are allowed up to 20% opacity at the source, no visible emissions of dust should ever be allowed to cross the property boundary.

E. A screening berm with a windbreak of trees planted on it will be constructed surrounding the site.

2 PROCESSING PLANT

A. The drop distance at each transfer point shall be reduced to the minimum the equipment can achieve.

B. Water spray nozzles or bars at transfer points and points of high dust generation shall be utilized when necessary.

C. Plant equipment and enclosures shall be inspected on a regular basis (daily, weekly, monthly, or per manufacturer's recommendation) for physical integrity. Any equipment or seal leaks shall be repaired as soon as practicable and not later than 48 hours after being identified.

3 STORAGE PILES

A. Stockpiling of all nonmetallic minerals shall be performed in a manner that minimizes drop distances and control potential dust problems.

B. Loading and stockpiling areas shall be watered as needed to control fugitive dust.

4 TRUCK TRAFFIC

A. Vehicles shall be loaded in a manner that prevents their contents from dropping, leaking, blowing, or otherwise escaping. This shall be accomplished by loading so that no part of the load shall come in contact within six inches of the top of any sideboard, side panel or tail gate. Trucks shall be covered or secured to prevent the escape of materials likely to become airborne during transport, prior to any transportation off site. (Section NR 415.075, Wis. Adm. Code)

B. Excess dust and/or spillage of material off-site shall be cleaned up and returned to the facility or properly disposed of.

5 Drilling & Blasting Activities

A. All drilling activities will be performed using a collar and dust collection system or other means to reduce fugitive emissions. Fugitive emissions from drilling will not exceed 20% opacity at the source. (Section NR 415.075, Wis. Adm. Code)

B. All blasting shall use blast hole stemming materials that have been approved by the Department or the Department of Commerce. (Section NR 415.075, Wis. Adm. Code)

6 Employee Responsibilities for Implementation of Plan

All employees are required to take action to prevent fugitive dust if they observe any site activity or site condition that is likely to cause it. Employees are required to immediately notify a supervisor if excessive fugitive emissions are observed. This will include a description of the source of the excessive emission. The supervisor will be responsible for directing dust control measures and ensuring the measures taken are adequate.

7 List of dust control Equipment

The following is a list of equipment that will be onsite or readily obtainable for control and cleanup to reduce fugitive dust.

A. Water trucks
B. Frontend loader/trucks (cleaning up spillage)
C. Brooms/hand tools
D. Road sweeper

8 Excessive Fugitive Dust Plan

If excessive dust is generated at the facility, the operation creating the dust problem shall be shut down immediately and will not resume until the problem is corrected. An investigation as to the cause of the excessive dust shall be conducted, and if necessary, the Fugitive Dust Control Plan will be revised to avoid any future fugitive dust emissions.

The Sky is Falling: Misconceptions About Mining in Green Lake County

Michael C McConnell

Kopplin & Kinas Company, Incorporated

Contents

The Sky is Falling: Misconceptions About Mining in Green Lake County

> Did you ever hear of Chicken Little, how she disturbed a whole neighborhood by her foolish alarm? Well, Chicken Little was running about in a gentleman's garden, where she had no business to be: she ran under a rosebush, and a leaf fell on her tail; so she was dreadfully frightened, and ran away to Hen Pen. "O Hen Pen," said she, "the sky is falling!" "Why, Chicken Little, how do you know it?" "O, I heard it with my ears, I saw it with my eyes, and part of it fell on my tail." "Come then," says Hen Pen, "let us run as fast as we can." (Chandler, 1840).

The Remarkable Story of Chicken Little bears an uncanny similarity to the hysteria that takes place when a new non-metallic mine is proposed. The role of Chicken Little is generally manifested by local environmental groups who are certain that a new pit or quarry will bring irreparable harm to the community and end life as we know it. Hen Pen, Loose Goose, and Turkey Lurkey are incarnated by a small faction of residents, and sometimes non-residents, who blindly follow the activist groups, believing the unfounded story of pending doom solely because their "friend" said it was so. The role of Fox Lox is where this similarity becomes more abstract. Fox Lox in this scenario is represented by mob mentality rather than a physical being, more specifically outrage culture caused by environmental alarmism. Outrage culture does not bring the neighborhood fowl to an untimely death as Fox Lox did to the birds in the story, but rather it kills reason and rational thought amongst the affected members of the community. The effect of outrage can be so profound, that even when presented with fact and scientific evidence that shows the anti-mining narrative is based on myths and misconceptions, those consumed by outrage will claim that the information is invalid or not even be able to acknowledge it at all (in one ear and out the other).

A frequent statement is “anywhere but here”, which seems like an honest compromise until you arrive at the next “here” only to “hear” this phrase again. Unfortunately, “anywhere” does not exist. Mineral deposits are not accessible “anywhere”, and even if they were, that “anywhere” would almost certainly be a different group’s “here”.

The intent of this document is to address concerns that commonly arise during the permitting of a new mine, and to clear up the misconceptions about mining in Green Lake County, Wisconsin.

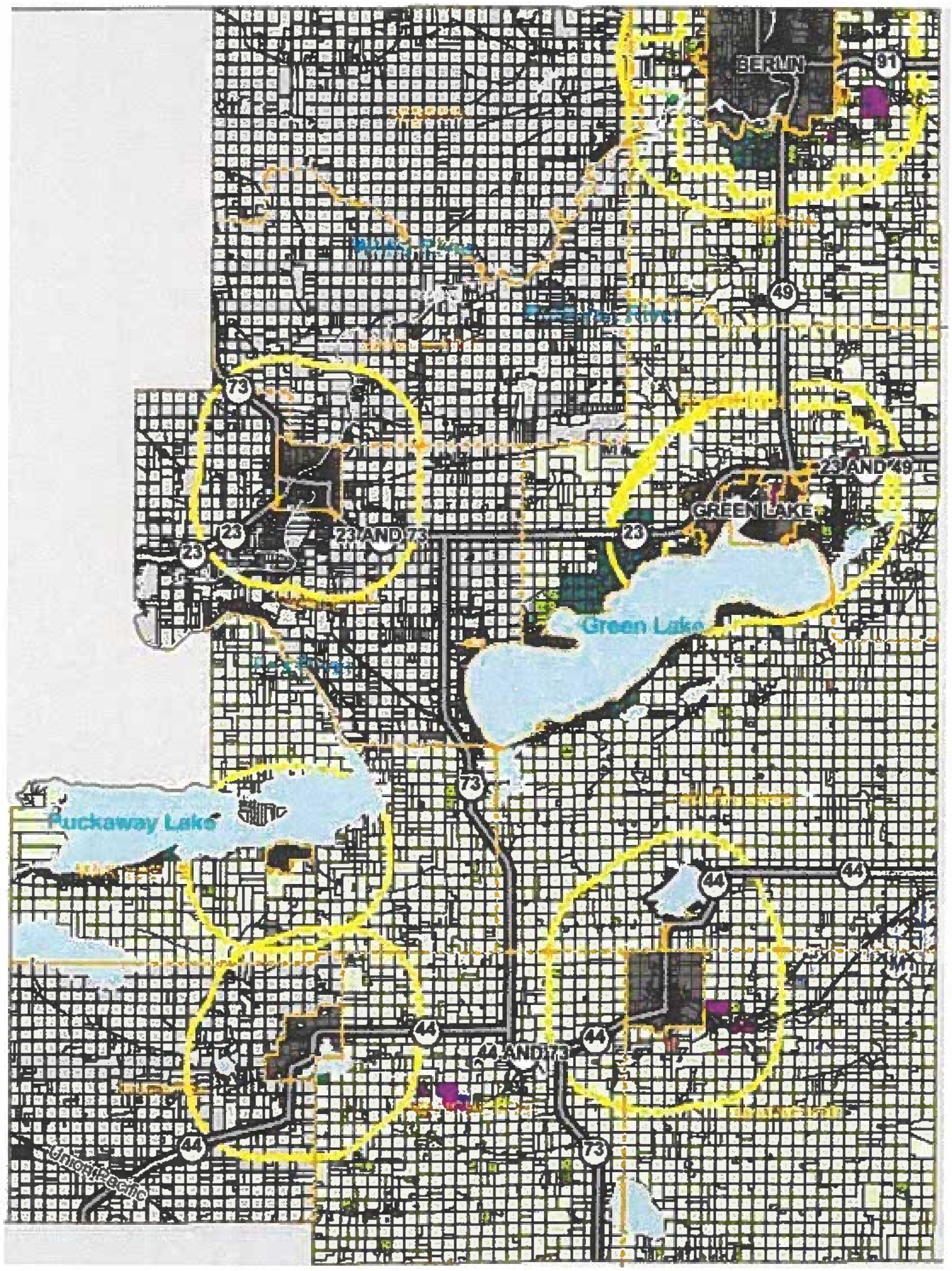
Mining and the Green Lake County Zoning Ordinance

The zoning ordinance of Green Lake County establishes fourteen zoning districts (Ch. 350-24). Non-metallic mineral extraction is only allowed in three of these districts and is only allowed as a conditional use. The three districts are the A-1 Farmland Preservation District, the A-2 General Agriculture District, and the M-1 Mineral Extraction District.

A-1 Lands in Green Lake County

According to the Comprehensive Plan of Green Lake County, ninety-two- and one-half percent of the unincorporated area in Green Lake County falls under the Farmland Preservation designation. Non-metallic mining is allowed as a conditional use in the A-1 Zoning District. Mineral extraction sites in the A-1 District are required to be reclaimed back to agricultural use, which is the main distinction between mineral extraction in the A-1 District versus the other two districts. The map in Figure 1 shows the extents of the A-1 District in Green Lake County, The A-1 District is shown in pale-yellow.

Figure 1.

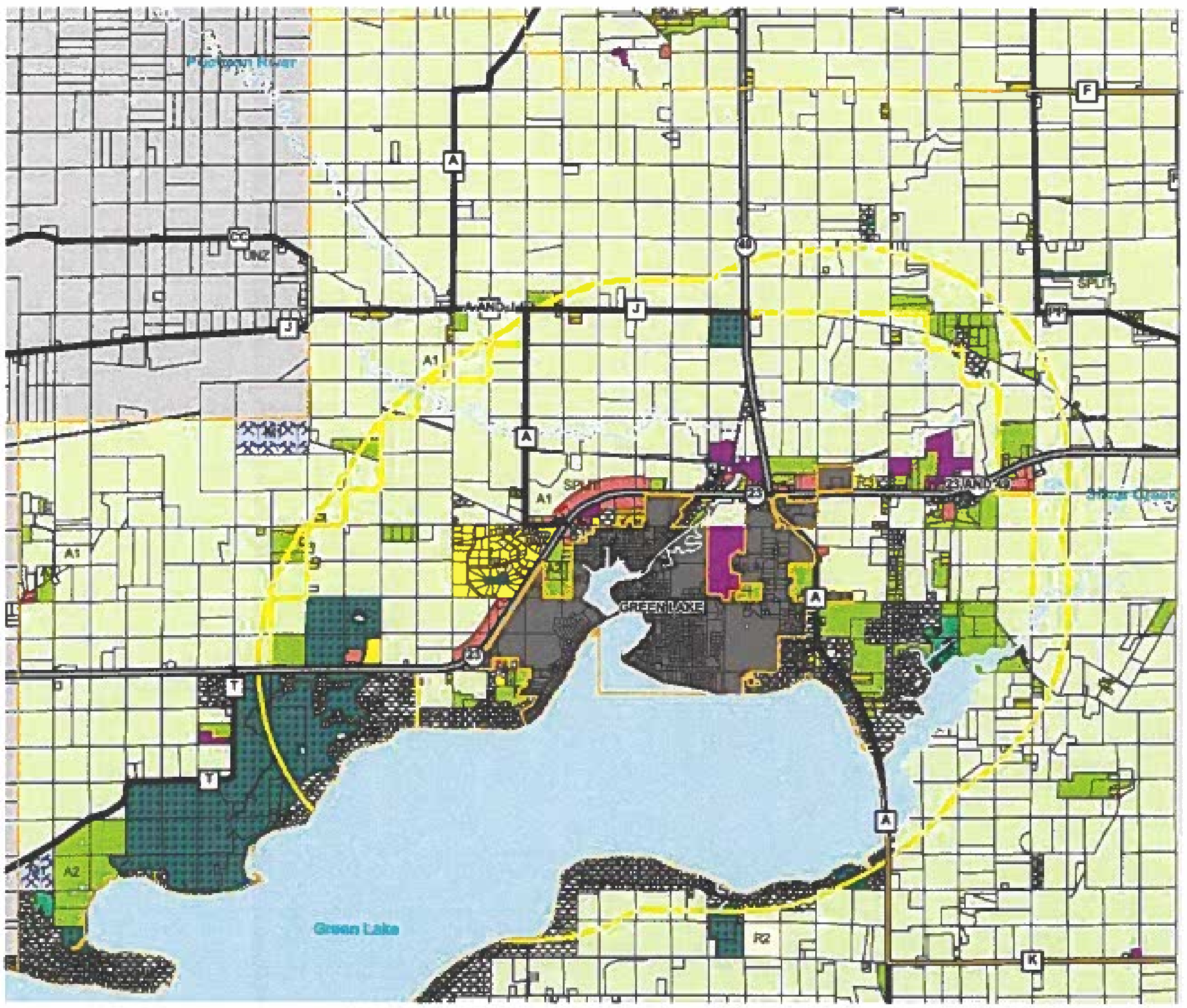


Note. Zoning district overlay map, Green Lake County GIS Web Application.

A-2 Lands in Green Lake County

Non-metallic mining is allowed as a conditional use in the A-2 General Agriculture District. The A-2 district in Green Lake County is generally made up of small, irregularly shaped parcels, mostly under forty acres in area. The district is predominantly made up of rural residences, marsh, and forest land. Figure 2 illustrates the scarcity, and irregular size and shape of the A-2 District in the Township of Brooklyn. The A-2 District is shown in green.

Figure 2.



Note. Zoning district overlay map, Green Lake County GIS Web Application.

M-1 Lands in Green Lake County

There are approximately 1,302.15 acres of land in Green Lake County that are zoned M-1 Mineral Extraction District. Approximately 1,155.06 acres of M-1 land are part of currently active non-metallic construction aggregate and industrial sand mines. There are approximately 147.09 acres of M-1 land not currently part of an active mine.

85.39 acres of the 147.09 total acres are contained in parcel number 004-00793-0000 and are reclaimed acreage from an industrial sand mine. The remaining 61.7 acres are contained on three different parcels in two townships.

Parcel number 010-00056-0000 is in the Town of Mackford. It contains 11.77 M-1 acres. If the site was previously mined, it has been reclaimed. Establishing a 100' buffer from adjacent properties, the actual minable acreage is approximately 4.75 acres.

Parcel number 012-00467-0000 is in the Town of Manchester. It contains 10 M-1 acres and is a split zoned parcel with the 30 acres zoned A-1. There has been activity on this parcel in the past, but it is unclear if it was aggregate mining or a borrow site for fill material. Establishing a 100' buffer from adjacent properties, the actual minable area is approximately 7 acres.

Parcel number 012-00278-0000 is in the Town of Manchester. It contains 40 M-1 acres. The parcel has an unnamed stream which flows along the eastern 1/3 of the parcel and contains approximately 15.5 acres of mapped wetlands. If the site was previously mined it has been reclaimed. Establishing a 100' buffer from adjacent properties, maintaining a 300' buffer from the stream, and avoiding the mapped wetlands, the actual minable area is approximately 7 acres.

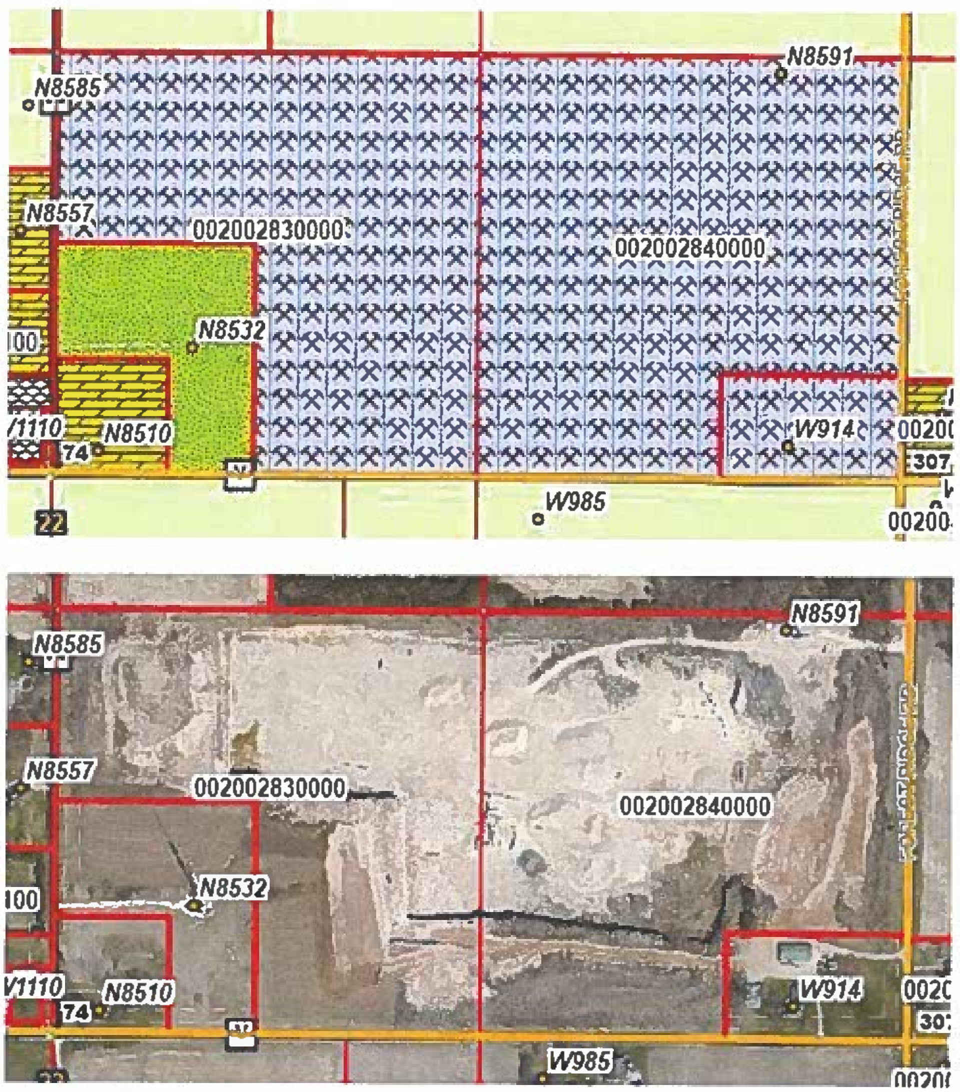
If the three parcels were not previously mined and have marketable reserves, they still do not contain enough minable acreage to be of any practical use and are not economical to mine. Figures 3-1 through 3-14 show the M-1 District parcels in Green Lake County.

Figure 3-1

Parcels: 002-00283-0000, 002-00284-0000, 002-00284-0100

Total M1 Acreage: 69.98

Operator: Ridge Stone Products



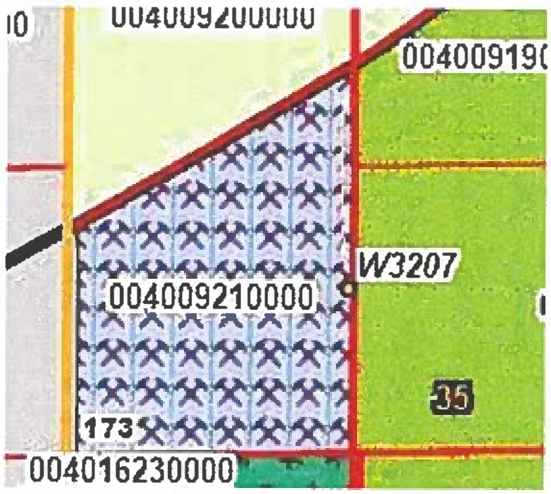
Note. Overlay & Aerial map, Green Lake County GIS Web Application.

Figure 3-2

Parcels: 004-00921-0000

Total M1 Acreage: 40

Operator: Kopplin & Kinas Co., Inc.



Note. Overlay & Aerial map, Green Lake County GIS Web Application.

Figure 3-3

Parcels:004-00793-0000

Total M1 Acreage: 85.39

Operator: Badger Mining Corporation- Reclaimed

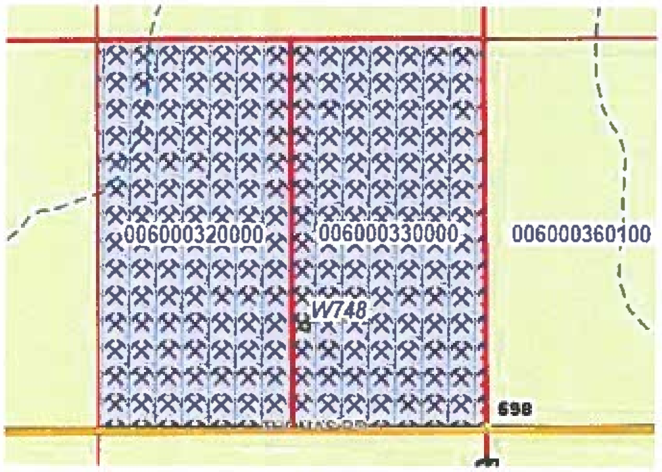
Note. Overlay & Aerial map, Green Lake County GIS Web Application.

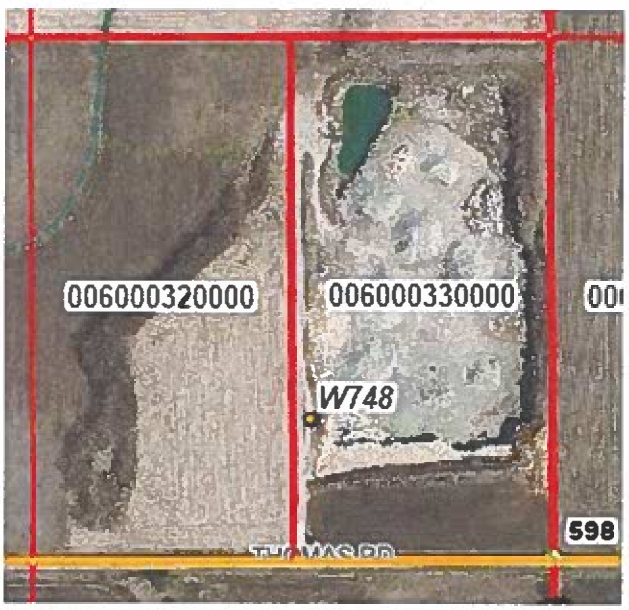
Figure 3-4

Parcels: 006-00032-0000, 006-00033-0000

Total M1 Acreage: 40

Operator: Egbert Materials





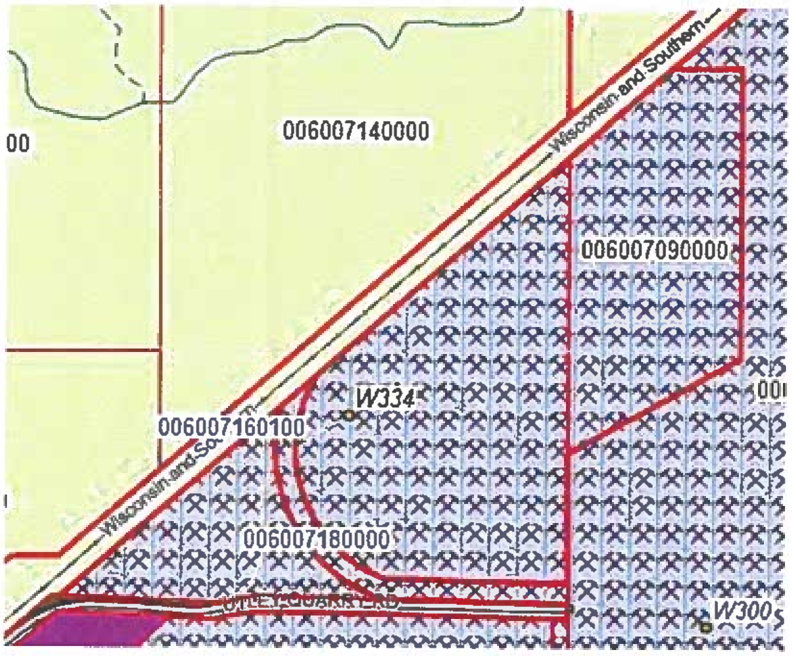
Note. Overlay & Aerial map, Green Lake County GIS Web Application.

Figure 3-5

Parcels: 006-00717-0000, 006-00709-0000

Total M1 Acreage: 44.5

Operator: Michels Road & Stone



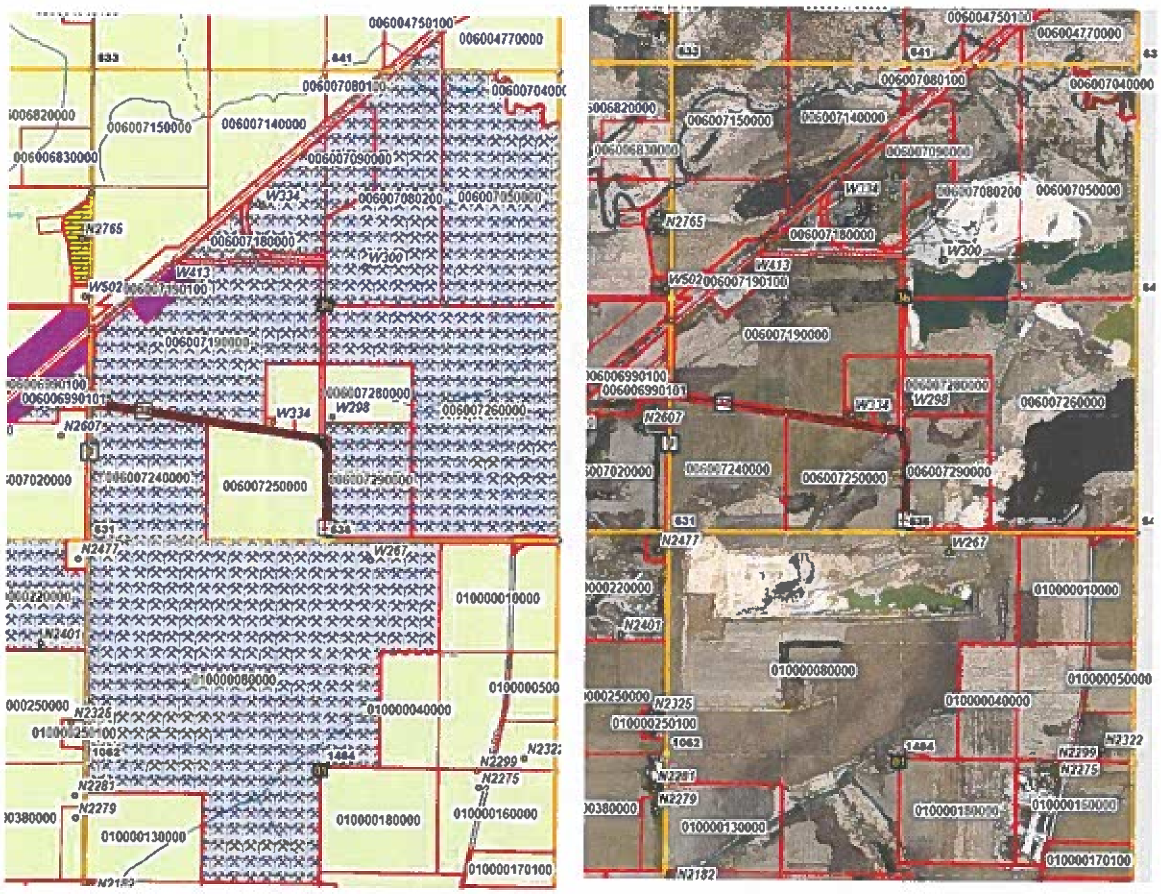
Note. Overlay & Aerial map, Green Lake County GIS Web Application.

Figure 3-6

Parcels: 006-00718-0000, 006-00708-0200, 006-00705-0000, 006-00699-0101, 006-00719-0000, 006-00726-0000, 006-00729-0000, 006-00724-0000, 010-00008-0000

Total M1 Acreage: 672.38

Operator: Badger Mining Corporation



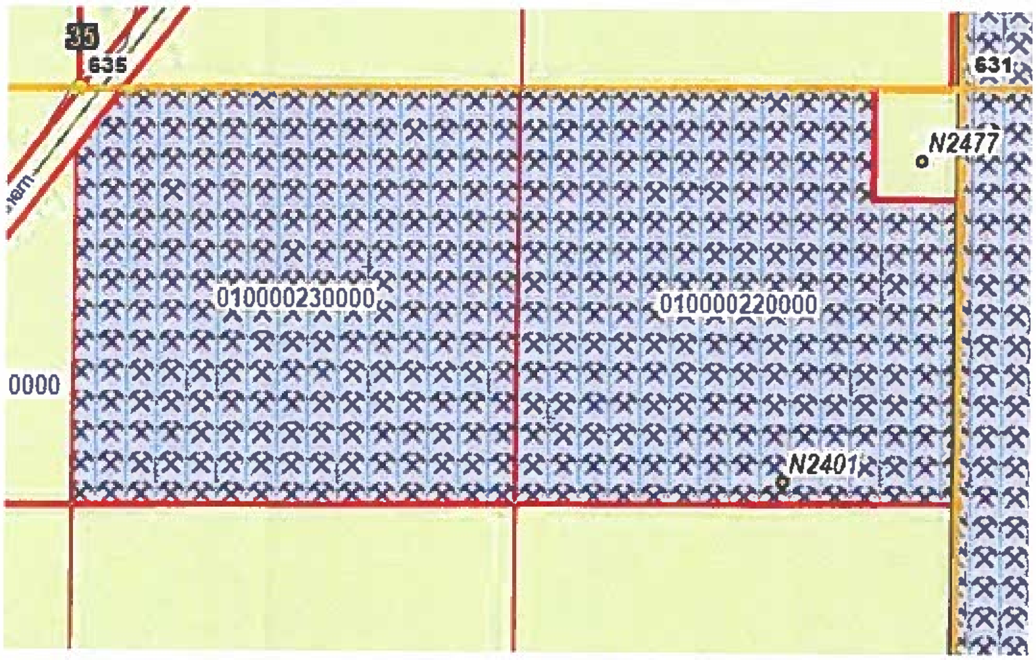
Note. Overlay & Aerial map, Green Lake County GIS Web Application.

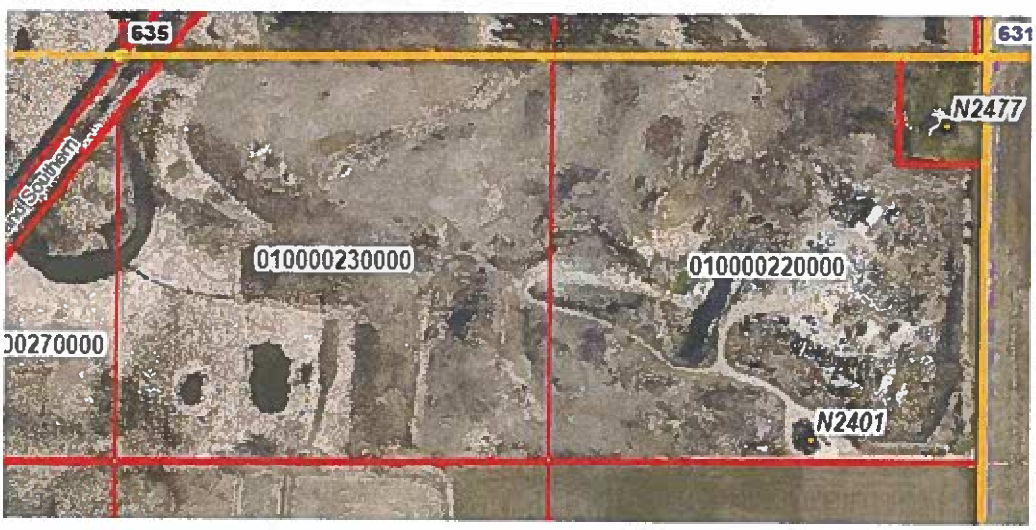
Figure 3-7

Parcels: 010-00023-0000, 010-00022-0000

Total M1 Acreage: 75.8

Operator: Kinas Materials, LLC.





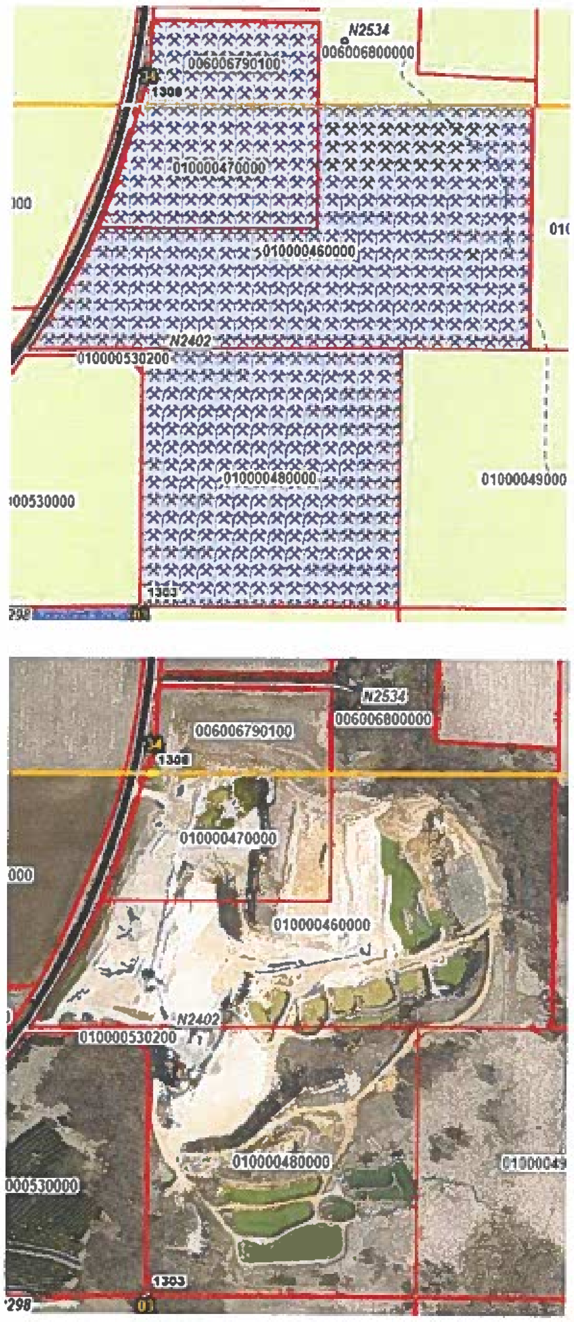
Note. Overlay & Aerial map, Green Lake County GIS Web Application.

Figure 3-8

Parcels: 006-00679-0100, 010-00047-0000, 010-00046-0000, 010-00048-0000

Total M1 Acreage: 116.36

Operator: A.F. Gelhar Co., Inc.



Note. Overlay & Aerial map, Green Lake County GIS Web Application.

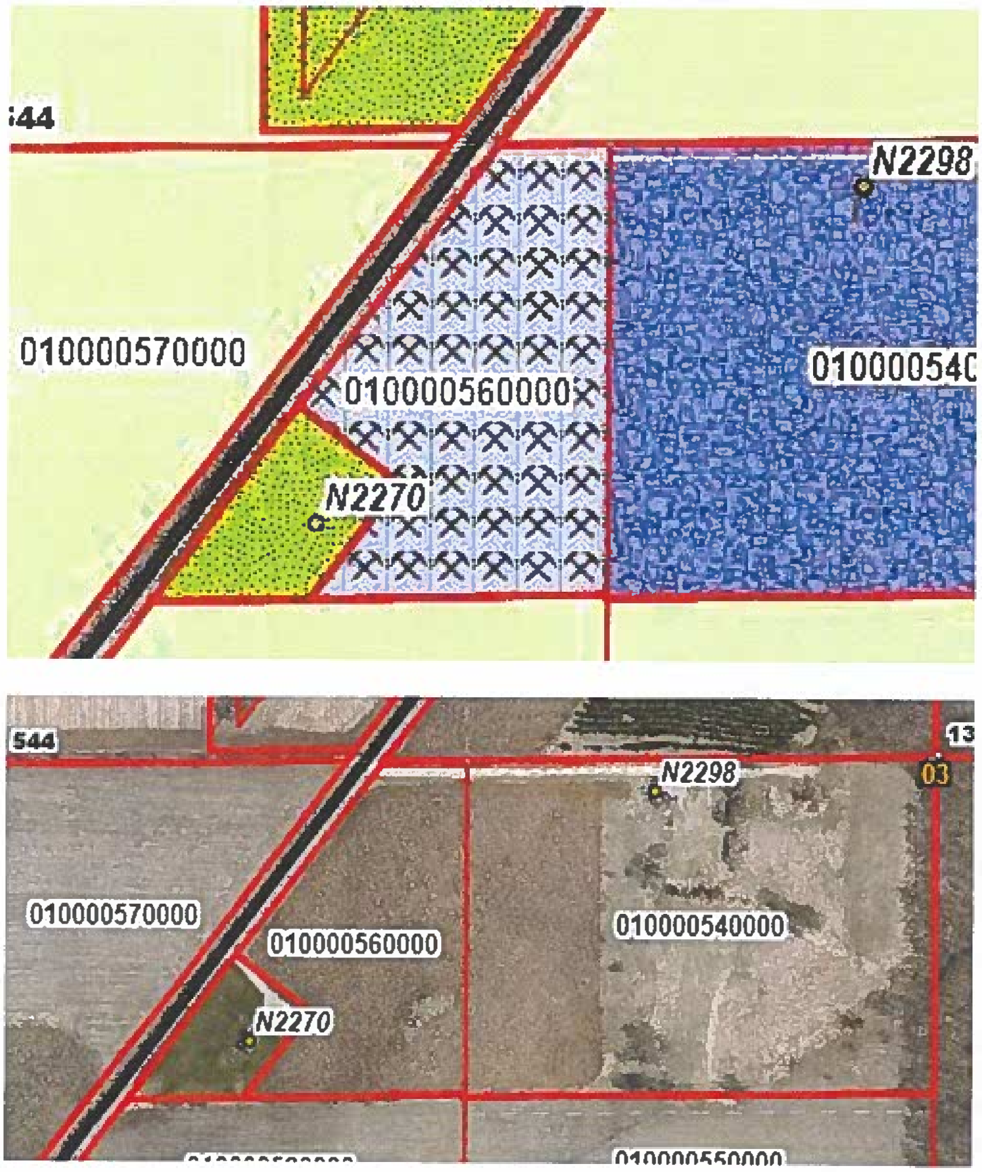
Figure 3-9

Parcels: 010-00056-0000

Total M1 Acreage: 11.77

Operator: None-Possibly a borrow source for the adjoining landfill,

Owned by the City of Markesan



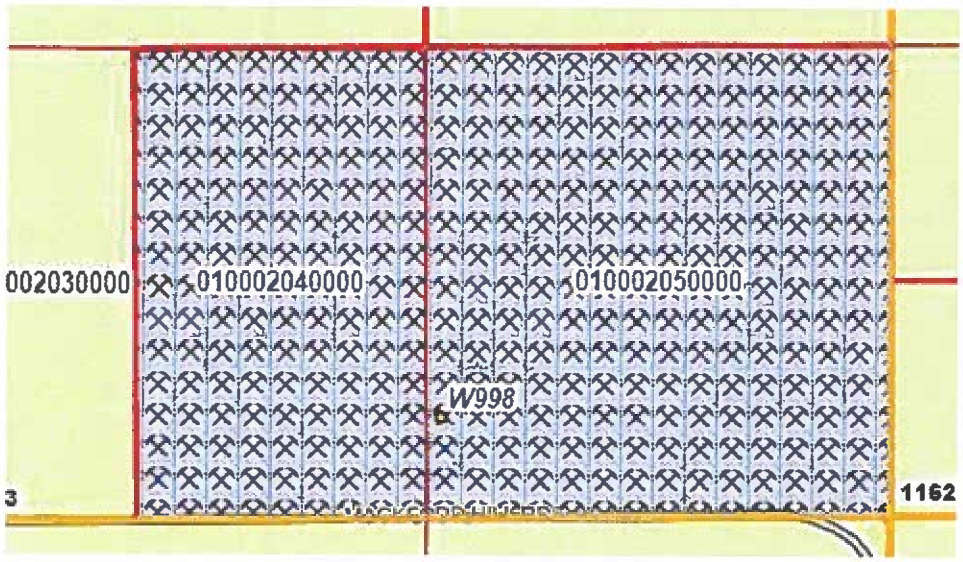
Note. Overlay & Aerial map, Green Lake County GIS Web Application.

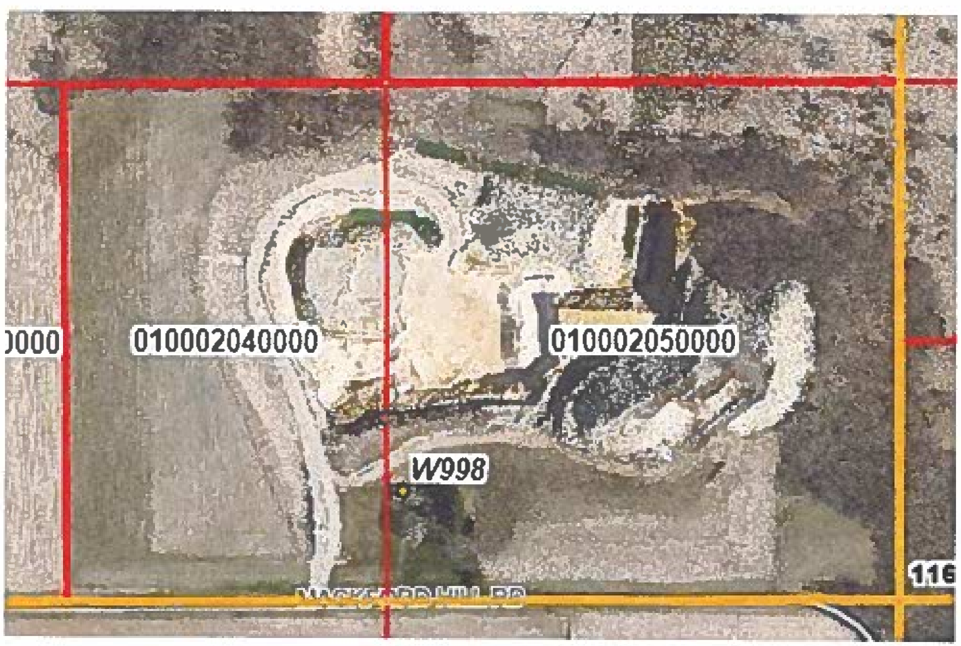
Figure 3-10

Parcels: 010-00204-0000, 010-00205-0000

Total M1 Acreage: 65

Operator: A.F. Gelhar Co., Inc.





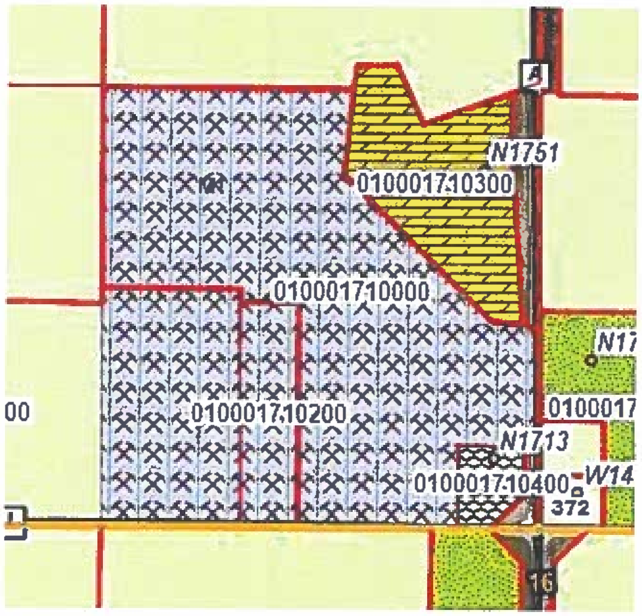
Note. Overlay & Aerial map, Green Lake County GIS Web Application.

Figure 3-11

Parcels: 010-00171-0000

Total M1 Acreage: 23.97

Operator: Sam Gaastra & Sons, Inc.



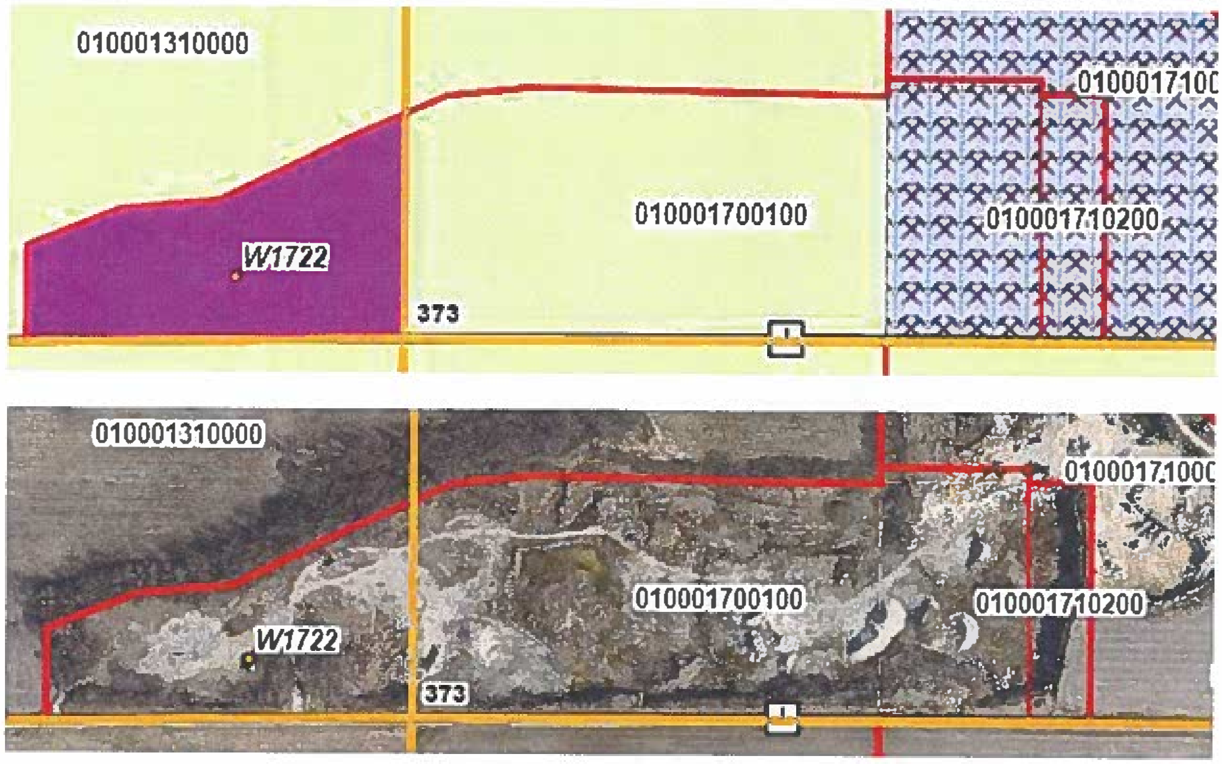
Note. Overlay & Aerial map, Green Lake County GIS Web Application.

Figure 3-12

Parcels: 010-00170-0100(**Split Zoning-M1 & A1**), 010-00171-0200

Total Acreage: 7

Operator: Michels Road & Stone



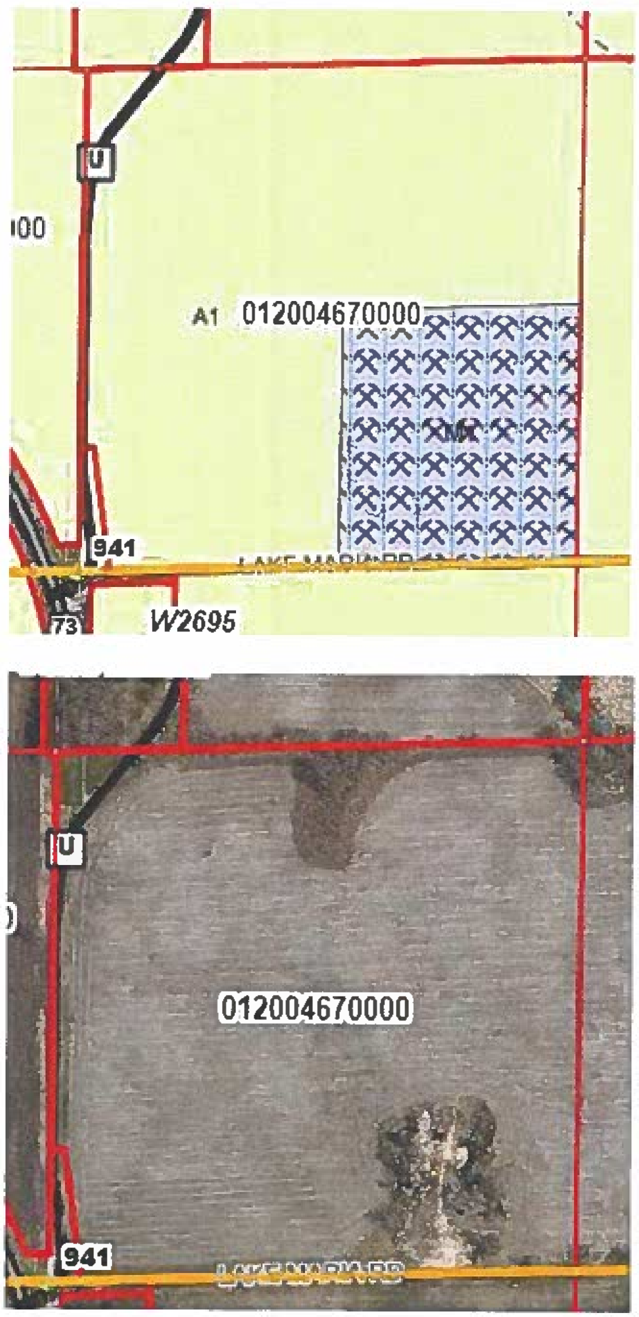
Note. Overlay & Aerial map, Green Lake County GIS Web Application.

Figure 3-13

Parcels: 012-00467-0000 (**Split Zoning-M1 & A1)**

Total Acreage: 10

Operator: None- Possible borrow pit/un-reclaimed



Note. Overlay & Aerial map, Green Lake County GIS Web Application.

Figure 3-14

Parcels: 012-00278-0000

Total M1 Acreage: 40

Operator: None- Reclaimed if previously mined, has a stream & mapped wetland.

Note. Overlays & Aerial map, Green Lake County GIS Web Application.

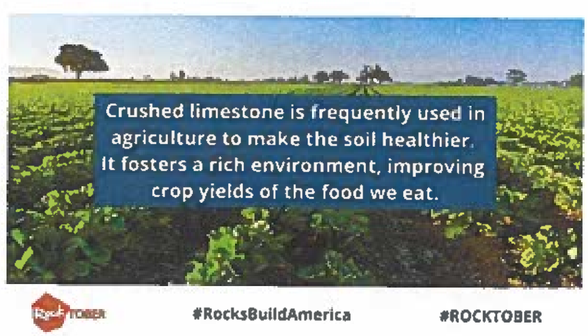
The Comprehensive and Farmland Preservation Plans of Green Lake County

Both the Comprehensive and Farmland Preservation Plans of Green Lake County state the need for adequate infrastructure, adequate roadways, and economic development.

Mined aggregate is an essential component of both infrastructure and roadways and also contributes to and is necessary for economic development. Every new factory or commercial building and every new house that is built requires concrete, and two of the main ingredients of concrete are stone and sand. The driveways, parking lots, roadways, and infrastructure that service all of these need, at a minimum, periodic maintenance and repair, and occasionally replacement and reconstruction, this all requires mined aggregates.

The Farmland Preservation Plan of Green Lake County recognizes that although mining will result in the loss of some farmland, it is necessary to support agricultural infrastructure. Modern agricultural operations also require an extensive infrastructure, both on and off the farm. Maintaining and updating agricultural facilities as well as expansions of existing operations all require mined aggregate. Agriculture uses mined aggregates for more than just construction and transportation purposes. Free-stall barns are commonly bedded with processed sand, and finely crushed limestone is applied to croplands to improve the soil.

Figure 4.



Agricultural equipment is growing in size and weight to increase efficiency and production rates so that the farms can maximize their production. The increased load on local roads increases the need for roadway improvements and thus an increased need for construction aggregates. In June of 2023 Wisconsin State Senate Bill 247 was signed into law and became 2023 Wisconsin Act 13. 2023 Wisconsin Act 13 provides one-hundred fifty million dollars in funding for the Agricultural Roads Improvement Program (ARIP). ARIP provides funding assistance for the improvement of small, deficient, weight restricted "Class B" roads and small bridges, that if improved, would provide agricultural haul routes that reduce deferred or repeated trips, providing more feasible haul routes. ARIP provides road improvement funding to towns that would not be able to afford or prioritize funding for roads that are less traveled by the public but are vital to local agriculture. Adequate agricultural infrastructure is vital to the success of the Farmland Preservation Plan of Green Lake County, and mined aggregates are vital to that infrastructure.

Figure 5.

The local availability of mined aggregate has a direct effect on infrastructure needs and the economic development of a community through transportation costs. On average it costs an additional one dollar and sixty-three cents per ton for every ten minutes added to a dump truck haul. For example, if you compare a ten-minute haul from the aggregate source to a thirty-minute haul, you will see a cost increase of just under forty-nine thousand dollars for fifteen-thousand tons of stone hauled ($1.63/ton per 10 min.; 20min. longer = $3.26/ton; 15,000 tons x

$3.26 = $48,900). For large projects this can mean hundreds of thousands of dollars in extra transit costs. The increase in cost can slow development, deter industry from moving to an area, and cause maintenance and updates to infrastructure to fall far behind the schedule they should be performed at.

Another aspect of economic development the mining industry in Green Lake County contributes to is providing jobs for the citizens of the county. The direct employment impact of one small construction aggregate mine is relatively small, providing for two to four additional employees, but the indirect contribution is far reaching. The indirect employment opportunities start at the mine with truck drivers, equipment sales and service, and various forms of technical support personnel. Opportunities that are not centered around the mine include jobs in infrastructure construction, building construction, all the way to those employed by industries that move to the area because of the appeal of lower construction costs and infrastructure that can meet or exceed their businesses' needs.

Non-metallic Mineral Extraction & Conditional Use Permitting

Section 350-56(2) of the Code of Green Lake County establishes standards that a conditional use must meet to be approved or approved with conditions. These standards ensure that a proposed conditional use does not pose a danger or nuisance to neighboring people or properties and is capable of being served by any applicable public services it would require. Section 350-27(e) establishes additional standards that a non-metallic mineral extraction operation is required to adhere to in order to be granted a conditional use permit in the A-1 zoning district. These additional standards ensure that the proposed mineral extraction operation will not be detrimental to neighboring agricultural lands and that the extraction site is reclaimed back to agricultural use.

The non-metallic mineral extraction sites in Green Lake County adhere to these standards every single day. If this was not the case, the Green Lake County Land Use Planning & Zoning Department, the Green Lake County Circuit Court, the Wisconsin Department of Natural Resources, and the Mine Safety and Health Administration would all be overwhelmed with claims from aggrieved neighbors and possibly even the employees of the mine. Every mineral extraction site in Green Lake County has its own unique framework that it operates under. This framework is made up of conditions of permits, agreements with property owners, agreements with the neighbors and neighborhoods they are located near, government regulation, and the individual policies and standards that the mining companies have developed and put in place on their own accord. The framework that these sites operate under ensures that each site conforms to the standards set forth by section 350-56(2) (and 350-27(e) if located in the A-1 District) of the zoning code. It also ensures the safety of the people who work at and live near these sites as well as protects the properties and environment surrounding the sites. Safety is a priority at all the mineral extraction operations in Green Lake County. The safety culture at these sites ensures the safety of the surrounding people and properties.

In November of 2017 Wisconsin Assembly Bill 479 was signed into law as 2017 Wisconsin Act 67. 2017 Wisconsin Act 67 created Section 59.69 (5e) which limits local government discretion related to the issuance of conditional use permits and defines both "conditional use" and "substantial evidence". 2017 Wisconsin Act 67 requires the county zoning board to grant a conditional use permit if the applicant meets or agrees to meet all of the requirements and conditions specified in the county ordinance or imposed by the board, and that the county's decision to approve or deny the permit must be based on substantial evidence, meaning facts and information, not personal preference or speculation.

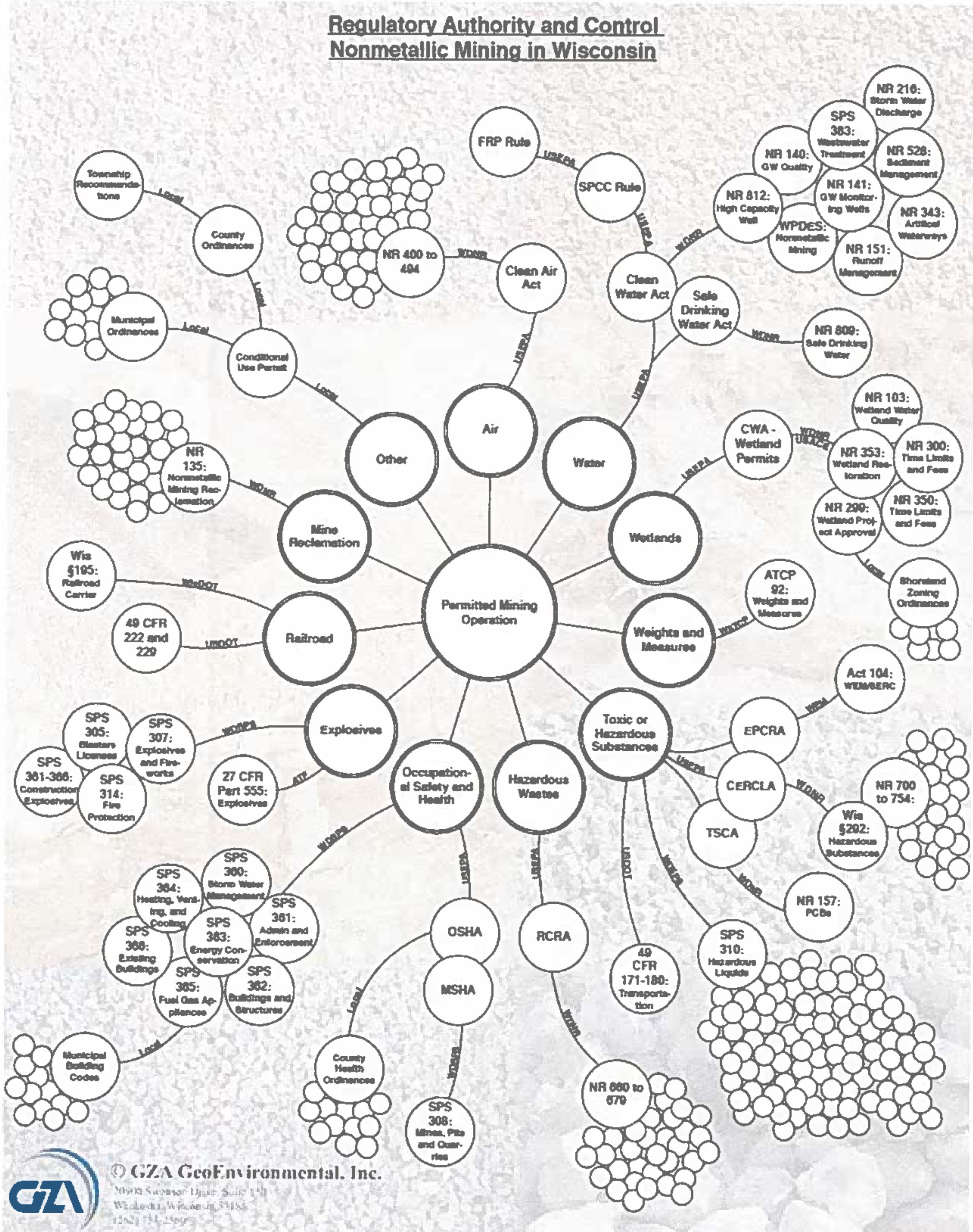
Conclusions on Conformity with the Land Use Ordinances of Green Lake County

Non-metallic mineral extraction is allowed only as a conditional use, and that conditional use is only allowed in three of the fourteen zoning districts established by the zoning ordinance of Green Lake County. Without re-zoning parcels, the only zoning district that contains lands viable for opening a new aggregate source in the zoned territories of Green Lake County is the A-1 Farmland Preservation District. If conditional use permits for non-metallic mining in Green Lake County are going to be denied on the basis that it is not an appropriate land use in the A-1 District, then the Land Use Planning and Zoning Committee is essentially creating a moratorium by proxy on new mineral extraction operations.

The development of local aggregate sources is essential to the success of both the Comprehensive Plan of Green Lake County and the Farmland Preservation Plan of Green Lake County. Tourism, residents, and industry all require functioning infrastructure and safe, adequately constructed roadways. Aggregates are literally the building block of these. Aggregates also lay the foundation for modern agricultural enterprise. If farming is going to continue to grow and prosper in Green Lake County, it will do this through updating and innovating. Developing local aggregate sources will help make this a certainty.

The existing mineral extraction sites in Green Lake County conform to the zoning ordinances that govern their permits. The operations also adhere to an extremely long list of regulations and legislation placed on them by the government entities that oversee them, as shown in Figure 6. The track record of mining in Green Lake County is substantial evidence that mineral extraction operations conform to the standards and requirements of the Green Lake County zoning ordinance.

Figure 6.



Note. Infographic from *Quarry Regulatory Control and Permitting* Krumenacher, 2021.

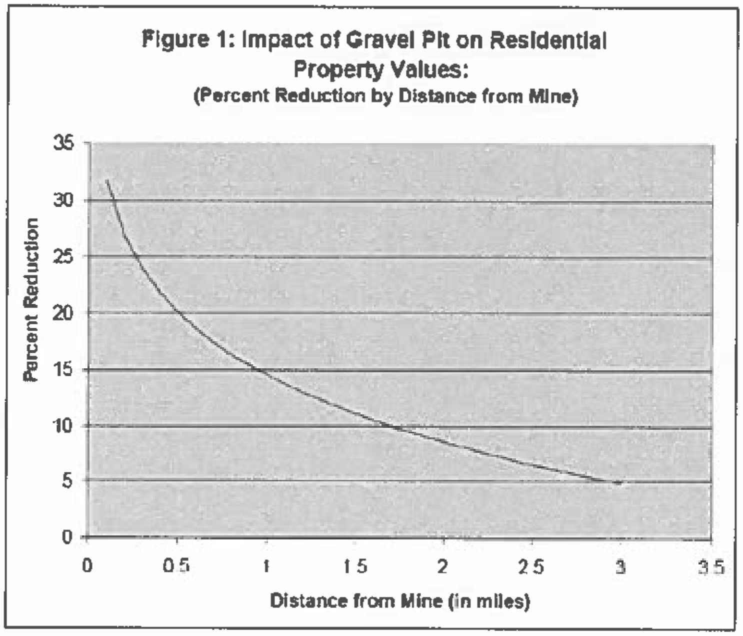
Mining & Property Devaluation

The claim that mining will have a negative effect on property values in the area surrounding a mine has become a common tactic that opposition groups use to bolster their argument that a proposed mineral extraction site does not meet the standards and requirements set forth in zoning ordinances for granting conditional use permits.

The Magic Curve

The claims of negative property value impacts almost universally rely on an unconventional regression model found in a short eight page working paper drafted by Diane Hite in 2006. The model in Hite's paper was originally created to calculate the negative property value impact of environmental disamenities, specifically sanitary landfills, on surrounding properties. In 2006 George Erickcek of the W.E. Upjohn Institute drafted a report in which he applied Hite's "model" to a proposed mining operation in Kalamazoo County Michigan. These documents are often called the "Hite Study" or "Erickcek Study", however these are not studies, they are non-peer-reviewed working papers that rely on an unproven theoretical model. Erickcek claims that upon commencement of mining surrounding properties will suffer an immediate loss in value based on proximity to the mine, and then appreciate at the same rate as properties not near the operation. Erickcek's paper contains the curve in Figure 7 which compares proximity to the mine to the assumed percent reduction in property value that would occur and appears to be a version of Hite's curve from her paper shown in Figure 8. The curve in Figure 7 is also almost universally shown in every report claiming a direct relationship between proximity and property value.

Figure 7.



Note. Curve from Erickcek, 2006.

Figure 8.

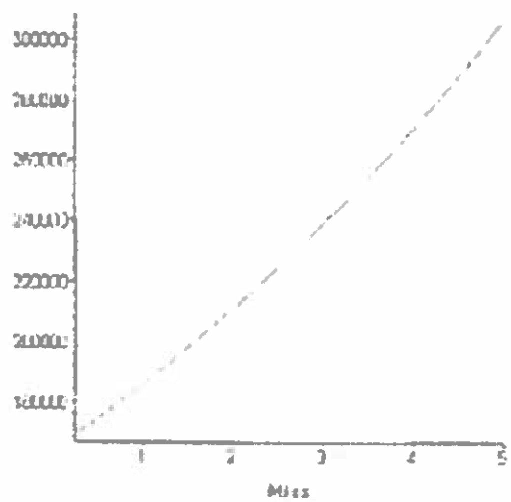


Figure 1: Predicted Price as Function of Distance from Gravel Pit

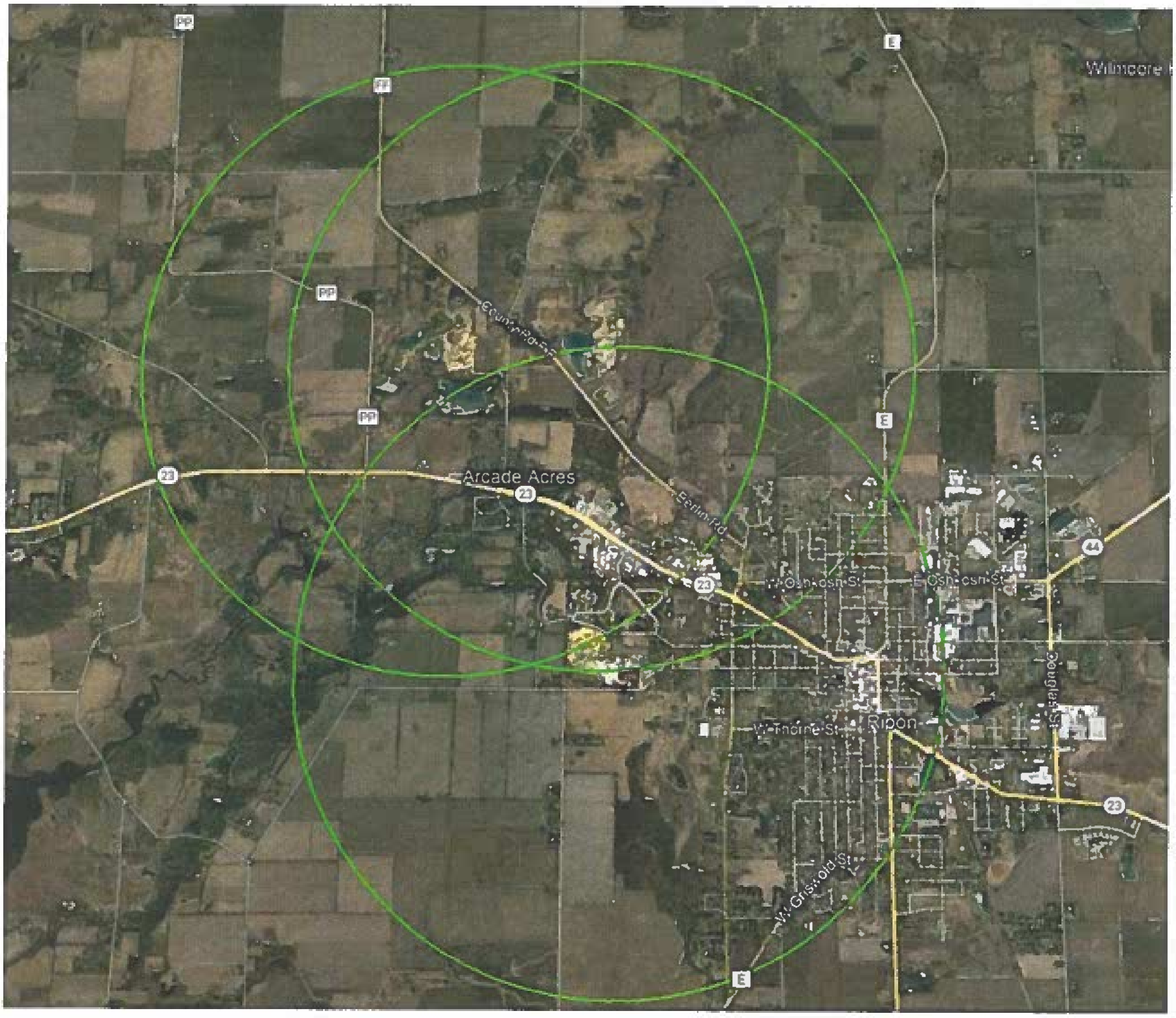
Note. Curve from Hite, 2006.

Erickcek's paper has been disproven by multiple firms including The Great Lakes Appraisal Company, Econsult Solutions, Inc., and The Phoenix Center for Advanced Legal and Economic Public Policy Studies. The Great Lakes Appraisal Company found Erickcek's work to be "unprofessional at best and likely misleading and reckless". The Phoenix Center tried to reproduce Hite's theory in 2018 and was unable to replicate the negative impact. They found some instances where the opposite was true, property values were lower at greater distances from the mine, not higher, and conclude that no negative property value impact is occurring. Studies exist from the pre-Hite/Erickcek era as well that find no negative impact on property values from neighboring mining operations. In 1981 the U.S. Bureau of Mines published a study titled *Social, Economic, and Legal Consequences of Blasting in Strip Mines and Quarries* which found no tie between properly developed mines and property values. In 1987 Joseph Rabianski and Neil Carn of the Department of Real Estate at Georgia State University found no significant impact from mining on property values, Anne Dorrian and Clifford Cook of the Department of Economics at Ohio Wesleyan University came to the same conclusion in 1996.

A Local Perspective

The lack of negative impact on property values from mining can be seen right across the eastern Green Lake County line in the City of Ripon. Ripon has one active mine within its city limits and two active mines operating northwest of the city. Additionally, the two sites outside of the city have or have had asphalt production plants staged at them. This puts most of the homes in Ripon within one- and one-half miles of at least one mine, with some being inside the radius of two or all three. The green circles in Figure 9 illustrate a one- and one-half mile radius from the center of each of the three mines.

Figure 9.



Note. Image from Google Earth, 2023.

The situation, or more accurately lack thereof, in Ripon can be seen through a laymen's eyes without magical curves or studies from various academic institutions. Using the website Zillow.com, data from recent property sales can be easily retrieved as well as comparable sales, time on market, and previous sales of the property. The spreadsheet in Figure 10 shows sales data from thirty-three homes in the Ripon area with proximity to the nearest mine ranging from four hundred seventy-five feet to just over two miles.

Figure 10.

ADDRESS	BEDROOMS	BATHROOMS	SQUARE FT.	SOLD FOR	DAYS ON MARKET	$/SQ. FT.	PROXIMITY/MI
825 WINDSOR CT.	4	4	4,019	$ 475,000.00	43	$ 118.19	0.82
242 MORAINE DR.	4	3.1	3,735	$ 545,000.00	41	$ 145.92	0.138
845 WINDSOR RD.	4	3	3,168	$ 449,000.00	62	$ 141.73	0.73
148 STONEY RIDGE RD.	3	2.1	3,071	$ 385,000.00	55	$ 125.37	0.09
220 N DOUGLAS ST.	4	3	2,989	$ 260,000.00	72	$ 86.99	1.82
N7883 ANGLE RD.	4	3	2,588	$ 285,000.00	?	$ 110.12	2.03
1017 EUREKA ST.	3	2.2	2,484	$ 309,500.00	79	$ 124.60	1.29
1034 NEWBURY ST	4	3	2,472	$ 295,000.00	63	$ 119.34	1.34
N7860 ANGLE RD.	3	2	2,460	$ 293,000.00	12	$ 119.11	2.06
W14173 PLANTE DR.	2	2	2,361	$ 290,000.00	171	$ 122.83	0.4
694 KENSINGTON DR.	4	3	2,350	$ 300,000.00	29	$ 127.66	0.73
W13879 SKYLINE CIR.	3	2	2,104	$ 320,000.00	20	$ 152.09	1.06
W13861 SKYLINE CIR.	3	3	2,036	$ 270,000.00	191	$ 132.61	1.04
768 S DOUGLAS ST.	4	2	1,890	$ 181,000.00	43	$ 95.77	1.98
731 CHESTER CT.	3	2	1,874	$ 360,000.00	?	$ 192.10	0.73
510 HOPE AVE.	4	2	1,762	$ 220,000.00	37	$ 124.86	1.59
N8615 ARCADE GLEN RD.	3	1	1,738	$ 184,900.00	56	$ 106.39	0.55
609 CAMBRIDGE DR.	3	2.5	1,650	$ 324,500.00	?	$ 196.67	0.84
N9005 S KORO RD.	3	2	1,600	$ 289,900.00	60	$ 181.19	0.19
412 ARDMORE AVE.	3	3	1,560	$ 205,000.00	?	$ 131.41	1.53
413 SANDMAR DR.	3	2	1,500	$ 275,000.00	378	$ 183.33	1.63
742 SUNRISE DR.	2	3	1,482	$ 265,000.00	?	$ 178.81	1.87
201 STONE HILL CT.	3	2	1,481	$ 389,000.00	?	$ 262.66	0.1
526 ARDMOORE AVE	3	2	1,470	$ 235,000.00	50	$ 159.86	1.65
W14256 HIGHLAND TER.	3	1	1,461	$ 185,500.00	?	$ 126.97	0.47
629 HARVEY ST.	3	2	1,368	$ 255,000.00	31	$ 186.40	1.71
632 SUNRISE DR.	3	2	1,350	$ 233,000.00	51	$ 172.59	1.85
N8610 ARCADE GLEN RD.	3	2	1,300	$ 150,000.00	52	$ 115.38	0.55
N8623 COMORN RD.	3	1	1,288	$ 185,000.00	46	$ 143.63	0.46
N8605 ARCADE GLEN RD.	3	2	1,152	$ 185,000.00	?	$ 160.59	0.55
W13252 SCANDI ST.	3	1	1,100	$ 181,000.00	49	$ 164.55	2.1
W14247 GINGER ST.	3	1	936	$ 140,000.00	?	$ 149.57	0.52
W14347 BROOKWOOD CT.	2	1	800	$ 147,683.00	23	$ 184.60	0.55

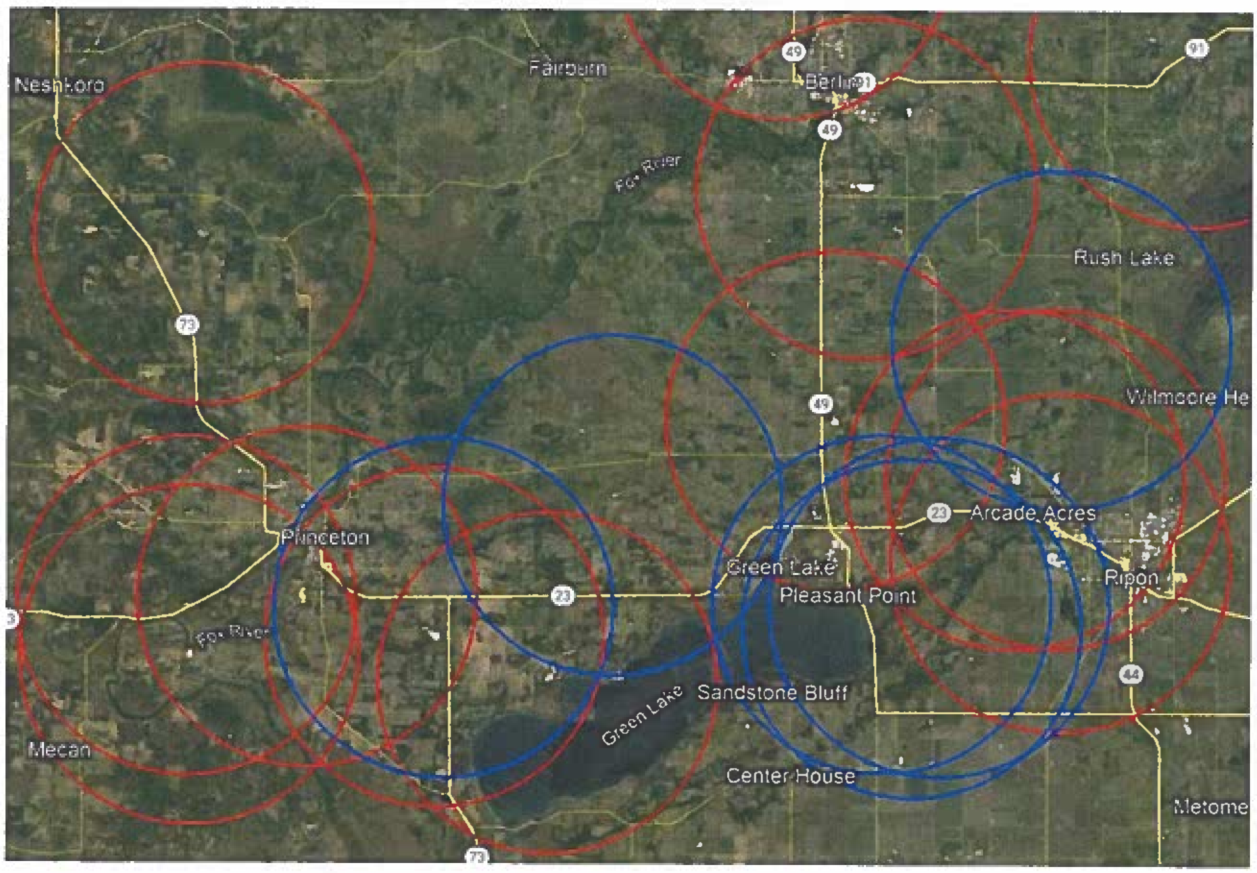
Note. Data in spreadsheet from Zillow.com

The data does not show any disparities in sales prices for homes closer to a mining operation. Of the homes which data on days on market were available for, only three spent more than ninety days on the market, of the three homes, the home farthest away from a mine spent the longest time on the market. There is no significant impact on property value due to proximity to mining operations occurring in the City of Ripon. Homes in Ripon are selling for what the local market will bear and two pits and a quarry have nothing to do with it.

A Regional View

If the curve in Figure 7 was correct, the City of Ripon would not be the only municipality dealing with devalued property. The problem would be apparent all the way around Big Green Lake, west through the City of Princeton and north through the City of Berlin as well. The image in Figure 11 shows a three-mile radius around active mineral extraction sites in red and reclaimed or inactive sites in blue.

Figure 11.



Note. Image from Google Earth, 2023.

There is no mining induced disparity in values for the properties inside the radii shown in Figure 11. It also begs the question that if the Erickcek model calculates the effect of opening one mine on property values, would properties within three miles of several mines endure a five to thirty-five percent loss for each mine? If this were true, it would be a major crisis across the entire region and the issue would be at the forefront of public policy decision making in Green Lake and Fond du Lac Counties.

Conclusions on Property Values

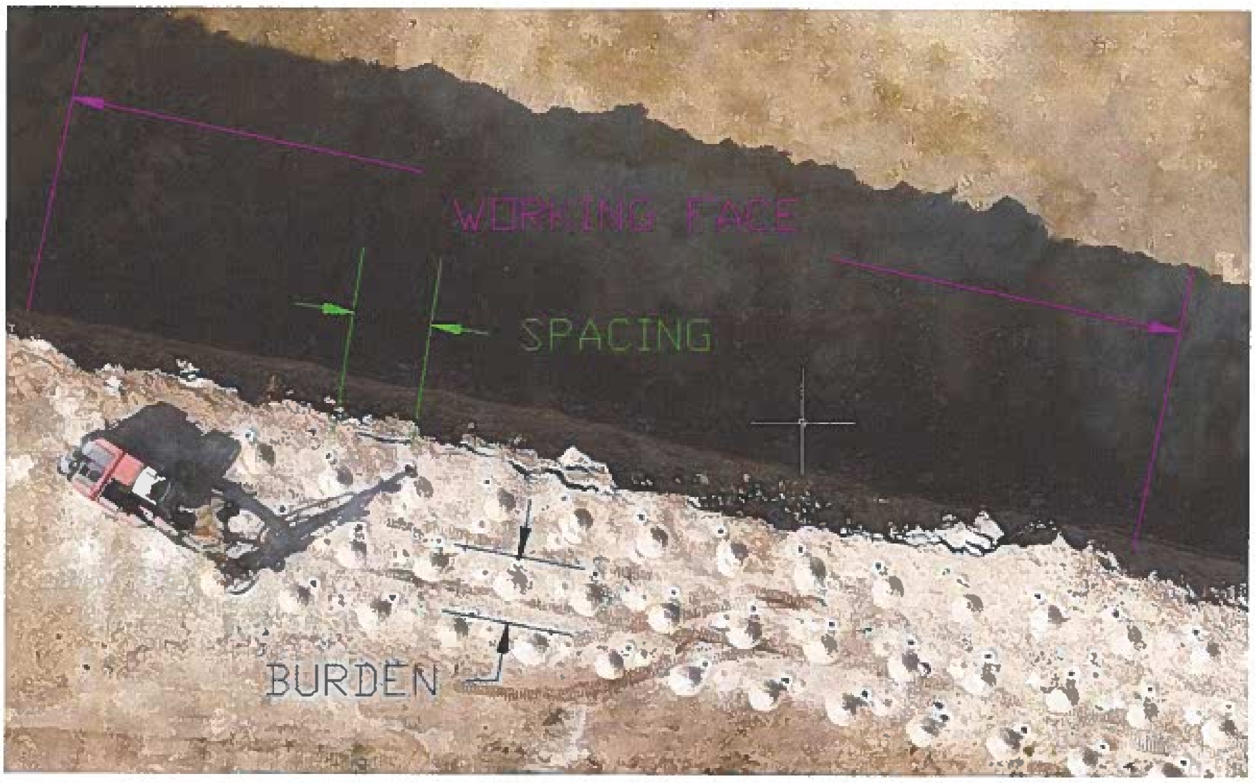
Owning property is one of the most significant investments the average person can make, so it is understandable that protecting the value of that property would be of the utmost importance. Concerns over a new mineral extraction site having a negative impact on neighboring property values have been brought up during the permitting process of many proposed sites. While the questions this concern brings are honest ones, the "go to" answer that those opposed to mining always lead with is not an honest answer. The Erickcek devaluation model is a poorly conceived work of fiction which continues to gain traction from being repeatedly claimed as fact. The model's misuse by real estate appraisal firms looking to make an easy dollar by drafting valuation reports to be used as propaganda by anti-mining groups is becoming more and more common and is extremely dishonest and even dangerous. These reports further the disconnect between the mining industry and the communities they serve and operate in.

A working knowledge of statistics and advanced mathematics is not needed to see that properties near active mineral extraction operations in Green Lake County and the surrounding area are not experiencing a loss in value due to mining. These homes are being sold for fair prices which are based on the size, age, and condition of the property and not how near or far they are from a mining operation.

Blasting

Blasting is the first stage of processing the rock at a quarry. An air-rotary drill is used to drill holes in the rock along and into the working face of the quarry. The holes are spaced apart at pre-determined distances known as burden and spacing as shown in Figure 12.

Figure 12.



The holes are drilled to depths based on the height of the working face to provide uniform fragmentation at the working level on the floor of the quarry. Some quarries have smooth uniform seams in the stone at the working level which determine the drilling depth, such as the quarry floor shown in Figure 13, note the dark circles on the floor that form a grid pattern, these are marks from the drill at the bottom of the hole that become visible when the floor gets wet. Some quarries do not have smooth uniform seams at the working level and require what is known as sub-drilling. Sub-drilling is drilling the holes to a depth below the working level, usually two feet below it, so that the floor can be built up with gravel and finer material from the blast to produce a smooth working surface and facilitate drainage away from the working area like the quarry floor in Figure 14.

Figure 13.

Figure 14.

Once the holes are drilled, the blasting crew fills them with a measured amount of blasting agent and detonation materials, and then top the hole off with stemming material (crushed stone or drill cuttings) to the depth determined in the design of the blast. Stemming material is used to confine the explosion inside the hole to prevent "fly-rock". The holes are linked together and electronically detonated. One blast in a quarry is actually a series of small explosions with millisecond delays between them. This allows for reduced vibration and air blast while still efficiently breaking up the rock for further processing. The delays also allow control over the direction of the blast so that it can be sent out into the quarry instead of up into the air or back into the solid face of the highwall, both of which could cause potentially dangerous situations. The images in Figure 15 illustrate the delays, duration, and direction of a blast at the Upper Mashuda Quarry in Green Lake County.

Figure 15.

Pre-Blast

Start of Blast

Note. There were some high spots of rock on the floor that were also blasted in this session.

0.51 Seconds into Blast

0.84 Seconds into Blast

1.35 Seconds into Blast

2.03 Seconds into Blast

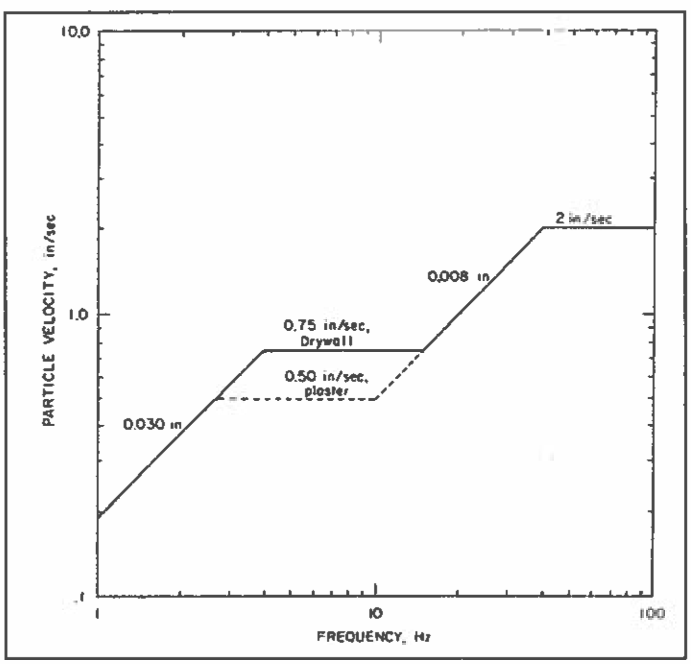
Note. The last hole has detonated by this point.

3.21 Seconds into Blast

Blast Design

The modern quarry blast is a highly engineered process, with multiple factors to consider with each blast design. The closest structure to the blast dictates the airblast and ground vibration limits for each blast and because of this, the amount of explosive energy that can be used. Airblast is the air overpressure from an explosion and is measured in decibels. This is not the same decibel scale used to measure the intensity of audible noise (dBA), it is a linear logarithmic measurement (dB(L)) used to measure the ratio between normal atmospheric pressure and the increased air pressure from the blast. Airblast generally isn't audible as it is at frequencies below what humans can hear. Ground vibration is just that, vibration through the ground, which is measured in inches per second and frequency in hertz. Chapter SPS 307.44 of the Wisconsin Administrative Code sets the limit for airblast for surrounding structures at one hundred thirty-three decibels and uses what is commonly known as the "Z-Curve" which was developed by the U.S. Bureau of Mines, shown in Figure 16 to set the limit on ground vibration.

Figure 16.



Studies by the U.S. Department of the Interior, Office of Surface Mining Reclamation and Enforcement have determined that risk of damage from airblast does not occur until approximately one hundred forty decibels. Studies on ground vibration by the U.S. Bureau of Mines concluded that if peak particle velocities are under the limits set forth in the "Z-Curve" no damage to structures will occur. Other factors that are included in engineering a blast include the density of the rock, height of the working face, the volume of rock to be blasted, atmospheric conditions, and the preferred sizing of the blasted rock. These parameters are all used to formulate a blast that is first and foremost under the allowable airblast and vibration limits, but also efficiently break the rock. The blasters perform pre-blast surveys of the working face of the quarry to determine minimum burdens and spacing as shown in Figures 17 and 18, as well as using data from previous blasts at the site and similar sites.

Figure 17.

Overview

Site name:
Bench name:
Blast name:
Recording date: 8/16/2023 12:16 PM
3D Model: Mashuda_#3-2023poly.jm3
Blast Site: Mashuda_#3-2023polyholes_FINAL.sm

Blast Site geometry

Face Plane dip direction:	11.0 °	Min bench height:	54.33 ft
Face Plane dip angle:	84.6 °	Mean bench height:	59.44 ft
Floor Plane elevation:	807.0 ft	Max bench height:	61.64 ft
Floor Plane dip direction:	n.a.	Distance (Delimiters):	482.11 ft
Floor Plane dip angle:	0.0 °	Distance (delimiting planes):	658.94 ft

Design parameters

Burden:	10.0 ft	Borehole inclination:	0.0 °
Number of rows:	1	Borehole subdrilling:	2.0 ft
Row distance:	8.20 ft	Side spacing:	9.84 ft
Row shift:	0.0 ft	Rock density:	0.0 tn. sh./cu. yd

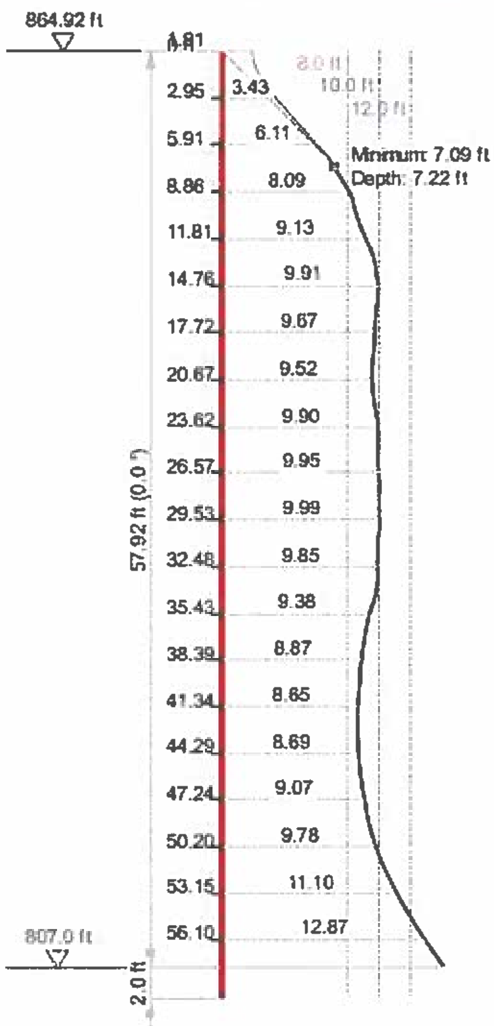
Drill Pattern analysis

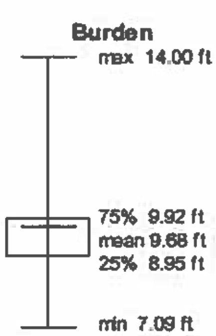
Number of rows:	3	Min subdrilling:	2.0 ft
Number of boreholes:	165	Mean subdrilling:	2.0 ft
Min side spacing:	7.6 ft	Max subdrilling:	2.0 ft
Mean side spacing:	10.9 ft	Total drilling length:	10166.62 ft
Max side spacing:	12.6 ft		
Min inclination:	0.0 °		
Mean inclination:	0.0 °		
Max inclination:	0.0 °		

Note. Image shows data for blast design from the blast in Figure 15.

Figure 18.

2 (Scale 1:130) Minimum Burden





Inclination: 0.00 °
Length: 59.92 ft
Diameter: 3.94 in
Area: 1191.0 sq. ft (of profile)
Position: u: -38.30 ft, v: 0.07 ft
E: 2210946.60 ft
N: 666216.12 ft
H: 864.92 ft
Subdrilling: 2 ft

Depth [ft]	Min. burden [ft]
0.0	0.000
3.3	3.276
6.6	6.553
9.8	8.406
13.1	9.638
16.4	9.765
19.7	9.534
23.0	9.820
26.2	9.937
29.5	9.986
32.8	9.849
36.1	9.218
39.4	8.783
42.7	8.628
45.9	8.850
49.2	9.479
52.5	10.765
55.8	12.654
59.1	-3.281

Note. Image shows data for hole number 2 of 165 for the blast shown in Figure 15.

The blast engineers use what is known as the scaled distance equation which calculates the weight of explosives that can be detonated in one eight millisecond window and keep the ground vibration under the safety limits at the surrounding structures. The modern quarry blast is a highly engineered process that is created through the use of many scientific, mathematic, and geologic principles as well as on the ground experience.

Safety & Environmental Precautions

Safety and environmental concerns about blasting are commonly brought up during the permitting phase of a new mineral extraction site. These concerns are generally brought by a lack of understanding of the process. Blasting at a quarry is one of the most safety-centric parts of the aggregate production process.

During a blasting session the blasters are responsible for the safety of every person at the mine as well as those in the immediate area surrounding the mine. Every part of the process is measured and monitored. Before the blast is detonated the blasters make sure that everyone on site is accounted for and is in the designated safety area before the blast occurs. The blasters also secure a safe perimeter around the site to ensure that no one inadvertently enters the blast area. An audible warning is sounded before the blast is detonated, and no one is allowed to enter the site after the blast until the blaster in charge assesses the blast and clears the site for re-entry.

Seismographs are deployed at structures near the site to record the real-time ground vibration and airblast to ensure compliance with the safety limits. The report in Figure 19 shows the seismograph data from the nearest structure for the blast at the Upper Mashuda Quarry in Green Lake County shown in Figure 15.

Figure 19.

Instantel

Event Report

Date/Time	Tran at 12:30:58 August 30, 2023
Trigger Source	Geo: 0.030 in/s, Mic: 130.0 dB(L)
Range	Geo: 10.000 in/s
Record Time	3.0 sec at 1024 sps
Job Number:	1

Serial Number	BA11290 V 10.72-8.17 BlastMate III
Battery Level	6.3 Volts
Unit Calibration	August 11, 2023 by Instantel
File Name	M290K6D4.3M0

Notes

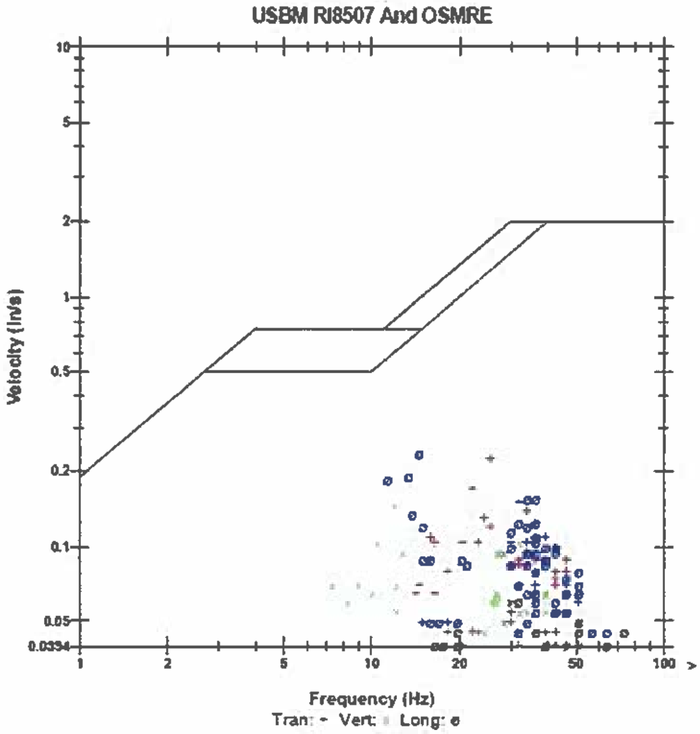
Client:	Kopplin & Kinas
Location:	Mashuda
Seis Location:	Farmhouse
User:	Mike

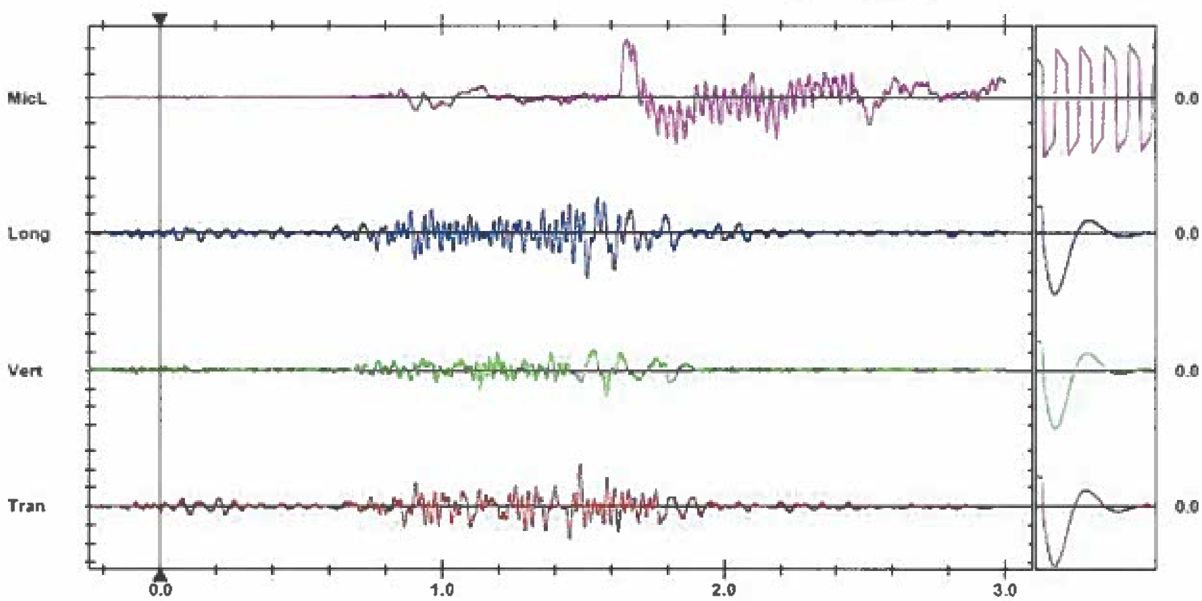
Extended Notes
Clear 66 N 10

Microphone	Linear Weighting
PSPL	124.1 dB(L) at 1.655 sec
ZC Freq	6.4 Hz
Channel Test	Passed (Freq = 20.1 Hz Amp = 573 mv)

	Tran	Vert	Long	
PPV	0.225	0.145	0.235	in/s
ZC Freq	26	12	15	Hz
Time (Rel. to Trig)	1.490	1.582	1.517	sec
Peak Acceleration	0.106	0.053	0.106	g
Peak Displacement	0.001	0.002	0.002	in
Sensor Check	Passed	Passed	Passed	
Frequency	7.8	7.6	7.3	Hz
Overswing Ratio	3.7	3.5	4.7	

Peak Vector Sum 0.240 in/s at 1.517 sec





Time Scale: 0.20 sec/div Amplitude Scale: Geo: 0.100 in/s/div Mic: 0.002 psi(L)/div
Trigger = ▶———◀

Sensor Check

Printed: August 30, 2023 (V 10.74)

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The seismograph data in Figure 19 shows that the peak particle velocities (PPV), measured in inches per second, are below the regulatory limit as well as the peak airblast shown as PSPL measured in dB(L). Just over eighty-thousand tons of rock were blasted in this session and zero damage occurred to surrounding properties or mine property. The ability to blast large quantities of rock in a single session makes blasting an intermittent occurrence. On an average year most rock quarries in Green Lake County will only blast two or three times a year, with blasts that are complete within several seconds, causing no damage to neighboring properties.

The compounds used for blasting are another common concern that is brought up in the discussion about blasting. A popular misconception is that quarries use dynamite to blast the rock, they do not. The modern quarry generally uses ANFO (ammonium-nitrate/fuel-oil) based compounds to blast the rock. ANFO based explosives are far less hazardous and more cost effective for quarry blasting than dynamite. ANFO based emulsions are normally used for quarry blasting in Green Lake County. Emulsions are viscous waterproof compounds which prevent the degradation and leaching of the product if it comes in contact with water. This ensures that the compound remains in the drill-hole and is converted into gas upon detonation which expands and breaks the rock. Emulsions allow for the use of less explosives to blast more rock at a lower energy than straight ANFO products.

Conclusions on Blasting

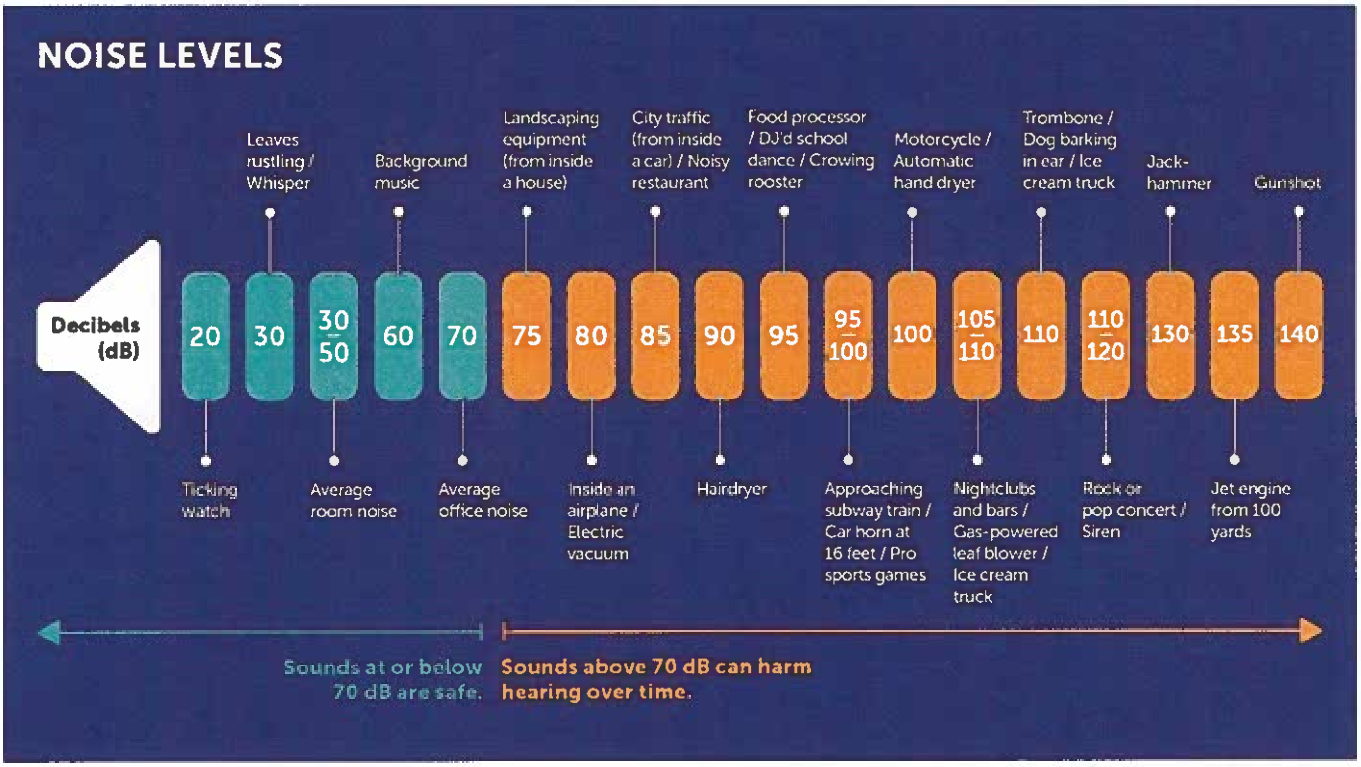
Blasting at a mineral extraction site is a technical, engineered process. Blasters utilize advanced technologies to ensure that it is performed in a safe, highly controlled manner. The methods and products used keep vibration and airblast at safe levels and prevent nitrates from leaching to groundwater. Blasting is performed at every active quarry in Green Lake County and is done so without damaging surrounding properties or contaminating groundwater.

Noise

The mineral extraction sites in Green Lake County all utilize mechanical processes that produce various sounds and at varying levels. Most of the sites process mined materials on an intermittent basis, except for the industrial sand sites, which for the most part, operate continuously. All the active stone quarries in Green Lake County drill, blast, and process stone on an intermittent basis which is determined by the demand for aggregate. Most of the quarries have daily dump truck traffic hauling out of the sites and delivering aggregates to customers. The amount of truck traffic varies from site to site and can range anywhere from several trucks per day to several trucks per hour. All these activities generate varying levels of sound. The intensity of sound outside of an extraction site is generally controlled by placing screening berms around the property which are extremely effective at dampening the sounds generated during operation. As the extraction area is increased in size, the processing equipment is set-up below grade on the floor of the quarry adding another layer to dampen the sound. Processing equipment is generally set up in between the working face of the mine and the stockpiles of processed products, which also contributes to sound reduction.

Sound functions similarly to ground vibration and airblast in that it lessens in intensity and dissipates with distance from the source. Sound, as it relates to human hearing capability, is measured in decibels on a weighted scale (dBA). Zero dBA is the bottom threshold of human hearing and one-hundred thirty dBA is the threshold for pain. The chart in Figure 20 shows examples of sounds at various intensities in decibels.

Figure 20.



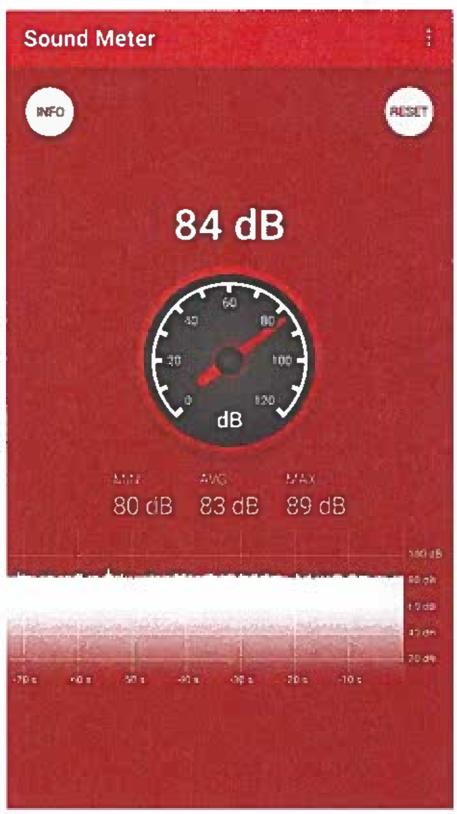
Note. Infographic from Hearing Health Foundation, Online.

Sound level readings were taken at two Kopplin & Kinas Co., Inc. mineral extraction sites during processing operations in July of 2023. The first site is the Morris Quarry which is located at STH 49 and McConnell Road in the Town of Brooklyn. The aerial photo in Figure 21 shows the locations of the sound level readings taken.

Figure 21.

Reading #1 is shown in Figure 22 and was taken on the quarry floor approximately one-hundred feet from the processing equipment.

Figure 22.

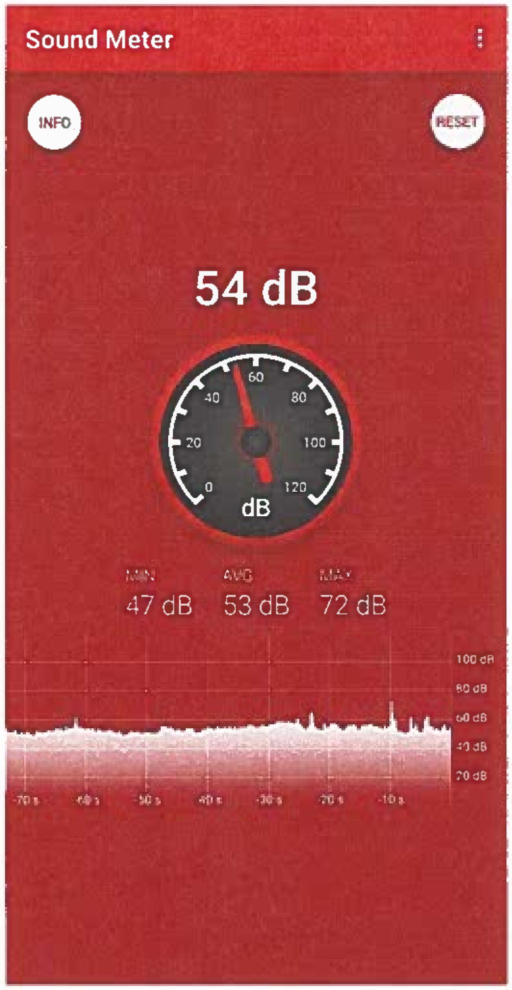


Reading #2 is shown in Figure 23 and was taken in between the highwall and the safety berm approximately two-hundred fifty feet from the processing equipment.

Figure 23.

Reading #3 is shown in Figure #24 and was taken in between the safety berm and the exterior screening berm, approximately eight-hundred twenty-five feet from the processing equipment.

Figure 24.



Reading #4 is shown in Figure 25 and was taken outside the exterior screening berm along STH 49, approximately one-thousand one-hundred twenty-five feet from the processing equipment.

Figure 25.

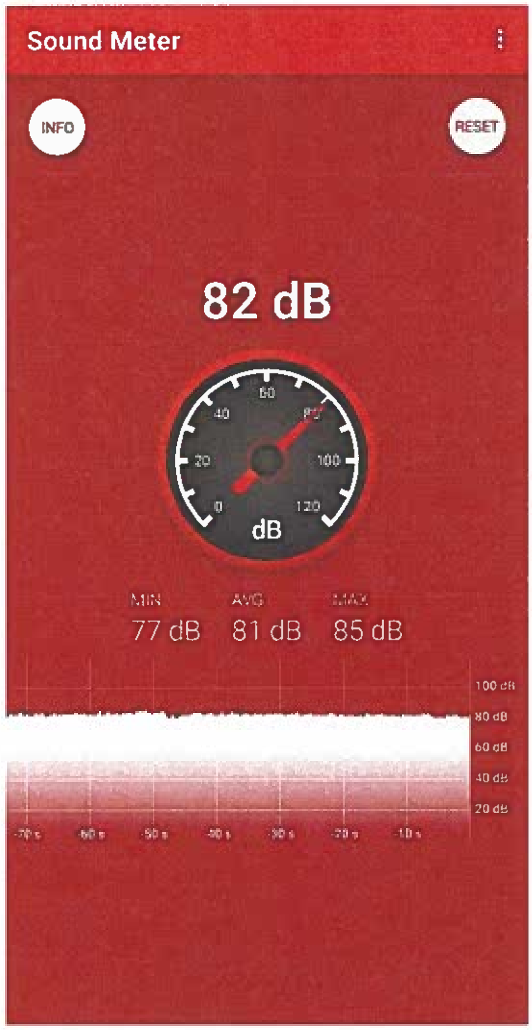
Readings #1 and #2 show similar results as would be expected. The time lapse graphs on readings #1 and #2 show steady high intensity sound readings with a reduction in the average decibel reading by three decibels at reading #2 due purely to the sound traveling over a distance and slightly losing intensity. Reading #3 shows a drastic reduction in the average sound level by twenty-seven decibels from reading #2. The reduction is caused by both the distance from the sound source and sound dampening from the eight-foot-tall safety berm along the top of the highwall. The time lapse graph on reading #3 shows a fairly steady, low intensity reading at this location which is a mixture of ambient sound and the sound of the processing equipment and is at an average of fifty-three decibels. Comparing this average to the sound level examples shown in Figure 20, the sound level falls in between average room noise and background music, normal conversation averages at sixty decibels for another level of reference. The peaks on the graph are from traffic on STH 49 and several birds that chirped during the reading. Reading #4 shows similar average and maximum levels to reading #3. The graph, however, does not show a steady readout, it rolls up and down due to traffic on STH 49 and the small peaks are from birds chirping once again during the reading. The twenty-foot-tall screening berm at this location provides enough sound dampening that extreme focus was necessary to discern the processing equipment sound from the ambient sound of the area.

The second site where sound level readings were taken is the Upper Mashuda Quarry on STH 73 in the Town of Princeton. The aerial photo in Figure 26 shows the locations of the sound level readings taken.

Figure 26.

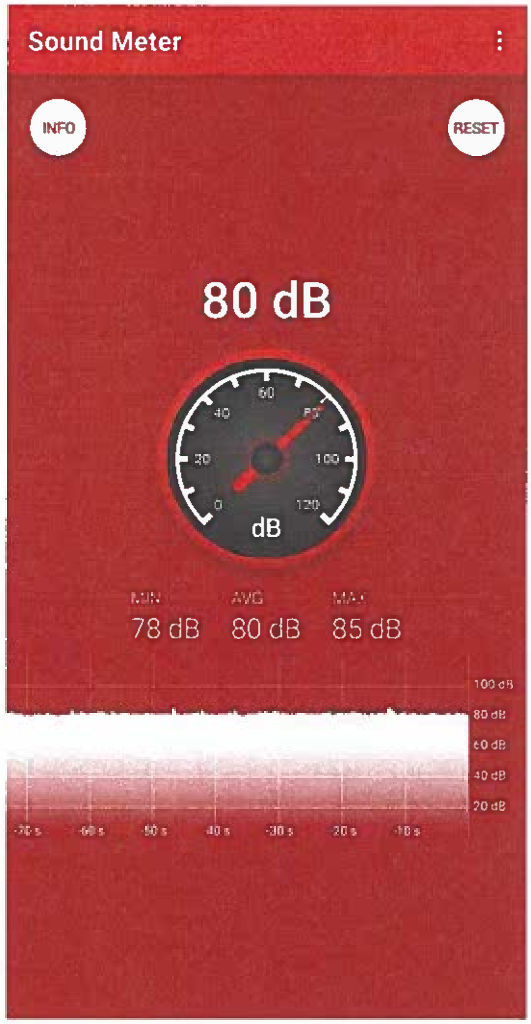
Reading #1 is shown in Figure 27 and was taken on the quarry floor approximately one-hundred feet from the processing equipment.

Figure 27.



Reading #2 is shown in Figure 28 and was taken in between the highwall and the safety berm approximately four-hundred seventy-five feet from the processing equipment.

Figure 28.



Reading #3 is shown in Figure 29 and was taken outside the safety berm in the hay field, approximately eight-hundred seventy-five feet from the processing equipment.

Figure 29.

Reading #4 is shown in Figure 30 and was taken along STH 73, approximately one-thousand three-hundred seventy-five feet from the processing equipment.

Figure 30.

Once again readings #1 and #2 are very similar with only a one decibel reduction in the average reading from reading #1 to reading #2. Both time lapse graphs also show steady high intensity sound. Reading #3 shows a twenty-decibel reduction with an average sound level of sixty decibels, and the time lapse graph showing steady low intensity sound. At the reading #3 location a high level of focus was required to discern between sounds from processing equipment and the ambient sounds of the area. Reading #4 was taken along STH 73 on the highway side of the hill that is utilized for screening in leu of a man-made berm. The hill crests approximately ten feet higher than the base of the safety berm that runs along the highwall. The results of reading #4 are extremely similar to reading #4 from the Morris Quarry. Traffic on STH 73 created all of the high intensity sound readouts, and it was not possible to discern between the ambient sounds of the area and the sounds of mineral processing at the quarry.

Screening berms and natural topography are an effective measure to mitigate the sounds of a mineral extraction operation. All of the non-metallic mineral extraction sites in Green Lake County utilize some form of screening to serve this purpose and others. Wind, temperature, and atmospheric conditions all affect how far and what direction sound will travel, but proper mine development with screening prevents the sounds emitted from an extraction site from becoming a nuisance.

Dust

Almost all ground engaging activities are capable of producing dust. Earthmoving, road construction, agriculture, and driving vehicles on unpaved roads or driveways all have a high probability of generating dust, as do non-metallic mineral extraction operations.

Dust Control

Dust can be generated by a mineral extraction operation by many of the different processes used at the site. Removal of overburden, drilling, blasting, crushing, screening, conveying, loading, and transporting products will all generate dust if control measures are not taken. Dust is controlled in several ways; the most common and effective way is through the application of water to the source of the dust. Water is applied to the travel-ways of the extraction site by water trucks and the discharge points of processing equipment can be outfitted with spray nozzles to knock down dust generated during processing. Product drop heights from conveyors are kept at minimal distances to keep dust down at transfer points. Screening berms and vegetation are also very effective at preventing dust from leaving the site and becoming fugitive or nuisance dust.

Dust Regulation

Dust generated by a non-metallic mineral extraction operation is regulated by both the federal and state governments to ensure a safe working environment at the site and to prevent fugitive or nuisance dust from entering surrounding properties. The Mine Safety and Health Administration (MSHA) regulates the dust at mineral extraction sites, and the Wisconsin Department of Natural Resources (WDNR) regulates dust emissions from mineral extraction sites. MSHA performs random inspections of non-metallic mineral extraction operations and conducts dust level monitoring frequently as part of their inspection. If an operation is not adequately controlling dust, MSHA will shut down the operation, order corrective action, and issue expensive citations. The WDNR enforces compliance with state air quality regulations and will also shut down and fine non-compliant operations. MSHA's dust monitoring detects the presence and amount of respirable crystalline silica in the dust as well as the amount of other respirable particles in the dust. Overexposure to respirable particles of crystalline silica can lead to the lung disease silicosis as well as lung cancer. Silica in Wisconsin comes in the form of quartz which is a commonly occurring mineral. The different minerals that are extracted in Green Lake County have varying quartz contents. The high-grade industrial sand that is extracted in southern Green Lake County is essentially pure quartz. The glacial sand which can be found in deposits around the county is made up of less than ninety-five percent quartz. The rhyolite extrusions that can be seen at Utley, Berlin, and Marquette (these are commonly misnomered as granite, rhyolite is the volcanic equivalent of granite) have a quartz content of twenty to sixty percent. The mined limestone formations in the county are dolomitic limestone and contain the least amount of quartz, ranging from less than five to ten percent quartz, and are mostly comprised of calcium carbonate and magnesium. The active non-metallic mineral extraction operations in Green Lake County all implement dust control measures to ensure the safety of their employees and to remain in compliance with government regulations. By ensuring the safety of their employees these operators are also ensuring the safety of neighbors near the site.

Water Quality

Concerns about water quality as they relate to non-metallic mineral extraction generally focus on the quality of water that will be discharged from the site. Most of the non-metallic mineral extraction sites in Green Lake County have been developed above the water table. Sites above the water table only have to manage surface water, whereas sites that are developed below the water table have to contend with both surface and ground water.

Surface Water Management

Surface water at a mineral extraction site comes in the form of stormwater and from pumped water if the site needs to mechanically dewater. The way non-metallic mineral extraction sites handle surface water puts them into one of two classifications for their required WDNR Wisconsin Pollutant Discharge Elimination System (WPDES) permit, internally or externally drained. The internally drained classification means that the site can capture and contain or infiltrate the full amount of stormwater that falls on all disturbed areas of the site from a twenty-five-year, twenty-four-hour storm event, which in Green Lake County would be approximately four and four tenths' inches to four and seven tenths' inches of rain. A site is considered externally drained if it cannot contain the twenty-five-year, twenty-four-hour rain event or if the site discharges pumped water from dewatering or process water. The WDNR requires monthly, quarterly, or annual water quality testing for the different types of discharges, as well as flow monitoring and temperature monitoring for externally drained sites. The type and frequency of monitoring is dependent upon where mine water is discharged and the results of water quality testing. Non-metallic mineral extraction operations put measures in place to prevent the in-flow of overland stormwater runoff into the extraction area because it is generally advantageous to not take on any more water than necessary. Some sites construct stormwater basins to capture and treat runoff and use the water for dust control or wash processes. The active areas of a site may also have basins or sumps to contain the stormwater that is received and reuse it in the same manner. Stormwater basins are an accepted best management practice (BMP) and are frequently prescribed by the USDA Natural Resources Conservation Service, the Wisconsin Department of Natural Resources, and the Green Lake County Land Conservation Department to control runoff flow rates and reduce sediment and nutrient loadings that are sent downstream.

Mine Water Quality Vs. Stream Water Quality

In September and October of 2023, water samples were collected and analyzed from two quarries in eastern Green Lake County and from three tributaries that flow into the east end of Big Green Lake. The samples were analyzed for the eight metals listed in the US EPA Resource Conservation and Recovery Act (RCRA 8), Nickel, Coliform, E-Coli, Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Nitrate + Nitrite, and pH. The quarry samples were pulled from the stormwater sump at the Egbert Materials Pahl Quarry on Thomas Road in the Town of Green Lake. Samples were also pulled from the stormwater sump and the closed-circuit wash pond at the Kopplin & Kinas Company's Morris Quarry on McConnell Road in the Town of Brooklyn. Two streams were sampled in the Town of Brooklyn: Silver Creek, upstream of the bridge on Spaulding Hill Road and Dakin Creek upstream of the cross-culvert on Skunk Hollow Road. One stream was sampled in the Town of Green Lake: White Creek, upstream of the bridge on Spring Grove Road. The results are shown in Figure 31.

Figure 31.

TESTS	WI DNR WATER QUALITY STANDARDS (UNITS ug/L UNLESS INDICATED OTHERWISE)	MORRIS QUARRY (PRAIRIE DU CHIEN GROUP) FLOOR STORMWATER SUMP	MORRIS QUARRY (PRAIRIE DU CHIEN GROUP) WASH PROCESS POND	EGBERT MATERIALS QUARRY (SINNIPEE GROUP) FLOOR STORMWATER SUMP
RCRA 8 METALS + NICKEL				
ARSENIC ug/L	10	1.7	1.1	1.01
BARIUM ug/L	2000	48.2	28.3	34.4
CADMIUM ug/L	5	< 2.7	< 2.7	< 0.09
CHROMIUM ug/L	100	< 2.3	< 2.3	< 3
LEAD ug/L	15	< 0.8	< 0.8	2.79 "J"
MERCURY ug/L	2	< 0.1	< 0.1	< 0.086
NICKEL ug/L	100	< 6.6	8.85 "J"	< 3.9
SELENIUM ug/L	50	< 1.1	< 1.1	< 5.7
SILVER ug/L	50	< 2.5	< 2.5	< 2.1
GENERAL				
COLIFORM mpn	N/A	276 mpn	53.7 mpn	921 mpn
E-COLI mpn	N/A	10.2 mpn	< 1 mpn	14.4 mpn
BOD mg/L	N/A	< 2 mg/L	< 2 mg/L	< 2 mg/L
COD, UNFILTERED mg/L	N/A	13.94 mg/L "J"	< 10.3 mg/L	14.0 mg/L "J"
NITRITE + NITRATE mg/L	10 mg/L	< 0.43 mg/L	1.51 mg/L	< 0.43 mg/L
pH su	N/A	7.26	7.65	7.53

Notes: "J" Flag: Analyte detected between LOD & LOQ.

TESTS	WI DNR WATER QUALITY STANDARDS (UNITS ug/L UNLESS INDICATED OTHERWISE)	SILVER CREEK (UPSTREAM FROM BRIDGE ON SPAULDING HILL RD)	WHITE CREEK (UPSTREAM FROM BRIDGE ON SPRING GROVE RD)	DAKIN CREEK (UPSTREAM FROM CULVERT CROSSING SKUNK HOLLOW RD)
RCRA 8 METALS + NICKEL				
ARSENIC ug/L	10	0.801	0.373	0.239 "J"
BARIUM ug/L	2000	57.4	67.4	55.6
CADMIUM ug/L	5	< 0.09	< 0.09	< 0.09
CHROMIUM ug/L	100	< 3	< 3	< 3
LEAD ug/L	15	4.67	4.53	4.69
MERCURY ug/L	2	< 0.086	< 0.086	< 0.086
NICKEL ug/L	100	5.58 "J"	< 3.9	< 3.9
SELENIUM ug/L	50	< 5.7	< 5.7	< 5.7
SILVER ug/L	50	< 2.1	< 2.1	< 2.1
GENERAL				
COLIFORM mpn	N/A	> 2420 mpn	770 mpn	>2420 mpn
E-COLI mpn	N/A	1990 mpn	6.20 mpn	488 mpn
BOD mg/L	N/A	< 2 mg/L	< 2 mg/L	< 2 mg/L
COD, UNFILTERED mg/L	N/A	< 10.3 mg/L	< 10.3 mg/L	< 10.3 mg/L
NITRITE + NITRATE mg/L	10 mg/L	1.82 mg/L	10.3 mg/L	9.37 mg/L
pH su	N/A	7.77	7.82	7.81

Notes: "J" Flag: Analyte detected between LOD & LOQ.

The results of the RCRA 8 Metals plus nickel analysis show the water quality for all six sample sites to be far below the limits set forth in the WDNR water quality standards for both drinking water and chronic toxicity criteria for aquatic organisms. Most of the metals analyzed show results under the limit of detection (LOD), which is the lowest concentration or amount of an analyte that can be identified, measured, and reported with confidence that the concentration is not a false positive value. Results that are reported as under the LOD are preceded by the less than symbol (<). Results that are followed by a "J" flag fall in between the LOD and the limit of quantitation (LOQ). The LOQ is the lowest concentration of an analyte that can be determined with acceptable repeatability and accuracy. When a result falls between the LOD and LOQ it means that there is enough of an analyte present to have certainty that it is not a false positive result, but the concentration of the analyte is not reported with the high confidence in repeatability and accuracy of a result that has a concentration exceeding the LOQ.

The results of the general water quality analysis show some differences between the quarry samples and the stream samples in several of the analytes tested. The coliform and E-Coli counts are generally higher in the stream samples. This result is expected as the streams are encountered by a large volume of wildlife and take on agricultural runoff that likely has been in contact with some form of waste produced by livestock, whereas the quarry waterbodies are only exposed to wildlife visiting the ponds and do not take on any agricultural runoff. The BOD and COD results for all six sites are low, which is an indicator that they are not polluted waters. BOD measures the amount of oxygen required by microbes to aerobically decompose organic matter present in a sample and COD measures the amount of oxygen required to chemically oxidize both organic and inorganic matter present in a sample. High BOD and COD equate to less available oxygen in the water for aquatic life. COD is always higher than BOD because it accounts for both organic and inorganic matter present in the sample where BOD only accounts for organic matter. Natural surface water generally has a BOD of less than 5mg/L and a COD of less than 20mg/L. The results of the nitrite + nitrate analysis show the stream samples having a higher nitrate concentration than the quarry samples. Two of the stream samples produced results near the WDNR drinking water limit, with White Creek just over the limit at 10.3mg/L and Dakin Creek just under at 9.37mg/L. The pH of the water at all six sites ranges from 7.26 to 7.62, which means the water is just on the alkaline side of neutral.

The wash process pond at the Morris Quarry was sampled to determine if closed circuit washing would cause increased concentrations of metals and nitrates in the pond. Closed circuit washing means that same pond was used to both supply the water that washes the aggregate and receive the sediment laden water that exits the wash plant. A floating turbidity barrier was used to keep the water intake separated from the sediment discharge. Over 25,000 tons of material were washed utilizing the pond in this configuration. The results of the wash pond analysis don't show any major increases in the concentration of analytes compared to the floor stormwater sump. Arsenic and barium were slightly lower, and nickel and nitrates were slightly higher than the sump sample. Well water was used to maintain the pond level because a portion of the process water leaves the plant with the finished products. The slight increase in nitrate concentration could have come from the supplemental groundwater. The WDNR Well Water Quality Viewer shows that water from three of the four wells sampled in the section the quarry is located in produced nitrate test results ranging between 5.1mg/L and 10.0mg/L as shown in Figure 32.

Figure 32.

Statistics Report ×

(1 of 1) Clear

NITRATE (mg/l as N) for S3 T16N R13E

Range	Number	Percent	Summary
None Detected	0	0%	Minimum: 0.2
... 2.0	1	25%	
2.1 - 5.0	0	0%	Median: 7.4
5.1 - 10.0	3	75%	Average: 6.1
10.1 - 20.0	0	0%	
20.1 ...	0	0%	Maximum: 9.4
Total Samples:	4		
> 10mg/l N	0	0%	Exceeds Health Standard

Note. Figure 32. from WDNR Well Water Quality Viewer, Online

The results of the water quality analysis show that the surface and process water from an active quarry can be as clean, if not cleaner, than the natural watercourses flowing in the surrounding area.

Sulfide Mineralization

The exposure of sulfide mineralization to air and water causes the oxidation of metals contained in the sulfide. The reaction generates sulfuric acid which turns the water acidic and acts as a vehicle for the metals, releasing and carrying them in the water. The product of the reaction is commonly known as acid mine drainage (AMD). A visual indicator that acid mine drainage is occurring is the discoloration on the bottoms of drainageways and ponds. As iron precipitates out of the acid solution it settles on the bottom of the drainageway or pond in the form of yellow, orange, or red sediment. AMD is a common occurrence in metal and coal mining and can be found in tailings piles or ponds, mine waste rock dumps, and coal spoils. Indicators of AMD can be seen in Figures 33 and 34.

Figure 33.

Note. Indicators of AMD in and around a tailings pond at a Minnesota iron ore mine.

Figure 34.

Note. Indicators of AMD in a drainageway at an Illinois coal mine.

AMD is treated with limestone. Limestone is mostly comprised of calcium carbonate which neutralizes the acid. Limestone is used in both passive and active treatments for AMD. Passive treatments include limestone lined basins to treat acidic water and working limestone into tailings and rock waste to neutralize the acid. Active treatments involve using a lime slurry in a water treatment plant which raises the pH of the water, causing the metals to precipitate out of the solution for separation. Metal free, neutral pH water is discharged from the treatment facility.

Green Lake County does not have any metallic or coal mining occurring, the potential for AMD to occur comes from a different source. The common sulfides found in Green Lake County are Pyrite and Marcasite, and they may be seen in small amounts in several of the rock formations found in the county. Concentrated sulfide mineralization can be found in the Sulfide Cement Horizon, which lies immediately below the base of the Platteville limestone formation. If the SCH is exposed, it can react and cause AMD. A quarry in the Fox River Valley exposed the SCH and created AMD due to the exposure, see Figure 35. The quarry was utilized in several studies concerning groundwater quality and the SCH and has been closed to prevent further exposure and stop the reaction, see Figure 36.

Figure 35.

Note. Indicators of AMD next to the submerged area of the quarry.

Figure 36.

Note. Closed Quarry

The SCH can be identified by test drilling and avoided through proper mine planning and development. The SCH does not pose a threat if it is not exposed or dewatered. Sulfides may be present in the limestone formations as well, but acid production is neutralized by the limestone itself. Composite samples of the Sinnipee Group formations (Galena, Decorah, Platteville) were taken during test drilling for the Skunk Hollow Quarry in Section 36 of the Town of Brooklyn and sent to ALS Laboratories in Reno, Nevada to have acid base accounting (ABA) testing performed. ABA tests determine the acid producing potential, neutralizing potential, and sulfide content of rocks and soils. ABA testing is a standard procedure in coal and metallic mining planning so that mine operators can develop plans to mitigate AMD. The results of the ABA testing showed that the limestone at Skunk Hollow contains 0.12% to 0.19% sulfide mineralization, has a very low acid producing potential, and a very large neutralization potential. If all the sulfide available at the site was converted to acid, only 1% of the available calcium carbonate at the site would be required to neutralize it.

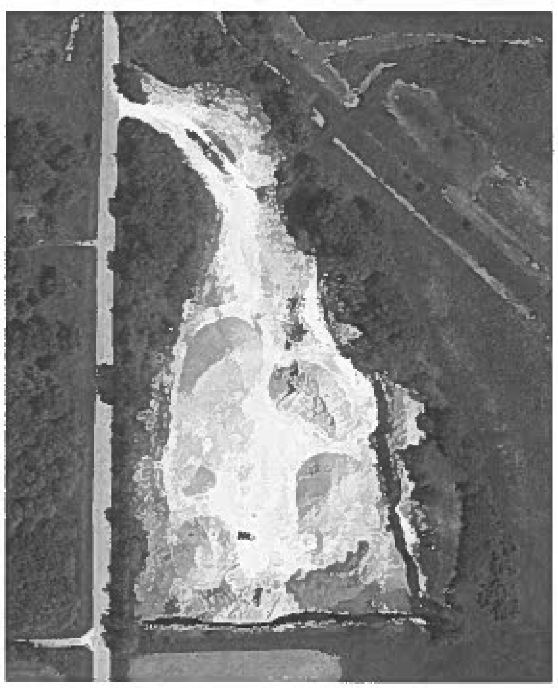
Reclamation

Reclamation is the process of turning mined areas back into land that can be used for purposes other than mining. A mine can be transformed into a lake or pond, filled and leveled to become agricultural land, and even transformed into golf courses, parks, or residential developments.

Wisconsin Chapter NR 135 sets the requirements for reclamation as well as what is required as part of a reclamation plan. Every non-metallic mineral extraction operation in Green Lake County has a reclamation plan on file with the county. Reclamation quite frequently begins while a property is still being mined because it reduces the amount of time needed to reach final reclamation and it reduces operating and reclamation costs.

The following figures show examples of reclamation performed by Kopplin & Kinas Co., Inc. in the last few years.

Figure 37.



Note. Priske Quarry, Fall River, WI, Pre-reclamation.

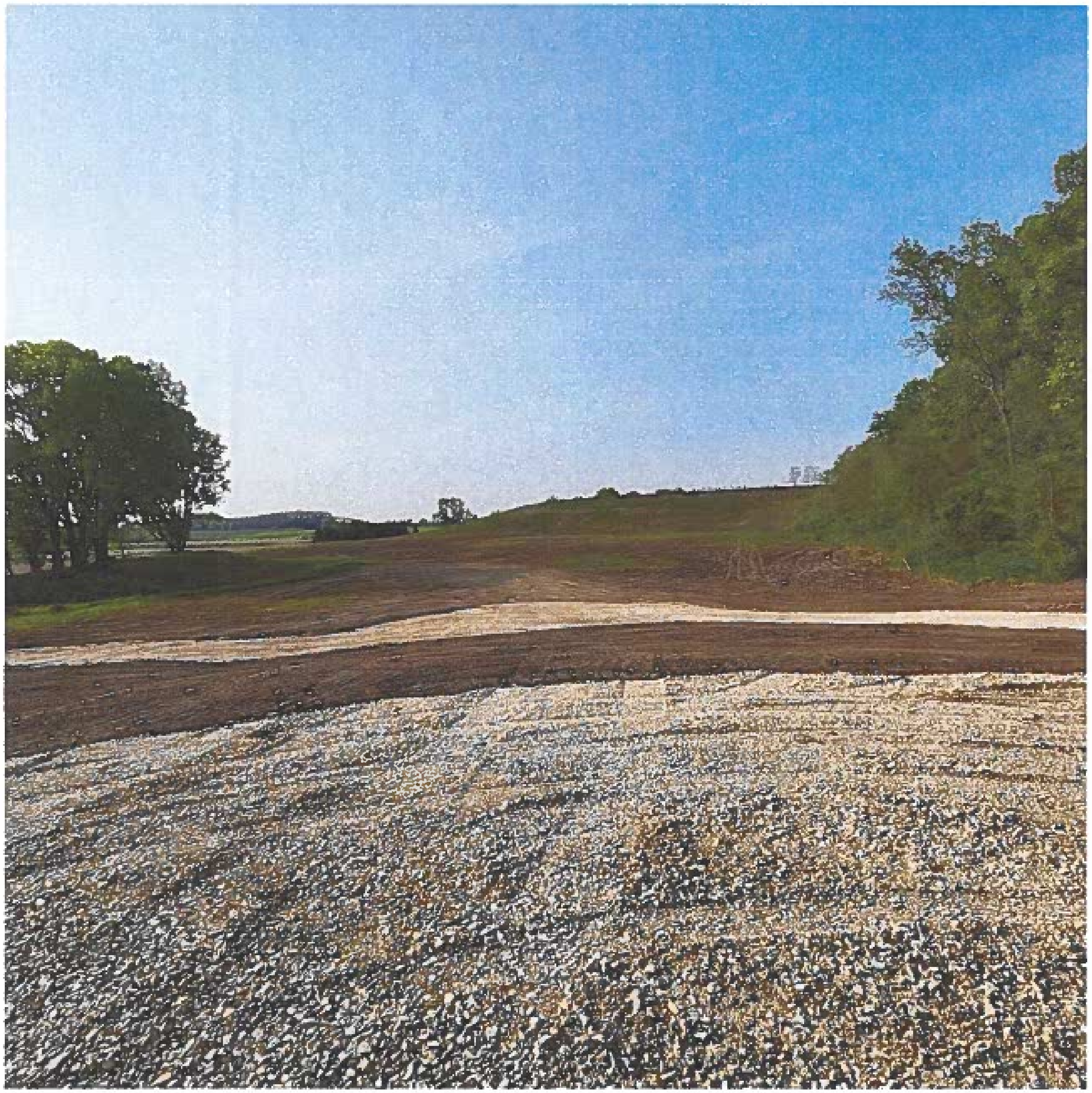
Figure 38.

Note. Highwalls have been sloped off, imported fill has been leveled across floor.

Figure 39.

Note. Slopes have been finish graded and seeded, floor prep in progress.

Figure 40.



Note. Floor has been finished and prepped for seeding, paths and look-out pad have been graveled.

Figure 41.

Note. Floor has been seeded.

Figure 42.

Note. Final Reclamation.

Figure 43.

Note. Final Reclamation

Figure 44.

Note. Final Reclamation.

Figure 45.

Note. Final Reclamation.

Figure 46.

Note. Undisclosed location per landowner's request. Active quarry in 2010. Reclamation has started. Reclamation will be completed utilizing only imported fill.

Figure 47.

Note. Reclamation progressing. 2017

Figure 48.

Note. Reclamation almost complete in 2020.

Figure 49.

Note. Final reclamation completed in 2022.

Mining Makes a Good Neighbor

U.S. mining respects the communities in which we operate and the environment in which we live.

Our commitment to the environment means investing heavily in the development of advanced technologies that minimize mining's footprint. It also means operating under a comprehensive set of standards, which include every major U.S. environmental law, as well as state laws and the industry's own strict sustainability practices.

Being a community partner means restoring more than 3.0 million acres of mined lands since 1978 for beneficial uses including recreation areas, farms, economic development parks, golf courses, schools, housing developments, wildlife habitat and wetlands. No mining project is complete until we fully restore the lands on which we operate.

No mining project is complete until we fully restore the lands on which we operate.

Visit the National Mining Association at www.nma.org
for more information.

NMA.

MINERALS MAKE GOOD NEIGHBORS

People are at the core of U.S. minerals mining. We respect and care for the health and safety of our employees, the well-being of the communities in which we operate and the environment in which we live.

COMMITTED TO OUR EMPLOYEES

Employees are the cornerstone of U.S. minerals mining, and their health and safety is our top priority.

U.S. mining has lower injury rates than many other industrial sectors—but we can and are doing more.[1]

CORESafety, mining's new health and safety initiative, seeks to reduce the rate of employee injury even further, cutting it in half by 2015.[2]

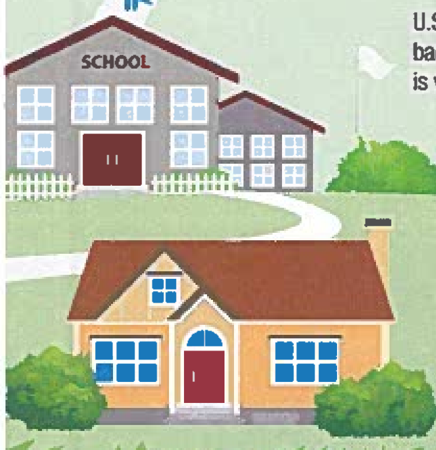
COMMITTED TO OUR COMMUNITIES

U.S. minerals mining strives to give back to the communities whose support is vital to our work.

We support local communities through volunteer efforts and millions of dollars in charitable contributions every year.

In addition, minerals mining generates tens of billions of dollars in much-needed revenue for federal, state and local governments ...[3]

... While stimulating the local economy by providing community residents with high-earning jobs that pay 79% more than the average private sector job.[4]



COMMITTED TO THE ENVIRONMENT

U.S. mining is dedicated to being a responsible environmental steward and invests heavily in the development of new technologies and processes to minimize environmental impacts.

U.S. mining operates under a comprehensive set of standards that includes every major U.S. environmental law.[5]

In 2012, U.S. mining introduced the Environmental Management System, a roadmap providing all minerals mining companies, regardless of size, the tools necessary to navigate regulatory processes and continually improve environmental performance.[6]

U.S. mining is committed to restoring the lands on which we operate, and always has a plan and funding for restoration in place before mining begins.

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mineralsmakelife.org

Federal Environmental Laws that Govern U.S. Mining

NMA
THE AMERICAN RESOURCE

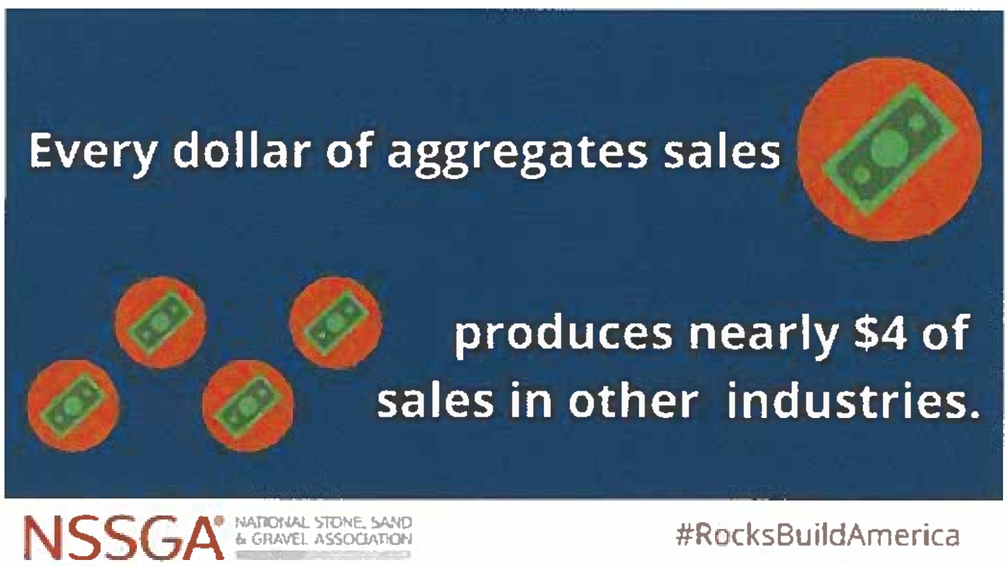
More than three dozen federal environmental laws and regulations cover all aspects of mining. The following list includes some of those major laws. In addition, each state has laws and regulations that mining companies must follow.

- National Environmental Policy Act - requires an interdisciplinary approach to environmental decision making.
- Federal Land Policy and Management Act - prevents undue and unnecessary degradation of federal lands.
- Clean Air Act - sets air quality standards.
- Federal Water Pollution Control Act (Clean Water Act) - directs standards for surface water quality and controlling discharges to surface water.
- Safe Drinking Water Act - directs standards for quality of drinking water supplied to the public (states are primary authorities) and regulating underground injection operations.
- Resource Conservation and Recovery Act (formerly the Solid Waste Disposal Act) - regulates generation, storage and disposal of hazardous waste (Subtitle C; authorized state programs) and manages solid, non-hazardous waste (Subtitle D; approved state programs).
- Comprehensive Environmental Response, Compensation, and Liability Act - Imposes liability on persons responsible for releases of hazardous substances.
- Toxic Substance Control Act - requires regulation of chemicals that present an unreasonable risk of injury to health or environment, including an unreasonable risk to a potentially exposed or susceptible subpopulation, under the conditions of use. In addition, manufacturers (including importers) are required to report certain production and use information on chemicals in commerce over certain threshold quantities.
- Emergency Planning and Community Right-to-Know Act – requires reporting on certain hazardous chemicals to state and local emergency planning committees, as well as certain chemicals under the Toxics Release Inventory program.
- Endangered Species Act - lists threatened plants and animals; protection plans mandated.

- Migratory Bird Treaty Act - protects nearly all bird species.
- Surface Mining Control and Reclamation Act - regulates coal mining operations and reclamation.
- Uranium Mill Tailings Radiation Control Act – directs standards for the protection of the public health, safety, and the environment from hazards associated with uranium recovery activities.

Other laws that impact mining include:

- the Rivers and Harbors Act,
- the Federal Mining Law,
- the National Historic Preservation Act,
- the Law Authorizing Treasury's Bureau of Alcohol, Tobacco and Firearms to Regulate Sale, Transport and Storage of Explosives, and
- the Federal Mine Safety and Health Act.


Every dollar of aggregates sales
produces nearly $4 of
sales in other industries.
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NATIONAL STONE, SAND
& GRAVEL ASSOCIATION
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Phoenix Center Policy Paper Number 53:

Quarry Operations and Property Values: Revisiting Old and Investigating New Empirical Evidence

George S. Ford, PhD
R. Alan Seals, PhD

(March 2018)

Phoenix Center Policy Paper No. 53
Quarry Operations and Property Values: Revisiting Old and Investigating New Empirical Evidence

George S. Ford, PhD†
R. Alan Seals, PhD•

Abstract: A large literature exists on the impact of disamenities, such as landfills and airports, on home prices. Less frequently analyzed is the effect of rock quarries on property values, and what little evidence is available is dated and conflicting. This question of price effects is a policy relevant one, with one study in particular used frequently to support "not in my backyard" campaigns against new quarry sites. In this POLICY PAPER, we revisit the literature and conduct a new analysis of the price effects of quarries, estimating the effect of quarries on home prices with data from four locations across the United States and a wide range of econometric specifications and robustness checks along with a variety of temporal circumstances from the lead-up to quarry installation to subsequent operational periods. We find no compelling statistical evidence that either the anticipation of, or the ongoing operation of, rock quarries negatively impact home prices. Our study likewise highlights a number of shortcomings in the empirical methodologies generally used to estimate the effect of disamenities on real estate prices. First and foremost, many existing studies are naïve as to the empirical conditions necessary to identify a causal relationship and do not establish credible strategies to estimate the counter-factual outcome. Second, the inclusion of "distance to the site" regressors in hedonic models is shown to be an unreliable statistical method. Using the method of randomized inference, the null hypothesis of "no effect" of placebo quarries is rejected in as much as 93% of simulations.

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† Chief Economist, Phoenix Center for Advanced Legal & Economic Public Policy Studies. The views expressed in this paper are the authors' alone and do not represent the views of the Phoenix Center or its staff.

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I. Background

Odds are that underneath your feet is a construction material made of sand, crushed stone, and gravel. These construction materials are an essential ingredient into nearly every construction project, from residential housing, office buildings, retail outlets, entertainment structures, to the roads that connect them.[1] Sand, rock and gravel are literally the foundation of economic development, but their extraction process can generate dust, noise, vibration, and truck traffic. While modern technologies and methods have greatly reduced quarries' impact, the environmental and economic consequences of quarry operations receive considerable attention, often in the form of "not in my backyard" (or "NIMBY") campaigns opposing quarry expansions or new sites. Choosing a quarry site is a delicate task. While a quarry may be best located far from residential density on NIMBY concerns, it also needs to be near the final point of demand due to its high transportation cost. Quarries must balance the need to be both "near" and "far," so they are typically found on the outskirts of cities and towns.

A key NIMBY complaint in the siting and expansion of quarries is the effect of the operations on nearby home values. According to Census data, housing amounts to about 70% of the average American's net wealth, so naturally homeowners are sensitive to any adverse effect, real or imagined, on property values.[2] Despite NIMBY opposition, nearly all the evidence on quarry operations finds no price effect. Frequently mentioned studies include Rabianski and Carn (1987) and Dorrian and Cook (1996), both of which find no relationship between appreciation rates of property values near to and far from quarries.[3] An

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1 *2014 Minerals Yearbook, Construction Sand and Gravel*, U.S. Geological Survey (2014) at p. 1 (available at: https://minerals.usgs.gov/minerals/pubs/commodity/sand_&_gravel_construction/myb1-2014-sandc.pdf) ("Construction sand and gravel is a traditional basic building material and is one of the earliest materials used by humans for dwellings and later for outdoor areas such as paths, roadways, and other constructs. Despite the relatively low, but increasing, unit value of its basic products, the construction sand and gravel industry is a major contributor to and an indicator of the economic well-being of the Nation").

2 *Wealth, Asset Ownership, & Debt of Households Detailed Tables: 2013*, U.S. Census Bureau (2017) (available at: https://www.census.gov/data/tables/2013/demo/wealth/wealth-asset-ownership.html).

3 A.M. Dorrian and C.G. Cook, *Do Rock Quarry Operations Affect Appreciation Rates of Residential Real Estate*, Working Paper (1996); J. Rabianski and N. Carn, *Impact of Rock Quarry*

(Footnote Continued. . . .)

even earlier study conducted for the U.S. Bureau of Mines in 1981 also found no consistent relationship between quarry operations and the prices of nearby homes.[4] There are a number of consulting reports on the question, and none report price attenuation attributable to a quarry.[5]

Opposition to quarries based on home valuations relies universally on a report by Professor Patricia Hite (2006).[6] This brief, 250-word study (hereinafter the "*Hite Report*") analyzes data from a few thousand homes sales (apparently in the mid-to-late 1990s) around a single quarry in Delaware, Ohio. Using an unconventional regression model and data on transactions occurring decades after the quarry opened, the *Hite Report* finds a positive relationship between home prices and distance from the quarry. Based on that evidence, the *Hite Report* concludes that quarries reduce home values. Yet, the *Hite Report*'s methods and data do not support a causal interpretation.

As economic development marches on, new quarries will be required to satisfy the demand for basic building materials. In light of the mostly dated and conflicting evidence on the effect of quarries on housing prices, this POLICY PAPER offers new evidence, and a review of old evidence, on the relationship between housing prices and rock quarries. First, given its frequent use by NIMBY opposition to quarries, we revisit the *Hite Report*, analyzing home sales data

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Operations on Value of Nearby Housing, Prepared for the Davidson Mineral Properties (August 25, 1987).

4 M. Radnor, D. Hofler, *et al.*, *Social, Economic and Legal Consequences of Blasting in Strip Mines and Quarries*, U.S. Bureau of Mines (May 1981) (available at: http://www.cdc.gov/niosh/nioshtic-2/10006499.html).

5 *See, e.g.*, *Study of Impact of Proposed Quarry on The Real Estate Values of Surrounding Residential Property in Raymond, New Hampshire*, Crafts Appraisal Associates Ltd. (April, 2009) ("The evidence does however suggest that the overall marketplace does not react to an influence such as a quarry with a measurable negative reaction as it relates to sale price."); *Martin Marietta New Design Quarry: Analysis of Effect on Real Estate Values*, Stagg Resources Consultants, Inc. (November 17, 2008); *A Property Valuation Report: Affect [sic] of Sand and Gravel Mines on Property Values*, Banks and Gesso, LLC (October 2002); *Impacts of Rock Quarries on Residential Property Values in Jefferson County, Colorado*, Banks and Gesso, LLC (May 1998); R.J. McKown, *Analysis of Proposed Sand & Gravel Quarry: Granite Falls, WA*, Schueler, McKown & Keenan, Inc. (September 25, 1995).

6 D. Hite, *Summary of Analysis: Impact of an Operational Gravel Pit on House Values: Delaware County, Ohio*, Working Paper (2006). We assign the date "2006" as is conventional, but that year is merely the recording stamp date on the document when it was filed in some type of proceeding. We do not know whether a more detailed analysis was provided at some point. We have never seen such a document cited and were unable to locate it.

around the same Delaware-Ohio quarry. Despite replicating both the location and methods of the *Hite Report*, our regression analysis finds that prices *fall* – not rise – as distance from the quarry increases. This result conflicts with that appearing in the *Hite Report*, so we look for more evidence by analyzing data on homes sales near a quarry outside of Murfreesboro, Tennessee, over the same time interval. Again, we find prices *fall* as distance from the quarry increases.

We are reluctant, however, to claim this evidence implies quarries raise home prices. Rather, we conclude, based on the method of randomized inference and other tests, that the *Hite Report*'s method is unreliable. Using a simulation of pseudo-treatments, we find that the null hypothesis that home prices rise or fall in distance from a *randomly selected location* is rejected in no less than 67% of cases at the 10% nominal significance level. Estimating price-distance relationships, especially without explicitly considering selection bias, is a highly-unreliable statistical procedure. The nature of real estate markets do not permit the effect of quarries to be identified with such naïve empirical tests.

Second, using data on home sales near a relatively new quarry in Gurley, Alabama, we augment the Hite-style analysis with a difference-in-differences estimator, which quantifies the price-distance relationship both before-and-after operations begin. By exploiting the timing of the quarry buildout and the location of home sales with respect to the quarry, we can credibly identify a causal relationship, at least in theory. Unlike the analysis for Delaware and Murfreesboro, home prices rises in distance from the Gurley quarry site, but do so *before* the quarry becomes operational. After operations begin in 2013, the positive effect of distance is attenuated, again suggesting a positive effect of quarries on housing values.

One critique of our Gurley analysis is that market participants shift price forecasts downward in response to the prospect of a quarry so that the deleterious effects of the quarry could be realized before the quarry opens. Quarry site approvals normally take a decade or so, providing ample time for anticipatory responses to valuation fears. To address this concern, we analyze transactions near a recently approved quarry in Madera County, California. Using a difference-in-differences estimator in conjunction with Coarsened Exact Matching, we test for the anticipatory effect of the proposed quarry on nearby housing prices located along the major roadways serving the site. We find no evidence the quarry reduced housing prices. If anything, relative home prices rose near the quarry site.

While our evidence suggests that quarries do not reduce, but may increase, home prices, our analysis suggests more than anything that the identification of the effect of quarries on prices is a very difficult problem, facing many conceptual and practical obstacles. We do not resolve all these difficulties. That said, we can conclude the evidence strongly implies the *Hite Report* and its methods are unreliable. Further analysis is, as usual, encouraged.

This paper is outlined as follows. First, we discuss the empirical requirements of quantifying a plausibly causal relationship between property values and quarry operations. Second, we revisit the *Hite Report*, estimating the price-distance relationship for the same quarry in Delaware, Ohio, and replicating the analysis for a quarry near Murfreesboro, Tennessee. Using a simulation method, we demonstrate the futility of estimating the price effects of quarries using the method proposed in the *Hite Report*. Third, we turn to the estimation of causal effects using the difference-in-differences estimator for quarry sites in Gurley, Alabama, and Madera County, California. Across multiple methods, we find, if anything, that home prices near quarries rise, not fall. In all, however, we believe our analysis best supports the hypothesis of "no effect" of quarries, or the announcement of quarries, on home prices. Conclusions are provided in the final section.

II. Empirical Framework

Disamenities such as landfills, airports, windfarms and prisons may plausibly reduce the prices of nearby homes. Such effects have been widely studied.[7] Modern empirical methods for observational data based on the Rubin Causal Model, however, suggest that much of the work may offer biased estimates of such disamenities because much it looks only at prices after the "treatment," making it difficult to address selection bias.[8] To conclude that a disamenity reduces home values, the researcher's interest must be in the *causal effect* of an amenity or disamenity on property values. Using only post-treatment prices is problematic since the locations of amenities and disamenities are not randomly selected, and

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[7] Other disamenities that may affect property values, airports and waste disposal, are frequently opposed by homeowners. *See, e.g.*, J.P. Nelson, *Airport and Property Values: A Survey of Recent Evidence*, 14 JOURNAL OF TRANSPORT ECONOMICS AND POLICY 37-52 (1980) (available at: http://www.bath.ac.uk/e-journals/jtep/pdf/Volume_X1V_No_1_37-52.pdf); J.B. Braden, X. Feng, and D. Won, *Waste Sites and Property Values: A Meta-Analysis*, 50 ENVIRONMENTAL AND RESOURCE ECONOMICS 175-201 (2011).

[8] Excellent resources on the modern methods of causal inference for economic analysis include G.W. Imbens and J.M. Wooldridge, *Recent Developments in the Econometrics of Program Evaluation*, 47 JOURNAL OF ECONOMIC LITERATURE 5-86 (2009); J.D. Angrist and J. Pischke, MOSTLY HARMLESS ECONOMETRICS: AN EMPIRICIST'S COMPANION (2008); and J.D. Angrist and J. Pischke, MASTERING 'METRICS: THE PATH FROM CAUSE TO EFFECT (2015).

disamenities are typically located away from residential density to minimize impact and to placate NIMBY resistance.

The non-random selection of a quarry site greatly complicates the quantification of a quarry on housing prices due to selection bias. Finding that housing prices rise at increased distance from a quarry may merely reflect the economics of site choice (i.e., real estate is cheaper per unit in less densely populated areas on the outskirts of town) rather than any causal effect on property values. Also and consequently, empirical work may be frustrated by the lack of housing density near the site, rendering small sample sizes, which may, in turn, lead to the undue influence of outliers. Many quarries, especially new ones, have almost no housing within a mile or two of the site (the typical distance within which negative effects are claimed), as shown in the maps provided in the Appendices. And, given the lengthy approval process, if a quarry does affect housing prices, then such effects may occur prior to operations by an "announcement effect." In conducting empirical work on quarries and housing prices, the researcher must address, and deal with the theoretical and empirical consequences of, the non-random nature of site location.

A. *Quantifying the Effect of a Quarry on Housing Prices*

Resistance to new quarry sites (or the expansions of old ones) based on property values rests exclusively on the *Hite Report*. In that report, the effect on prices is quantified by comparing the mean, quality-adjusted transactions prices around the quarry outside of Delaware, Ohio, as the home's distance from the quarry increases. This "experiment," however, has little hope of accurately measuring the effect of quarries on home prices.

To better grasp the nature of the problem, let there be two types of residential locations: (1) locations proximate to and potentially affected by quarry operations (labeled *N*, for "near"); and (2) locations distant from and entirely unaffected by quarry operations (labeled *F*, for "far"). Also, let there be two periods: the period prior to ($t = 0$) and after ($t = 1$) the initiation of quarry operations. For now, assume the approval process is instantaneous and that the quality and type of homes in the two locations are very similar (or, that such differences can be accounted for by statistical methods).

Prior to quarry operations homes sell for the average price P_0^N if near the future location of the quarry and P_0^F otherwise. (A numerical example is provided later.) For various reasons, these prices need not be equal. After quarry operations begin, the average, quality-adjusted prices for houses are P_1^N and P_1^F. The differences in the prices across time (P_1 - P_0) are δ^N and δ^F. Other things constant, the effect of the quarry operations can be measured as,

$$\Delta = \delta^N - \delta^F = \left(P_1^N - P_0^N\right) - \left(P_1^F - P_0^F\right), \tag{1}$$

where Δ is the difference-in-differences ("DiD") estimator.[9] The DiD estimator looks for a difference in outcomes after the treatment that is difference than the differences in outcomes before the treatment (thus, explaining the term difference-in-differences). Under certain conditions, the DiD estimator plausibly measures the causal effect of the quarry.

Many studies of the effect of amenities or disamenities on housing values looks only at the difference between *near* and *far* locations in the *post-treatment* period, or the difference in P_1^N and P_1^F (or δ_1). This post-treatment approach is the one used in the *Hite Report*, where all the data is from sales decades after the quarry operations began. If, however, there is a difference in prices before the quarry operations begin, this post-operations difference is clearly not a measure of the effect of proximity to the quarry. A numerical example may prove helpful.

B. *A Numerical Example*

Before a quarry opens, assume the average, quality-adjusted price for a home near the quarry site is $80,000, but the average price is $100,000 for homes far from the future quarry site. Thus, there is a $20,000 or 20% difference in prices prior to quarry operations, perhaps reflecting the lack of locational rents for homes far from residential density. Plainly, since quarry operations have not begun, this difference cannot be attributed to the quarry. In fact, the quarry site may have been chosen because of the lower property values or lack of residential housing in the area.

As a benchmark case, say that the quarry operations once initiated have *no effect* on property values and the sales prices of homes are unchanged after quarry operations begin ($80,000 and $100,000, respectively). If a researcher were to

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[9] *See, e.g.*, B.D. Meyer, *Natural and Quasi-Experiments in Economics*, 13 JOURNAL OF BUSINESS & ECONOMIC STATISTICS 151-161 (1995); J.D. Angrist and A.B. Krueger, *Empirical Strategies in Labor Economics*, in HANDBOOK OF LABOR ECONOMICS Vol. 3A (eds., O. Ashenfelter and D. Card) (1999); S. Galiani, P. Gertler, and E. Schargrodsky, *Water for Life: The Impact of the Privatization of Water Services on Child Mortality*, 113 JOURNAL OF POLITICAL ECONOMY 83-123 (2005); D. Card, *The Impact of the Mariel Boatlift on the Miami Labor Market*, 13 INDUSTRIAL AND LABOR RELATIONS REVIEW 245-257 (1990).

simply compare prices based on distance from the quarry after operations begin, then a difference of 20% would be found. Yet, that difference existed prior to the quarry's opening, and thus the quarry did not *cause* that difference, implying any causal claim made about that difference is mistaken. The truth (by assumption) is that the quarry had *no effect*. The DiD estimator (Δ) is, in fact, zero, correctly identifying the causal effect of the quarry [= (80,000 – 80,000) – (100,000 – 100,000)].

Assume instead that the quarry does reduce prices for nearby homes. Let the post-quarry average prices be $70,000 near and $100,000 far from the quarry, other things constant.[10] Prices near the quarry fall by $10,000 and those far from the quarry are unchanged. The DiD estimator accurately quantifies the effect of the quarry, which is a $10,000 reduction in value [= (70,000 – 80,000) – (100,000 – 100,000)]. Looking at data after the quarry operations begin, alternately, which is the *Hite Report*'s approach, would find an effect size of $30,000 [=70,000 – 100,000], or three times the true effect. Selection bias accounts for the $20,000 error in the estimated effect.

Ideally, then, to properly identify the causal effect of a quarry operation, the researcher must observe prices both before and after the quarry may reasonably be expected to affect housing prices (among other considerations such as the similarity in pricing trends prior to the treatment). The analysis of transactions occurring well after the quarry opens offers little hope for quantifying the effect of the quarry, absent unique circumstances. Certainly, the empirical demands are considerable, and the identification of the causal effect must be explicitly set forth and proper empirical methods applied.

C. *Key Assumptions for Estimating Causal Effects*

With regard to the location of homes and quarries, we do not have the luxury of experimental data. Rather, the data is observational and the data generation process occurs over many decades. The observational nature of the data is crucial: quarry site and housing locations are non-random and not independent of economic activity near the site or each other. Thus, research on the price effects of quarry sites must pay careful attention to selection bias, which is caused by the non-random process by which sites are chosen to avoid residential density but still

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10 For instance, a large condominium complex may have built near the quarry. The researcher must adjust for the difference in average prices resulting from this changing mix of household types).

(Footnote Continued. . . .)

remain close to the point of demand for aggregates (i.e., sand, stone and gravel). Thus, the "treatment" and "outcome" are related through observed and potentially unobserved factors.[11]

As explained by Imbens and Wooldridge (2009), when estimating the causal treatment effect in observational studies the researcher must be alert to two key concepts stemming from selection bias: (1) unconfoundedness (or the conditional independence assumption) and (2) covariate overlap (or common support).[12] Unconfoundedness implies that, conditional on observed covariates X, the treatment assignment probabilities are independent of potential outcomes. If we have a sufficiently rich set of observable covariates, then regression analysis including the variables X leads to valid estimates of causal effects. Since the X must be observed to be included in the regression model, this approach is often referred to as *selection on observables*. It is difficult to know and impossible to test whether the observed and included X are sufficient to guarantee unconfoundedness (so the regression error and treatment are uncorrelated), though some guidance is available through pseudo-treatment tests (as applied later).

The conditional independence assumption (or *unconfoundedness*) implies that the observed factors included in the statistical analysis fully account for all the differences in the types of homes sold both near and far from the quarry (or other site of interest).[13] In quantifying the effect of education on income, for instance, it is not enough to simply compare the incomes of persons with and without a college education. Work ethic, for instance, affects both the probability that a person will obtain a college degree and his or her future income. A hard-working person may earn a higher income even without a college education. If work ethic cannot be observed, then a comparison of average incomes across those with and without a college degree does not measure the true value of a degree. The difference is a positively biased estimate of the payoff of education.

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11 In regression analysis, this problem appears as a correlation between the regression residual and the treatment variable.

12 *Supra* n. 8.

13 That is, the regression model includes all the regressors needed to make the conditional *near* and *far* prices equal prior to the treatment.

(Footnote Continued. . . .)

The second factor to consider for the measurement of the causal effect is covariate overlap, which Imbens and Wooldridge (2009) observe is, after unconfoundedness, the "main problem facing the analyst."[14] This condition implies that the support of the conditional distribution of X for the control group overlaps completely with the conditional distribution of X for the treatment group. That is, the covariate distributions for the treated and untreated groups are sufficiently alike, thereby lending credibility to the extrapolations inherent to regression analysis between groups. If the characteristics of untreated observations (home *far from* the quarry) are very different from the treated observations (homes *near to* the quarry), then the projections from the controls to the treated units will be a poor one.

Say, for instance, that a sample used to assess the effect of an experimental cancer treatment includes only persons over 65 years old in the experimental treatment group (or simply treatment group) and only persons below 45 years old in the non- treatment group (or control group). The purpose of the control group is not simply a counterweight to the treatment group. Rather, the control group measures the outcomes for the treated group if that group did not receive the treatment. To fix ideas, what we actually want to estimate is what would the treatment group have looked like had they not been treated, which is the sole purpose of a control group. It is unreasonable to expect, we believe, that the survival outcomes of 45 year-old persons provides an approximation of survival outcomes of persons 65 years and over that did not receive the experimental treatment. To extrapolate this discussion to the case of housing values, if the control group includes almost all homes in a golf course community with swimming pools and the treatment group—the properties near some dis-amenity—includes mostly one-bedroom condominiums, then the difference in sale prices between the two is a nearly meaningless statistic. Regression models are powerful tools, but they cannot make up of for such large differences in characteristics across treatment and control groups (even if observable and included in the regression model as explanatory variables), which is important given that the control group is being "projected" onto the treatment group.

A number of statistical techniques are used to address confoundedness and covariate imbalance in observational studies. In a housing study, for instance, a researcher may choose the control group by finding a group of homes comparable to the treatment group—that is, similar square footage, amenities, lot sizes—from a population of homes unaffected by the treatment. This approach, which we

[14] Imbens and Wooldridge, *supra* n. 8 at 43.

employ here, ensures that the characteristics of homes in the treatment and control groups are sufficiently similar, adding credibility to the control group as a suitable "stand in" for the treatment group if it had not received the treatment.

The *Hite Report* is silent on both of these key assumptions, and there is good reason to suspect the analysis fails on both counts. All the pricing data is for home sales occurring long after the quarry operation began and the regression model is quite basic, so the experiment is almost certainly plagued with selection bias. As for covariate overlap, from what few descriptive statistics are provided in the *Hite Report* we observe that the range of home prices within 0.5 miles of the quarry has a minimum of $80.1 and a maximum of $178.9 (in thousands). In contrast, the range of prices for homes further from the quarry is $60 to $798.6. This difference in the maximum prices is sizable, suggesting that the homes near the quarry may be very much unlike those far from the quarry, thus risking biased results of the effect of distance.

III. Revisiting the *Hite Report*

In NIMBY campaigns challenging quarry development, the *Hite Report* is the sole empirical analysis supporting the claim that quarries reduce housing prices. Subsequent works by Erickcek (2006), the Center for Spatial Economics (2009), Smith (2014), among others, conduct no new empirical analysis, choosing instead to extrapolate the *Hite Report*'s results to different locations (a questionable practice on its own).[15]

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[15] G.A. Erickcek, *An Assessment of the Economic Impact of the Proposed Stoneco Gravel Mine Operation on Richland Township*, W.E. Upjohn Institute for Employment Research (August 15, 2006) (available at: http://www.stopthequarry.ca/documents/US%20Study%20on%20the%20impact%20of%20pits%20quarries%20on%20home%20prices.pdf); *The Potential Financial Impacts of the Proposed Rockfort Quarry*, Center for Spatial Economics (February 26, 2009) (available at: http://wcwrpc.org/FinancialImpacts_RockfortQuarryCanada.pdf); G. Smith, *Economic Costs and Benefits of the Proposed Austin Quarry in Madera County*, Report (October 23, 2014) (available at: http://www.noaustinquarry.org/wp-content/uploads/2016/08/Austin-Quarry-Economics-Report.pdf). Other works relying on the *Hite Report* (directly or indirectly) include, *e.g.*, M. Conklin, *et al.*, *The Quarry Proposed by St. Marys Cement Inc. for a Location Near Carlisle, Ontario Should Not be Permitted: Proponents' Brief*, 5 STUDIES BY UNDERGRADUATE RESEARCHERS AT GUELPH (2011) (available at: https://journal.lib.uoguelph.ca/index.php/surg/article/view/1338/2345); *Business Suirvey and Economic Assessment of Locating a Quarry and Asphalt and Cement Plants within Aeortech Park*, Group ATN Consulting, Inc. (October 13, 2014) (available at: http://stopthefallriverquarry.com/wp-content/uploads/2015/10/GATN_Aerotech_Park_FINAL_Report_Oct_13_2015-2.pdf); M.A. Sale,

(Footnote Continued. . . .)

This uniform reliance on the *Hite Report* is somewhat surprising. On the face of it, the report is a seven-page document consisting of 1.5 pages of double spaced text (about 250 words) along with a few tables and figures. It is more an "abstract" than it is a "study." Moreover, even a brief review of the *Hite Report* points to a number of serious problems that should give any researcher pause. First, there are almost no details regarding model specification and few details on the data used. Not even descriptive statistics are provided. Second, the choice of model specification is entirely ad hoc, treating nearly identical variables (distance) differently with respect to functional form and using a non-standard and unnecessary estimation procedure. Such inconsistent, unconventional and inconvenient choices are symptomatic of ends-driven analysis. Third, no explanation is provided as to how the chosen model and analysis of transactions occurring decades after the quarry operations began might identify the effect of *that particular* quarry (or any new quarry) on housing prices. Selection bias is clearly a concern, but it is neither mentioned nor addressed. Fourth, no analysis is provided to suggest that the homes near the quarry are sufficiently similar to those distant from the quarry to provide reliable estimates of the effect of distance (i.e., covariate overlap). Comparing prices of the homes in rural areas on the outskirts of town to those near the local university risks confusing the vagaries of real estate development with the impact of the quarry.

Setting aside the question of causality for the moment, whether the relationship estimated in the *Hite Report* can be replicated is an important first step in evaluating the report's credibility and the suitability of the methods used to answer this policy-relevant empirical question. To that end, we collect data on home sales within five-miles of the same quarry in Delaware, Ohio, evaluated in the *Hite Report*.[16] It appears the data from the *Hite Report* was from the 1990's (though it is impossible to be certain given the lack of detail), so we collect data on

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Quarry Bad for Area, THE NEWS & ADVANCE (September 28, 2008) (available at: http://www.newsadvance.com/opinion/editorials/letters-to-the-editor-for-sunday-september/article_ca388ca4-14c7-534b-9b17-1b78d1cecc40.html).

16 Data is obtained from www.agentpro247.com. For all our analysis, we limit the prices to greater than $25,000 and less than $1,000,000, and look only at the "full" sales of single-family homes not in distress. The National Lime & Stone Quarry near Delaware, Ohio, is located near Latitude 40.281005 and Longitude -83.135828.

(Footnote Continued. . . .)

sales over the ten-year period 1998 through 2007.[17] These data appear to immediately follow that used in the *Hite Report* but precedes the housing market crash in 2008 and the broader economic malaise that followed.[18] For further analysis, we also collect data on sales near a quarry outside of Murfreesboro, Tennessee, over the same ten-year period.

A. *A Review of Empirical Methods*

To reproduce the *Hite Report*'s analysis, we obtain transactions prices on 2,114 single-family homes between 1998 through 2007 that are located within five miles of the National Lime & Stone Quarry near Delaware, Ohio. Using latitude and longitude coordinates, distance from each home to the center the quarry (D) is calculated. Other explanatory variables used the *Hite Report* include, for each transaction, the sale date ($DATE$), the distance to Delaware City (DDC), the house-to-lot size ($H2L$), the number of bathrooms ($BATH$), and the number of total rooms ($TOTR$). We measure the sale date as the year of sale; the *Hite Report* does not indicate how the sale date is measured.[19]

The regression model of the *Hite Report* takes the following general form,

$$p_{it} = \exp(\delta_1 \ln D_i + \beta_0 + \sum_{j=1}^{k} \beta_j X_{j,i}) + \varepsilon_{i,t}\,, \qquad (2)$$

where p_{it} is the transaction price (in thousands) for home i at time t, $\ln D$ is the natural log of distance from the quarry (in miles), and X_j are the k regressors listed above (with coefficients β_j as coefficients).[20] For reasons unexplained in the *Hite Report*, only the distance from the quarry is transformed by the natural log

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17 *See also* D. Hite, *The Impact of the Ajax Mine on Property Values*, ARMCHAIRMAYOR.CA (March 5, 2015) (available at: https://armchairmayor.ca/2015/03/05/letter-the-impact-of-the-ajax-mine-on-property-values) (stating that the analysis was completed in 1996-1998).

18 Our data source does not offer data in the early-to-mid 1990s, so we cannot replicate the same time period as the *Hite Report*. We are trying to obtain such data for further analysis.

19 It is preferred to measure *DATE* as a fixed effects, as this specification requires prices to rise monotonically over time.

20 The variables in the model are listed at *Hite Report*, *supra* n. 6 at p. 3. A similar specification is used in D. Hite, *A Hedonic Model of Environmental Justice*, Working Paper (February 14, 2006) (available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=884233).

transformation; distance from the city center (*DCC*) and the other regressors are not transformed. The specification seems purely ad hoc.

Equation (2) is non-linear in the parameters and must be estimated by Non-Linear Least Squares ("NLS"). This specification is highly irregular in econometric practice. Normally, hedonic models of housing prices are estimated by Ordinary Least Squares ("OLS"). A regression model quite similar to Equation (2) and very common in hedonic analysis is,

$$\ln p_{i,t} = \delta_1 \ln D_i + \beta_0 + \sum_{j=2}^{k} \beta_j X_{j,i} + \upsilon_{i,t}, \tag{3}$$

where the dependent variable is the natural log of price and where the *X*s might be transformed to logs as well.[21] While Equation (3) is typical of hedonic price functions, we are unable to find the estimation of Equation (2) anywhere in the literature. In fact, we were unable to locate a single instance where even the author of the *Hite Report* estimates a hedonic price function using Equation (2), but plenty of instances where Equation (3) is used.[22] As detailed later, a test of functional form can inform us as to whether the natural log transformation of the dependent variable is a better approach and infinitely more common.

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21 Note that Equation (3) is not simply the log transformation of Equation (2) because of the additive error term in Equation (2).

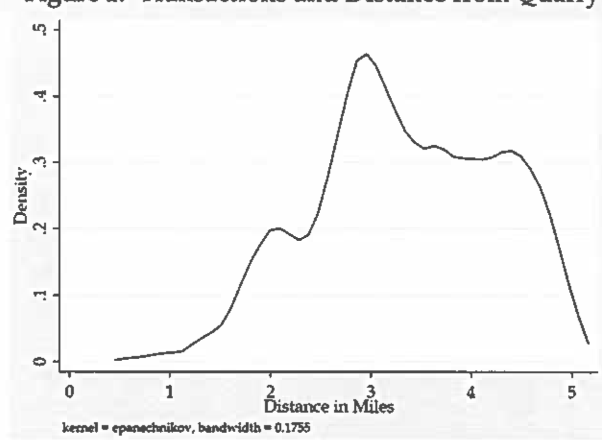
22 *See, e.g.*, D. Hite, W.S. Chern, F. Hitzhusen and A. Randall, *Property Value Impacts of an Environmental Disamenity*, 22 JOURNAL OF REAL ESTATE FINANCE AND ECONOMICS 185-202 (2010) (draft available at: https://ssrn.com/abstract=290292); D. Hite, A. Jauregui, B. Sohngen, and G. Traxler, *Open Space at the Rural-Urban Fringe: A Joint Spatial Hedonic Model of Developed and Undeveloped Land Values*, Working Paper (November 1, 2006) (available at: https://ssrn.com/abstract=916964); D.M. Brasington and D. Hite, *A Mixed Index Approach to Identifying Hedonic Price Models*, 38 REGIONAL SCIENCE AND URBAN ECONOMICS 271-284 2008 (August 5, 2006) (available at: https://ssrn.com/abstract=928252); E. Affuso, C. de Parisot, C. Ho, and D. Hite, *The Impact of Hazardous Wastes on Property Values: The Effect of Lead Pollution*, 22 URBANI IZZIV 117-126 (2010) (available at: https://ssrn.com/abstract=1427544); D. Hite, *Factors Influencing Convergence of Survey and Market-Based Values of an Environmental Disamenity*, Mississippi State University Agricultural Economics Working Paper No. 2001-011 (November 29, 2001) (available at: https://ssrn.com/abstract=292447); C. Ho and D. Hite, *Economic Impact of Environmental Health Risks on House Values in Southeast Region: A County-Level Analysis*, Working Paper (2005) (available at: https://ssrn.com/abstract=839211); D. Hite, *A Hedonic Model of Environmental Justice*, Working Paper (February 14, 2006) (available at: https://ssrn.com/abstract=884233).

The coefficient of primary interest in the *Hite Report* is δ_1, which measures the percent change in the transaction price for a percentage change in distance from the quarry (*D*), but only *after* the quarry operations began (see Eq. 1). In this specification (and also for Eq. 3), this elasticity is constant across the full range of distance. With data on 2,812 sales, the *Hite Report* estimates the coefficient δ_1 to be 0.125, where the positive sign indicates the average sale price of homes is higher the further away the homes are from the quarry (statistically significant at the 1% level). The *Hite Report* concludes, as do subsequent reports that adopt the result, that this positive coefficient implies quarries reduce the price of nearby homes. As detailed above, the positive sign on the coefficient δ_1 cannot reasonably be interpreted in this manner since the data is for sales occurring long after quarry operations began, among other concerns.

B. *National Lime & Stone Quarry in Delaware, Ohio*

Replication is the essence of science. Even if the estimated price-distance relationship from Equation (2) lacks a causal interpretation, it is worth evaluating whether the *Hite Report's* findings can be confirmed. We do so by estimating Equation (2) using data on 2,114 transactions in the same area over the period 1998-2007. Figure 1 offers the kernel density of the distribution of transactions by distance from the quarry. The thinness of the market very near the quarry is plain to see, which is also apparent from a map of the area surrounding the quarry (see Appendix 1).

Figure 1. Transactions and Distance from Quarry



Regression results from Equation (2) are summarized in the first column of Table 1, along with descriptive statistics for the full sample and the sample divided into homes closer to the quarry than two miles and those further than that distance. The model has a Pseudo-R^2 of 0.25, which is very close to that reported in the *Hite Report* (0.254).[23] Five of the seven estimated coefficients (including the constant term) are statistically different from zero at the 1% level or better.

Table 1. Regression Results and Descriptive Statistics
National Quarry near Delaware, Ohio

	Coef (t-stat)	Mean (St. Dev)	$N=0$ Mean (St. Dev)	$N=1$ Mean (St. Dev)
ln$D$ (δ_1)	-0.1413***	1.166	1.227	0.518
	(-4.00)	(0.304)	(0.230)	(0.224)
DATE	0.0450***	2002.7	2002.5	2004.4
	(11.13)	(2.952)	(2.969)	(2.125)
DDC	0.0409***	2.876	2.859	3.050
	(5.92)	(2.139)	(2.207)	(1.207)
H2L	-0.102	0.1498	0.148	0.1668
	(-0.81)	(0.1110)	(0.111)	(0.102)
BATH	0.0419	1.806	1.788	1.995
	(1.09)	(0.584)	(0.597)	(0.384)
TOTR	0.1398***	5.099	5.065	5.099
	(7.59)	(1.016)	(1.031)	(1.016)
Constant	-85.71***	...	...	...
	(-10.57)			
Pseudo-R^2	0.250			
Obs.	2,114	2,114	1,930	184

Statistical Significance: *** 1%, ** 5%, * 10%

Despite using exactly the same regression model and data on sales around the same quarry, we find that the transaction prices of homes *decrease* (not increase) as the distance from the quarry increases. The negative coefficient (-0.141) is similar in size *but different in sign* from that found in the *Hite Report* (0.125) and is statistically significant at the 1% level. The estimated coefficient implies a 1% increase in distance reduces home average, quality-adjusted home prices by about 0.14%. Since the coefficient is less than unity, the price-distance relationship is subject to diminishing marginal returns.[24] Figure 2 illustrates the relationship

23 The Pseudo-R^2 is the squared correlation coefficient between the predicted value of the regression and the dependent variable.

24 For any fixed change in mileage, the percentage change falls as distance increases.

between sale prices and distance from the quarry, revealing sizable reductions in average prices as distance from the quarry increases.

Figure 2. Price-Distance Relationship

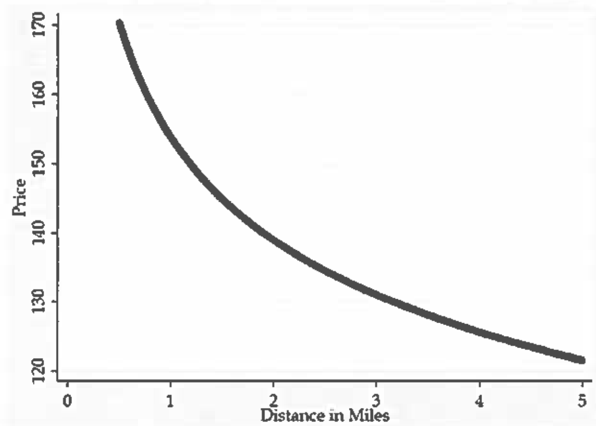


Table 2 summarizes the average predicted prices and price effects at varying distances from the quarry. Interpretation of the table is straightforward. A home sold 3 miles from the quarry will have a price 22% lower that of a home sold within 0.5 miles of the quarry, or 16% lower than the average home sold within 1.5 miles of the quarry. At two miles, the differences are 18% and 11%; at five miles, the differences are 28% and 22%. These are sizable effects.

Table 2. Home Values by Distance from Quarry

	Distance in Miles from Quarry							
	0.5	1.0	1.5	2.0	2.5	3	4.0	5.0
Avg. Price ('000)	169.8	153.9	145.4	139.6	135.2	131.8	126.5	122.6
Reduced Value (from 0.5 miles)	...	-9%	-14%	-18%	-20%	-22%	-25%	-28%
Reduced Value (from 1.5 miles)	...	...	...	-11%	-14%	-16%	-19%	-22%

These estimates and their predicted effect on prices are based on the estimation method (Eq. 2) used in the *Hite Report*. There are other equation specifications and estimation methods that are more consistent with standard practice in the analysis of housing prices (hedonics). In order to assess the robustness of the result, we offer alternative analyses below.

1. *Alternative Estimation Approaches*

As discussed above, Equation (2) is a non-standard method to estimate the relationship of interest. Normally, a researcher would avoid the non-linear Equation (2) and use the natural log of price to estimate Equation (3) by OLS. Statistical testing (such as the Box-Cox test of functional form) may be used to evaluate whether the linear or log-form of the dependent variable is preferred.[25] Other advantages of Equation (3) over Equation (2) is that the linear equation is amenable to estimation by Median Regression ("MReg") and Robust Regression ("RReg"), both of which are less sensitive to outliers in the data than is NLS or OLS.[26] Outliers are common in home sales data, so it is sensible to evaluate the effect on the estimates by these alternative estimation procedures, especially when the results are used in a policy relevant setting that may have significant financial implications.[27] We summarize the results from both methods.

Modern research on housing prices increasingly accounts for the spatial nature of real estate markets using new spatial methods.[28] We estimate the price-distance

[25] W.E. Griffiths, R.C. Hill and G.G. Judge, LEARNING AND PRACTICING ECONOMETRICS (1993) at pp. 345-7.

[26] *See, e.g.*, R. Koenker, QUANTILE REGRESSION (2005); B.S. Cade and B.R. Noon, *A Gentle Introduction to Quantile Regression*, 1 FRONTIERS IN ECOLOGY AND THE ENVIRONMENT 412-420 (2004) (available at: http://www.econ.uiuc.edu/~roger/research/rq/QReco.pdf); O.O. John, *Robustness of Quantile Regression to Outliers*, 3 AMERICAN JOURNAL OF APPLIED MATHEMATICS AND STATISTICS 86-88 (2015); P.J. Rousseeux and A.M. Leroy, ROBUST REGRESSION AND OUTLIER DETECTION (2005); R. Andersen, MODERN METHODS FOR ROBUST REGRESSION (2008); T.P. Ryan, MODERN REGRESSION METHODS (2008).

[27] C. Janssen, B. Söderberg and J. Zhou, *Robust Estimation of Hedonic Models of Price and Income for Investment Property*, 19 JOURNAL OF PROPERTY INVESTMENT & FINANCE 342-360 (2001); S.C. Bourassa, E. Cantoni and M. Hoesli, *Robust Hedonic Price Indexes*, 9 INTERNATIONAL JOURNAL OF HOUSING MARKETS AND ANALYSIS 47-65 (2016).

[28] Including papers by the *Hite Report*'s author. *See, e.g.*, D.M. Brasington and D. Hite, *Demand for Environmental Quality: A Spatial Hedonic Analysis*, 35 REGIONAL SCIENCE AND URBAN ECONOMICS 57-82 (2005) (draft available at: https://ssrn.com/abstract=491244); *see also* J.M. Mueller and J.B. Loomis, *Spatial Dependence in Hedonic Property Models: Do Different Corrections for Spatial Dependence Result in Economically Significant Differences in Estimated Prices?*, 33 JOURNAL OF AGRICULTURAL AND RESOURCE ECONOMICS 212-231 (2008) (available at: http://ageconsearch.umn.edu/bitstream/42459/2/MuellerLoomis.pdf); L. Osland, *An Application of Spatial Econometrics in Relation to Hedonic House Price Modeling*, 32 JOURNAL OF REAL ESTATE

(Footnote Continued. . . .)

relationship using a Spatial Regression Model ("SReg"). To do so, a spatial weighting matrix (*W*) is computed and spatially-weighted lags of the dependent and independent variables are included in the regression as well as an adjustment for autocorrelated errors.[29]

Table 3. Alternative Estimation Methods
National Quarry near Delaware, Ohio

	OLS Coef (t-stat)	*MReg* Coef (t-stat)	*RReg* Coef (t-stat)	*SReg* Coef (t-stat)	*OLS-CEM* Coef (t-stat)
ln*D*	-0.2726***	-0.2021***	-0.1220***	-0.1558 ***	-0.147***
	(-7.31)	(-14.21)	(-5.59)	(-2.65)	(-3.00)
DATE	0.0433***	0.0342***	0.0367***	0.0440***	0.0453***
	(12.45)	(15.76)	(16.58)	(12.86)	(6.30)
DDC	0.0273***	0.0460***	0.0551***	0.0679***	0.0483***
	(3.90)	(8.64)	(15.00)	(5.09)	(3.31)
H2L	0.0794	-0.1131	-0.2591***	-0.1779	0.1812
	(0.68)	(-1.47)	(-3.74)	(-1.48)	(0.94)
BATH	0.0485	0.0997***	0.1499***	0.0166	-0.0092
	(1.46)	(5.41)	(7.94)	(0.56)	(-0.10)
TOTR	0.1540***	0.1523***	0.1508***	0.1497***	0.2047***
	(8.97)	(14.00)	(14.12)	(9.11)	(6.44)
Constant	-82.47***	-64.31***	-69.52***	-77.07***	-86.77***
	(-11.82)	(-14.80)	(-15.67)	(-11.25)	(-6.02)
Spatial Terms (χ^2)				242.3***	
Pseudo-R^2	0.246	0.216	0.243	0.265	0.214
Obs.	2,114	2,114	2,114	2,114	1,461

Statistical Significance: *** 1%, ** 5%, * 10%

RESEARCH 289-320 (2010) (available at: http://pages.jh.edu/jrer/papers/pdf/past/vol32n03/03.289_320.pdf).

[29] D.M. Drukker, H. Peng, I.R. Prucha, and R. Raciborski, *Creating and Managing Spatial-Weighting matrices with the* spmat *Command*, 13 STATA JOURNAL 242-286 (2013); D.M. Brasington and D. Hite, *Demand for Environmental Quality: A Spatial Hedonic Analysis*, 35 REGIONAL SCIENCE AND URBAN ECONOMICS 57-82 (2005) (draft available at: https://ssrn.com/abstract=491244). We truncate the distance at 0.5 miles.

(Footnote Continued. . . .)

Results for the alternative estimation methods are summarized in Table 3.[30] Across all four alternatives, the price-distance relationship is negative and statistically different from zero at the 1% level or better. Plainly, the negative price-distance relationship is robust to estimation method. The price-distance elasticity is a good bit larger for OLS and MReg, but similar to that estimated by Equation (2) for both the RReg and SReg methods (in the full sample). Note that more of the regressors are statistically significance in MReg and RReg, suggesting these estimation alternatives are worth consideration.

2. *Coarsened Exact Matching*

Thus far, we have paid no attention to whether homes near the quarry are like those far from the quarry (i.e., covariate overlap). What evidence is available in the *Hite Report* suggests that in her sample the types of homes sold near the quarry may have been be very different than those sold at a distance from it. While distance from the quarry is a continuous variable, we can consider covariate overlap by comparing the characteristics of homes near to and those far from the quarry, using a two-mile cutoff. In Table 1, we do observe some meaningful differences between homes within two miles of the quarry and those further away especially in the year sold and the number of bathrooms and total rooms.[31] To ensure we are comparing like homes, we apply Coarsened Exact Matching ("CEM") to the data and match on these three variables.[32] All 184 transactions within two miles of the quarry are matched to 1,277 (of 1,930) homes further than

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30 The Box-Cox test statistic for the Delaware County data is 64.1, which is statistically significant at better than the 1% level. The test statistic is distributed $\chi^2(1)$ with a critical value of 2.71 at the 10% level. The natural log transformation, consistent with Equation (3), is preferred to the specification estimated in the *Hite Report*. Or, we might say the problem is not so much in the estimation by NLS rather than OLS but that the natural log transformation of the dependent variable is the better specification.

31 Standardized differences (the absolute value of the means difference divided by the square root of the summed variances) are used. *See* Imbens and Wooldridge, *supra* n. 8 at p. 24. The rule of thumb for a large difference is a standardized difference exceeding 0.25. For the DATE variable, the standardized difference is 0.51, and about 0.30 for bathrooms and total rooms.

32 S.M. Iacus, G. King. G. Porro, *Causal Inference without Balance Checking: Coarsened Exact Matching*, Working Paper (June 26, 2008) (available at: https://ssrn.com/abstract=1152391), later published *Causal Inference without Balance Checking: Coarsened Exact Matching*, 20 POLITICAL ANALYSIS 1-24 (2012) (available at: https://gking.harvard.edu/files/political_analysis-2011-iacus-pan_mpr013.pdf).

(Footnote Continued. . . .)

two miles from the quarry. The weights created by the CEM procedure are then used to estimate Equation (3) by weighted OLS.

Results for the CEM-weighted regression are reported in the final column of Table 3. The estimated coefficients are comparable in most respects to the other models.[33] Most significantly, the price-distance relationship remains negative (-0.147) and statistically different from zero. While we do not present the results in the table, we note that when estimated using the non-linear Equation (2) with CEM-weighted data the price-distance relationship is negative (-0.053) but not statistically significant, a difference we will return to later.

C. *Rogers Group Quarry near Murfreesboro, Tennessee*

It is reasonable to expect that the relationship of home prices to distance from a quarry might vary by location. Earlier research suggests this is so in other contexts.[34] To further evaluate the results reported in the *Hite Report*, we collect data on home sales around the Rogers Group Quarry near Murfreesboro, Tennessee.[35] Transaction data is again collected for years 1998 through 2007 and the sample includes 2,311 transactions. Given differences in data availability, we replace the total number of rooms with square footage (*SQFT*). Distance from the city center (*DCC*) is measured from Murfreesboro. We apply the same methods as before, estimating Equation (2) by NLS and then Equation (3) by OLS, MReg, RReg, and SReg. Results are summarized in Table 4. We do not observe large differences between the characteristics of home sold near to and far from the quarry, so we do not apply CEM for this quarry.

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33 CEM-weighting often alters the coefficients and their significant levels since the data is better matched.

34 *See supra* n. 7 and citations therein.

35 The quarry is located at coordinates: 35.884699, -86.530625.

Table 4. Regression Results and Descriptive Statistics
Rogers Quarry near Murfreesboro, Tennessee

	NLS Coef (t-stat)	*OLS* Coef (t-stat)	*MReg* Coef (t-stat)	*RReg* Coef (t-stat)	*SReg* Coef (t-stat)
ln*D*	-0.0655***	-0.0383***	-0.0320***	-0.0327***	-0.0222
	(-4.99)	(-2.63)	(-3.01)	(-3.78)	(-0.72)
DATE	0.0522***	0.0443***	0.0407***	0.0404***	0.0444
	(27.09)	(20.36)	(31.73)	(35.55)	(23.05)
DDC	-0.0035*	-0.0006	-0.0007	-0.0011	-0.0012
	(1.85)	(-0.26)	(-0.44)	(-0.84)	(-0.15)
H2L	-0.6590	0.6404	-2.170***	-2.676***	0.3311
	(-1.11)	(0.42)	(-4.47)	(-5.84)	(0.42)
BATH	0.1395***	0.1666***	0.1811***	0.1759***	0.1344***
	(17.65)	(13.44)	(24.06)	(28.87)	(12.17)
SQFT	0.00026***	0.00021***	0.00032***	0.00033***	0.00018***
	(17.40)	(5.82)	(25.01)	(29.27)	(9.10)
Constant	-100.3***	-84.59***	-77.57***	-76.87***	-77.84***
	(-17.40)	(-19.52)	(-30.57)	(-33.79)	(-20.17)
Spatial Terms (χ^2)					385.2***
Pseudo-R^2	0.692	0.590	0.529	0.678	0.605
Obs.	2,311	2,311	2,311	2,311	2,311

Statistical Significance: *** 1%, ** 5%, * 10%

The fit the regressions (R^2 is around 0.60) is much higher than for the Delaware data, but the negative coefficients on distance are seen again. For the NLS model, the price-distance relationship is -0.0655 and the coefficient is statistically different from zero at better than the 1% level. Across the alternative specifications and estimation methods, the price-distance relationship is consistently negative and statistically different from zero, save one exception. Only in spatial regression is the price-distance relationship not statistically significant, though the coefficient is negative and similarly sized to the other models.

Additional evidence also leads to questions about the negative views of quarries. If quarries were a disamenity, then we might expect people to avoid living around them. Figures 3A-3C in Appendix 3 demonstrate population movements for Rutherford County, Tennessee, with emphasis on the Rogers Group quarry. Population is measured using U.S. Census Bureau population data for years 1990, 2000, and 2010. These figures show population density increasing dramatically over this time period in the same census block as the Rogers Group quarry. These population movements toward the quarry in conjunction with the econometric results further indicate the Murfreesboro quarry is not a great disamenity, if a disamenity at all.

D. *Randomized Inference and the Implausibility of the Model*

Our analyses of home prices near the quarries in Delaware, Ohio, and Murfreesboro, Tennessee, find a negative and statistically significant relationship between home prices and distance from a rock quarry in most specifications and estimation methods. Consequently, we find no evidence that supports the findings of the *Hite Report*, despite using the same model and, in one instance, the same quarry from that earlier study. We fear, however, that these estimated relationships are mainly the consequence of the *Hite Report*'s poor experimental design than they are a measure of any real effect of the quarry. Indeed, we question whether the quantification of the effect of a disamenity or amenity can be plausibly estimated by a price-distance relationship. In Delaware County, for instance, it is not hard to find a statistically-significant price-distance relationship (using Eq. 2) from just about anywhere: the Church of the Nazarene off Highway 101 (δ_1 = -0.058, t = -2.79); The Greater Gouda gourmet grocery on North Sandusky Road (δ_1 = 0.268, t = 6.92); and the Foot & Ankle Wellness Center off South Hook Road (δ_1 = -0.043, t = -2.99).

Given patterns in real estate development, it seems plausible that a positive or negative price-distance relationship would be observed from almost any location. A sensible way to evaluate the reliability of the distance-based hedonic regressions is to apply the method of randomized inference (a type of pseudo-treatment).[36] In this procedure, the location of a "disamenity" or "amenity" is randomly chosen in the geographic area under study. Given the random assignment of location, we might expect the price-distance relationship to be statistically significant in proportion to the alpha-level of the statistical test (say, a 10% significance level) due to random variation. That is, a valid statistical test conducted at the 10% level

[36] R.A. Fisher, THE DESIGN OF EXPERIMENTS (1935); P.R. Rosenbaum, OBSERVATIONAL STUDIES (2002); M.D. Cattaneo, B.R. Frandsen, and R. Titiunik, *Randomization Inference in the Regression Discontinuity Design: An Application to Party Advantages in the U.S. Senate*, 3 JOURNAL OF CAUSAL INFERENCE 1–24 (2015); T. Fujiwara and L. Wantchekon, *Can Informed Public Deliberation Overcome Clientelism? Experimental Evidence from Benin*, 5 AMERICAN ECONOMIC JOURNAL: APPLIED ECONOMICS 241–255 (2013).

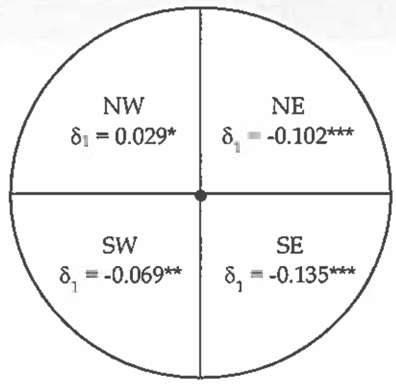
will reject the null hypothesis 10% of the time even if the null is true (e.g., Type I error).

We conduct such tests using the following simulation. First, a random location (latitude, longitude) within the Delaware area is chosen (see Appendix 4 for an illustration of the process). Second, the distances from this location to all home sales is computed. Third, we replace in the regression model the variable measuring distance from the quarry (D) with this alternate distance measure (D'). Fourth, we estimate a regression of price on the same variables as above, obtaining the coefficient, t-statistic and its probability on δ_1. Fifth, this process is repeated 1,000 times. Finally, from these 1,000 simulations, we can compute how often the null hypothesis of "no effect" is rejected.

At the threshold significance level of 10%, the null hypothesis is rejected in a whopping 67% of the simulations for the data from Delaware County, sometimes with positive and sometimes negative coefficients. Conducting the same simulation for Murfreesboro, the rejection rate is an even larger 93%. Given the random selection of locations in the simulation, this result is a powerful indictment against the sort of model employed in the *Hite Report*. A researcher may pick just about any location and find a statistically-significant price-distance relationship. We conclude based on this analysis that the addition of a distance variable to a hedonic model in an effort to identify the effect of a quarry on home prices is a poor experimental design with grossly inaccurate inference tests, especially when using asymptotic critical values for hypothesis testing and only data on post-operation transactions. In fact, we suspect many of the hedonic studies using distance from disamenities may be similarly unable to identify an effect of interest, but leave that question to future research.

Another problem with estimating the price-distance relationship is that unlike square footage, distance from a quarry is not unidimensional but occurs on a coordinate plane. A house may be located to the east or to the west, to the north or to the south, of a quarry, and moving closer to or away from the town center, a university, a landfill, or any other site that may influence prices. To see this, we divide the transaction data near Murfreesboro into four quadrants around the quarry (northeast, northwest, southeast, and southwest) and estimate a price-distance relationship unique to each quadrant (using Eq. 2). Results are summarized in Figure 3.

Figure 3. Price-Distance Relationship
Quadrants around Murfreesboro Quarry



From Figure 3, we see that the price-distance relationships are not equal across quadrants but rather differ substantially by the direction of the movement away from the quarry. From Table 4, we know that the average price-distance relationship from this quarry is negative (and statistically significant). Yet, from Figure 3, we see that the price-distance relationship is positive in the Northwest quadrant, but negative in all other quadrants. All the estimated price-distance relationships are statistically different from zero at the 10% level or better. It appears, therefore, that there is no "price-distance relationship" but many "price-distance relationships" from any given site. We believe these results are more evidence of the spurious nature of the price-distance relationship estimated using hedonic models of housing prices.

In light of our randomized inference procedure and additional evidence, we conclude, for now, that the type of model and experimental design used in the *Hite Report* is entirely unsuited to the task of identifying the price impact of quarries. Our results from replication efforts, which consistently find a negative price-distance relationship, are no less implicated by the defect than those of the *Hite Report*. Identifying the effects of quarries on housing prices requires a different experimental design, and careful attention to selection bias, covariate overlap, and the numerous ramifications of thin markets around the site. We attempt to offer some better evidence below.

E. *Spurious Regression and the Search for Results*

In light of the evidence that a statistically significant price-distance relationship is found for no less than seven-out-of-ten randomly chosen locations, we conclude the *Hite Report's* experimental design is incapable of quantifying the effect of quarries on house prices. The results from such models are spurious. Consequently, we expect that the price-distance relationship will be sometimes positive, sometimes negative, sometimes statistically significant and sometimes not for any given quarry. Statistical significance is the flip of a coin heavily weighted toward the rejection of the null hypothesis. Our analysis also shows that the choice of estimation method may alter the estimated coefficient and its significance, a common trait of spurious regression.

The fact different quarries and different estimation methods produce different results advises caution in conducting and assessing such studies, especially in a policy-relevant context when economic development is at stake. Inference errors may be inadvertent, or an advocate may exploit the spurious nature of the relationship by searching for a location, model specification, and time period to produce an outcome supporting a favored policy position. We can demonstrate the risks of such an ends-driven search by looking at more recent data for Delaware, Ohio, using data on prices for the five-year period 2012 through 2016 (1,429 transactions). The models and variables are measured in the same way as above.

Table 5 summarizes the results from a few estimation methods. For expositional purposes, we present only on the price-distance relationship. Using the unconventional Equation (2) from the *Hite Report*, we find that the price-distance relationship for this period is positive—a statistically significant result (by asymptotic convention). The result is opposite of that estimated for the data from the 1998-2007 period, even though the location is the same. Without any constraint on the choice of time period to analyze, an unscrupulous advocate is free to choose data from different periods in search of results to support his or her position.

Table 5. Results Delaware Quarry, Years '12-16

	NLS Coef (t-stat)	*OLS* Coef (t-stat)	*MReg* Coef (t-stat)	*RReg* Coef (t-stat)	*SReg* Coef (t-stat)
ln*D*	0.1285*** (3.45)	0.0192 (0.52)	-0.0065 (-0.32)	0.0412 (1.63)	0.0780 (1.10)
Spatial Terms (χ^2)					41.28***
Pseudo-R^2	0.392	0.332	0.263	0.377	0.347
Obs.	1,429	1,429	1,429	1,429	1,429

Statistical Significance: *** 1%, ** 5%, * 10%

Model selection and variable choice may also be used in an ends-drive search for results. As shown in Table 5, estimating Equation (3), a standard functional form for hedonic regressions, the positive coefficient is now a sixth the size of that estimated by Equation (2) and is no longer statistically different from zero at standard levels.[37] Also, Median, Robust and Spatial Regression do not find statistically significant price-distance relationships. In fact, the only model that produces a statistically-significant positive effect is the non-standard regression equation used in the *Hite Report*. Moreover, if we replace the *TOTR* variable with the *SQFT* variable in the NLS model, the price-distance relationship shrinks to 0.02 (one-sixth the size) and the coefficient is no longer statistically significant. Again, a researcher may pick-and-choose model specification, along with time period analyzed and regressors, to obtain a desired result. Skepticism is warranted for any analysis of the price effects of quarries (and amenities or disamenities generally) absent robustness analysis across time and model specifications.

Table 6. Results Delaware Quarry, Years '98-07 & '12-16

	NLS Coef (t-stat)	*OLS* Coef (t-stat)	*MReg* Coef (t-stat)	*RReg* Coef (t-stat)	*SReg* Coef (t-stat)
ln*D*	0.10028	-0.1361***	-0.0963***	-0.0501***	-0.1059**
	(0.11)	(-5.04)	(-6.33)	(-2.89)	(-2.10)
Spatial Terms (χ^2)					41.28***
Pseudo-R^2	0.302	0.262	0.219	0.288	0.151
Obs.	3,543	3,543	3,543	3,543	3,543

Statistical Significance: *** 1%, ** 5%, * 10%

As another check on robustness (or a lack thereof), we combine the data from 1998-2007 and 2012-2016, excluding those years when the housing market and economy generally were in turmoil (2008-2011). Results on the price-distance relationship are summarized in Table 6. Now, Equation (2) estimated by NLS reports a statistically insignificant (but positive) coefficient for the price-distance relationship. The other estimation methods, however, all confirm the negative and statistically significant relationship consistent with the results in Tables 1 and 3. It appears, therefore, whether or not quarries affect prices hinges on model selection and dates selected, which simply demonstrates the spurious nature of these sorts of experiments. Plainly, care must be given to model selection, and robustness analysis should be thorough and explicit. And, in light of the randomized

[37] The Box-Cox test indicates a preference for the transformation ($\chi^2 = 40.7$).

inference and quadrant analysis above, the utility of the price-distance relationship for quantifying the effects of quarries and disamenities should be regarded as defective, at least until further research demonstrates otherwise.

The analyses presented here, we believe, offers compelling evidence that the *Hite Report*'s experimental design is a flimsy method, easily manipulated to produce nearly any desired result through the selection of location, model specification, estimation technique, and the time period analyzed. The *Hite Report*'s findings cannot be reliably replicated and conflicting results are readily obtained. The spurious nature of the price-distance relationship from such experiments is clearly demonstrated, and the defective approach allows for nearly any result imaginable. Using data long after a quarry opens poses no limits on the selection of time period, enhancing the risk of the exploitation of spurious regression for economic and political advantage.

IV. A Difference-in-Difference Approach

As detailed above, to quantify the effect of a quarry on home prices the researcher ideally needs pricing data both before and after quarry operations begin.[38] With this data, statistical analysis can determine how the relationship between price and distance from the quarry *changes* after the quarry opens, thus quantifying, under some well-known assumptions, a plausible causal effect.

There are some potential shortcomings with a simple before-and-after analysis, however. New quarries take years to get approval and normally we expect equity prices to reflect new information quickly, so price effects may precede that event. In this section, we offer two before-and-after analyses of the effect of a quarry on home prices. First, we evaluate pricing activity around the Vulcan quarry in Gurley, Alabama, which began operations in 2013. Gurley is a rural area not far from the city of Huntsville, Alabama. Consistent with the analysis above, we use the general format of the *Hite Report* (and several

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[38] Another possible identification strategy involves exploiting policy experiments with respect to residential distance from a quarry. For example, if some states required houses to be a certain distance away from a quarry while other states did not, then a credible counter-factual could be constructed allowing the researcher to estimate the effect of quarry distance on home prices. A regression discontinuity design could be used to identify the price-distance relationship if regulations required potential home buyers to be informed of the quarry for homes within a certain distance. Homes just inside and just outside this cut-point would could be used as treatment and control units to identify the causal price-distance relationship.

(Footnote Continued. . . .)

alternatives) to test for a *change* in the price-distance relationship after the quarry opens.

Second, we evaluate the price effects of the contested Austin Quarry in Madera, California, which was approved in 2016.[39] Located in the southwest corner of the intersection of Highway 41 and Highway 145, the site is proximate to two subdivisions, one located on Highway 145 and the other on Highway 41. Thus, not only are the subdivisions proximate to the quarry, but both are expected to deal regularly with the quarry's traffic flow. Though first proposed in 2010, media coverage and public protest did not begin until 2013, at which time the new quarry might be expected to affect home prices through an announcement effect.[40] A control group is chosen using CEM from homes sales in subdivisions not too far from the quarry site but beyond the range of influence. We find no statistically significant effect of the quarry in either model, though in both cases the estimated coefficients indicate, if anything, the quarry raises property values.

A. *The Empirical Model*

For these analyses, we employ the standard regression model for the DiD estimator. Using a log-linear form common to hedonic regressions, the regression equation is,

$$\ln p_{it} = \Delta T \cdot N_i + \delta_0 N_i + \beta_0 + \sum_{j=2}^{k} \beta_j X_{j,i} + \upsilon_{it} \ , \tag{4}$$

where T is dummy variable equal to 1.0 after the treatment and N_i is a dummy variable for homes near the quarry site (or a continuous measure of distance from the quarry). The estimated coefficient δ_0 measures the difference in average sale prices for homes near the quarry (or the effect of distance from it) *prior to the treatment*. After the treatment, the difference in price between homes near and far from the quarry is $\Delta + \delta_0$. The difference between the two effects is Δ, which is the DiD estimator, as defined in Equation (1), or $\Delta = \delta_1 - \delta_0$. The t-test on the coefficient

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[39] J. Rieping, *Controversial Quarry Up for Vote*, MADERA TRIBUTE (July 16, 2016) (available at: http://www.maderatribune.com/single-post/2016/07/16/Controversial-quarry-up-for-vote); M.E. Smith, *Austin Quarry Approved in 3-2 Vote*, SIERRA STAR (July 20, 2016) (available at: http://www.sierrastar.com/latest-news/article90713132.html).

[40] Lexus-Nexus search conducted on February 20, 2018. B. Wilkinson, *Concerns Over Truck Traffic on Road*, SIERRA STAR (February 21, 2013).

Δ is, therefore, a direct test of the statistical significance of the effect of a quarry on home prices.

As an alternative, we estimate,

$$\ln p_{it} = \Delta T \cdot N_i + \beta_0 + \sum_{j=2}^{k} \beta_j X_{j,i} + \lambda_t + \nu_{it} \ , \tag{5}$$

where the continuous *DATE* variable is replaced with year fixed effects (λ_t), which is a somewhat standard treatment of time in the DiD regression. Due to collinearity with the fixed effects, the $\delta_0 N$ term is no longer included in the regression, but the interpretation of Δ is unchanged.

For consistency with the earlier analysis, we also estimate the model specification of the *Hite Report*, adding as a regressor the interaction of a treatment dummy variable for years 2013 and later (T). The regression model is,

$$p_{it} = \exp(\delta_0 \ln D_i + \Delta \ln T \cdot D_i + \beta_0 + \sum_{j=2}^{k} \beta_j X_{j,i}) + \varepsilon_{it} \, , \tag{6}$$

where the variables are defined the same way as the Murfreesboro analysis (i.e., total rooms is replaced with square footage). The coefficient δ_0 quantifies the price-distance relationship prior to the initiation of quarry operations in 2013. Starting in 2013, the price-distance relationship is measured by $\delta_0 + \Delta = \delta_1$, where Δ measures the *change* in the slope of the price-distance relationship. If the quarry reduces home values near the quarry, then Δ should be positive and statistically significant. Equation (6) is estimated by NLS.

B. *Vulcan Quarry in Gurley, Alabama*

As with the earlier analysis, data is obtained on home sales within a five-mile radius of the quarry location in Gurley, Alabama. The quarry began operations in 2013, and our data spans 2005 through portions of 2017. The sample includes 593 transactions, but we note only 83 are for sales prior to 2013.[41] Since there is no "city

[41] The low samples are likely the consequence of the rural nature of the market and data collection in such areas. We cannot exclude the possibility the sample is peculiar in some respect.

center" in the area, the *DCC* variable is measured as the distance from the WalMart Supercenter in the nearby town of Big Cove.

Table 7. Regression Results and Descriptive Statistics
Vulcan Quarry in Gurley, Alabama

	NLS-Eq. 6 Coef (t-stat)	*OLS-Eq. 4* Coef (t-stat)	*OLS-Eq. 5* Coef (t-stat)	Mean (St. Dev)
ln*D*	0.0876	0.2723***	0.3679**	3.445
	(0.97)	(3.64)	(2.20)	(0.987)
T·ln*D*	-0.1205**	-0.0543	-0.1587	2.936
	(-2.41)	(-1.07)	(-0.88)	(1.50)
DATE	0.0162*	0.0191*	…	2014.1
	(1.67)	(1.85)		(2.30)
DDC	-0.0456***	-0.0529***	-0.0512***	4.484
	(-5.85)	(-5.99)	(-5.80)	(2.27)
H2L	-1.2185	-0.2457	0.1868	0.063
	(-0.79)	(-0.11)	(0.08)	(0.029)
BATH	0.1752***	0.2672***	0.2655***	2.875
	(6.92)	(8.84)	(8.71)	(0.932)
SQFT	2.2E-04***	2.0E-04***	1.9E-04***	2,870.3
	(5.97)	(3.22)	(3.11)	(1,139.8)
Constant	-27.99	-27.57	10.61***	…
	(-1.43)	(-1.32)	(36.57)	
λ_t	No	No	Yes	…
Pseudo-R^2	0.641	0.602	0.608	…
Obs.	593	593	593	593
Statistical Significance: *** 1%, ** 5%, * 10%				

Results are summarized in Table 7.[42] Many of the coefficients are statistically significant and similar to those estimated using the Murfreesboro data. First, for Equation (6) estimated by NLS, we find that housing prices rise as distance from the quarry increases (the coefficient on ln*D* is positive), but this positive effect is observed *prior to the beginning of quarry operations*. After the quarry opens, the positive (though statistically insignificant) price-distance relationship is attenuated; the estimated Δ coefficient is -0.103 and the null hypothesis of "no effect" for the DiD estimator is rejected at the 5% level. Prior to 2013, the price-

42 Since we do not observe large differences in the characteristics of homes near to and far from the quarry, we do not apply CEM.

distance elasticity is 0.088 (δ_0), but after 2013 it is -0.033 (δ_1), a small effect that is statistically indistinguishable from zero (F-stat = 0.16, prob = 0.69).

Turning to Equation (4), the price-distance relationship is again positive (and much larger than with NLS) but is now statistically significant prior to the beginning of quarry operations. The Δ coefficient is -0.054, which while negative is no longer statistically different from zero at standard levels. The positive price-distance relationship is attenuated after the quarry began operating, but not to a statistically significant degree. The results are similar for Equation (5). Though not summarized in the table, we note that for MReg and RReg neither of the quarry-distance coefficients is statistically different from zero. The SReg results, also not presented in the table, are not wholly unlike the OLS estimates of Equation (4); the coefficient δ_0 is positive (0.331, t = 4.45) and statistically significant, but the Δ coefficient is negative (-0.055, t = 0.98) and not statistically different from zero.

The lack of robustness to specification leads us to conclude that the most likely effect of the quarry is no effect at all. Also, we acknowledge that the defects in the *Hite Report*'s empirical strategy is as relevant here as before: our randomized inference simulation computes a rejection rate on δ_0 of 65% and for Δ of 67% (at a nominal 10% significance level). While we recognize the limitations of the data and the methods, on whole the results are entirely at odds with the claim that quarries reduce housing prices. If anything, the effect is the opposite.

C. *Austin Quarry in Madera County, California*

Quarry sites often take years for approval. Our model of the Gurley quarry presumed that prices do not reflect the quarry operations until after the quarry is operational. A reasonable argument may be made, however, that home prices might adjust before the quarry opens when the local population becomes aware of the future quarry site. We consider that possibility now.

The Austin Quarry in Madera, California, was approved in September 2016 despite a substantial NIMBY effort.[43] A search of news outlets reveals that public attention to proposed quarry initiated in early 2013 and was very active is

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43 M. Smith, *Supervisors Approve Austin Quarry 3-2*, SIERRA STAR (September 12, 2016) (available at: http://www.sierrastar.com/news/local/article101492412.html).

(Footnote Continued. . . .)

subsequent years.[44] Thus, we define the treatment dummy T as having values of one in years after 2013 (and also consider other years). Data is collected for the ten years preceding the treatment date, so the data spans 2007 through 2016.

The Austin Quarry site is well outside of town, but there are two subdivisions proximate (less than three miles) to the site: Bonadelle Racheros-Madera Ranchos and Bonadelle Rancheros Nine. Both subdivisions abut the major highways (Highways 41 and 145) servicing the quarry site. If any homes are to be affected by the quarry, then these are the most likely candidates, and they represent our treatment group. The dummy variable N takes a value of 1 for these subdivisions (zero otherwise). Visual inspection of the area points to a number of subdivisions in the vicinity that are neither on the major highways serving the site nor within ten miles of the site: Madera Estates, Madera Country Club, Lake Madera Country Club, Chuk Chanse, Valley Lake Ranchos, Madera Acres, Madera Knolls, and Madera Highlands. A control group will be selected from home sales in these subdivisions.

Estimation of the DiD estimator employs Equation (5). Regressors include the age of the home at the sale data (*AGE*), square footage (*SQFT*), the number of bedrooms (*BED*) and bathrooms (*BATH*), a dummy variable indicating whether the home a two story home (*STRY*), a dummy variable indicating the presence of a fireplace (*FIRE*), a dummy variable indicating whether the home has a swimming pool (*POOL*). Year fixed effects are included.

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[44] B. Wilkinson, *Concerns Over Truck Traffic on Road*, SIERRA STAR (February 32, 2013); G. Smith, *Economic Costs and Benefits of the Proposed Austin Quarry in Madera County* (October 23, 2014) (available at: http://www.noaustinquarry.org/wp-content/uploads/2016/08/Austin-Quarry-Economics-Report.pdf); M.E. Smith, *Progress Continues on Austin Quarry*, SIERRA STAR (February 10, 2016) (available at: http://www.sierrastar.com/news/article87816032.html); B. Wilkinson, *Group Opposes Proposed Rock Quarry*, SIERRA STAR (November 12, 2014) (available at: http://www.sierrastar.com/news/article87802492.html); D. Joseph, *Quarry Issues Need to be Addressed*, SIERRA STAR (December 3, 2014) (available at: http://www.sierrastar.com/opinion/article87803072.html).

Table 8. Descriptive Statistics
Austin Quarry in Madera County, California

Variable	ALL Mean (St.Dev)	*N*=0 Mean (St.Dev)	*N*=1 Mean (St.Dev)	Stan. Diff.
AGE	16.13	16.50	15.21	0.075
	(12.16)	(12.22)	(11.95)	
SQFT	1811.6	1706.7	2072.9	0.518*
	(522.7)	(490.6)	(509.5)	
BED	3.32	3.27	3.43	0.179
	(0.59)	(0.54)	(0.70)	
BATH	1.99	1.83	2.38	0.639*
	(0.68)	(0.66)	(0.56)	
STRY	0.024	0.016	0.043	0.115
	(0.15)	(0.12)	(0.20)	
FIRE	0.632	0.730	0.390	0.515*
	(0.48)	(0.44)	(0.49)	
POOL	0.068	0.033	0.159	0.311*
	(0.25)	(0.17)	(0.36)	
Price	215.4	195.0	266.3	
Price/*SQFT*	120.8	116.4	131.9	
Obs.	887	633	254	

Descriptive statistics for the treatment and control pool are provided in Table 8. The homes are similar in some respects, but large standardized differences (> 0.25) are found for square footage, the number of bathrooms, and the presence of a fireplace or pool.[45] CEM based on *SQFT*, *BATH*, *FIRE*, and *POOL* reduces the standardized differences to acceptable levels for all the regressors. We are able to match 229 of 254 homes in the treated group to 450 of 633 homes in the control pool, for an estimation sample of 679 home sales.

[45] Imbens and Wooldridge, *supra* n. 8.

Table 9. Regression Results and Descriptive Statistics
Austin Quarry in Madera County, California

	OLS Coef (t-stat)	*CEM-OLS* Coef (t-stat)	*CEM-MReg* Coef (t-stat)	*SReg* Coef (t-stat)
N (δ_0)	0.1166**	0.1277**	0.1194***	0.1913**
	(2.47)	(2.08)	(4.99)	(2.11)
T·N (Δ)	0.1663***	0.1005	0.1161***	0.0878
	(2.95)	(1.21)	(3.14)	(1.32)
AGE	0.0017	0.0087***	-0.0003	-0.0055*
	(1.20)	(3.47)	(-0.35)	(-0.35)
SQFT	1.7E-04***	1.3E-04**	3.0E-04***	2.0 E-04***
	(3.40)	(2.05)	(12.68)	(4.39)
BED	0.0349	0.01205***	0.0450**	-0.0542
	(0.90)	(2.63)	(2.49)	(1.54)
BATH	0.0288	-0.0439	-0.0777***	-0.0218
	(1.08)	(-0.60)	(-2.60)	(-0.61)
STRY	-0.0878	-0.0408	0.0043	-0.1378
	(-0.70)	(-0.33)	(0.05)	(-1.29)
FIRE	0.0770**	0.0650*	0.0422***	0.0305
	(2.43)	(1.73)	(2.94)	(0.88)
POOL	0.1833***	0.1577***	0.0853***	0.2346***
	(3.71)	(4.03)	(3.68)	(3.63)
Constant	11.21***	10.92***	11.35***	11.62***
	(98.08)	(70.30)	(20.67)	(83.17)
λ_t	Yes	Yes	Yes	Yes
Spatial Terms (χ^2)				27.17***
Pseudo-R^2	0.482	0.491	0.361	0.186
Obs.	887	679	679	887

Statistical Significance: *** 1%, ** 5%, * 10%

Regression results are summarized in Table 9. For comparison purposes and to illustrate the important effects of covariate balance, estimates for both the full and CEM-weighted samples are provided. The models fit the data well for both samples. For the full sample, which we caution does not rely on balanced data, the estimated δ_0 coefficient (0.117) indicates that prices in the treated group were about 12% higher [exp(δ_0) - 1] in the pre-treatment period. After the treatment, the prices were even higher (Δ = 0.166), a statistically significant result of about an 18% increase. The remaining coefficients are sensibly sized and many are statistically different from zero. A swimming pool, for instance, raises price by about $38,000.

Turning to the CEM-weighted model, the price difference before the treatment is a bit larger (δ_0 = 0.128), and the difference is statistically significant at standard levels. As in the full sample, the DiD estimator Δ is positive (0.100), but now it is not statistically significant. For the balanced sample, we cannot reject the null hypothesis that the quarry's announcement effect is zero, though the coefficient is relatively large and the t-statistic is much larger than 1.00. In contrast, for the CEM-weighted MReg, prices are higher in the treated area during both the pre-treatment and treatment period, and both coefficients are statistically different from zero at better than the 1% level.

In the final column of Table 9, we summarize the results from SReg using the full sample. The spatial terms are statistically significant at the 1% level. The results are comparable to the others. Prices are higher in the treated area before the treatment, but we do not see a statistically significant change is seen after the treatment. The DiD estimator Δ is positive and relatively large (0.09), but statistically significant only at the 20% level.

Table 10. Regression Results, Annual Treatment Effect
Austin Quarry in Madera County, California

	2013 Coef (t-stat)	2014 Coef (t-stat)	2015 Coef (t-stat)	2016 Coef (t-stat)
$T{\cdot}N$ (Δ)	0.2721***	0.0018	0.0322	0.3949
	(2.65)	(0.01)	(0.42)	(1.41)

Statistical Significance: *** 1%, ** 5%, * 10%

Finally, we can estimate the Δ coefficient for each year beginning with our chosen treatment date (2013), thereby assessing whether that choice is influencing the estimate.[46] The results by year are summarized in Table 10. Large positive coefficients are observed in years 2013 and 2016 (the latter close to being statistically significant), and smaller positive coefficients for the other years. These results are consistent with those reported in Table 9.

Notably, we do not estimate a price-distance relationship in these equations. Distance from the quarry site is not a regressor. Unlike the distance-based model, the rejection rates for randomized inference (assigning the homes in the treatment group randomly from those in the sample) are very close to the nominal level of the test (11% rejection rate versus 10% nominal test level). The statistical reliability

[46] The coefficients are year specific and do not quantify the average after the treatment year, as do the results from Table 9.

of this approach is much superior to the price-distance approach used in the *Hite Report*.

Taken together, we conclude from these results indicate that the effect of the quarry may very well be zero, at least in the form of an announcement effect. If there is any effect, it is positive. Whether or not the quarry will affect prices, either positively or negatively, after operations begin (assuming they do) is unknowable at this time. In light of the evidence presented here and in prior research, the expectation must be that there will be little to no effect on home prices and, if anything, that effect may be positive.

V. Conclusions

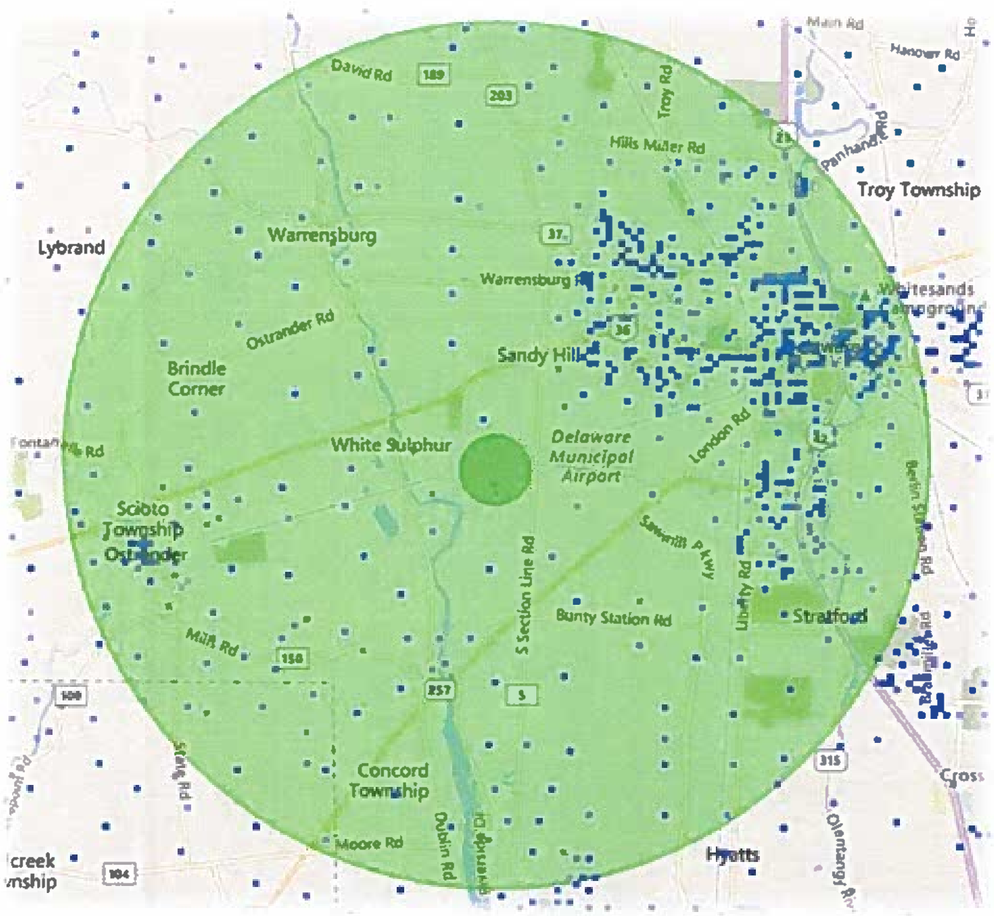
We estimate the effect of rock quarries on home prices with data from four quarry locations across the United States, a wide range of econometric specifications and robustness checks, and a variety of temporal circumstances from the lead-up to quarry installation to subsequent operational periods. We find no compelling statistical evidence that either the anticipation of, or the ongoing operation of, rock quarries negatively impact home prices. While our study extends the literature on estimating the effects of "disamenities," primarily as a critique of existing methods, the empirical problem is difficult and likely requires advanced research methods beyond what we provide here. The primary obstacle to estimating these effects is the lack of data and that lack of data is actually driven by the quarry site selection process, which limits our ability to infer a causal relationship. Thin markets and a subsequent lack of sales data are a serious problem since quarries are today (and typically in the past) located, by design, away from residential density.

Our study highlights a number of shortcomings in the empirical methodologies generally used to estimate the effect of disamenities on real estate prices. First and foremost, the vast majority of studies do not (or even attempt to) identify the causal effect of disamenities. That is, existing studies are naïve as to the empirical conditions necessary to identify a causal relationship and do not establish credible strategies to estimate the counter-factual outcome—i.e., how the real estate around quarries would have looked, on average, without a landfill or other disamenity. To evaluate the credibility of existing studies and their methodologies, we first employ permutation tests to examine whether or not the existing methodologies yield higher than expected rejection rates of the null hypothesis. We accomplish this by randomly assigning a location in our sample space with a "disamenity" (i.e., a placebo quarry) and then estimate the effect on surrounding home prices. The null hypothesis of "no effect" of the placebo quarries is rejected in no less than 7 out of 10 simulations, and at a rate as high as 9 out of 10 simulations.

In an attempt to produce a meaningful counter-factual we employ a difference-in-differences estimation strategy which exploits the timing and placement of a quarry. We use this strategy in two different contexts: (1) before and after operations of a quarry in Gurley, Alabama; and (2) before and after local debate (and subsequent approval) of a quarry in Madera County, California. The first exercise estimates the effect of quarry operations on home prices and the second exercise estimates the anticipatory effect of a quarry on home prices. Neither exercise yields evidence of a negative impact on home prices. Given a number of data concerns and model limitations (since our interest is primarily in replication), further research is advised.

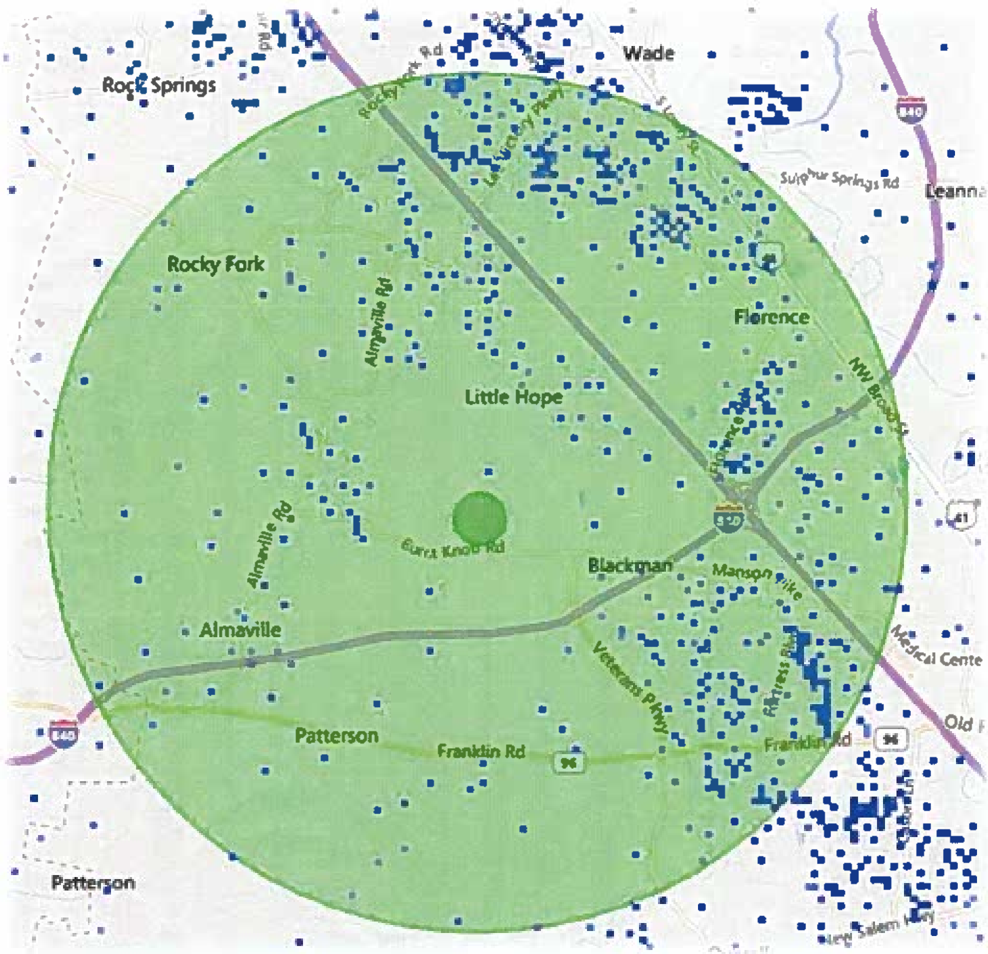
APPENDIX 1. MAP OF NATIONAL LIME & STONE QUARRY NEAR DELAWARE, OHIO

Notes: The small, inner green circle marks the National Lime & Stone Quarry near Delaware, Ohio. The larger green circle is a five-mile radius around the quarry location. The blue dots mark areas of population density using 2010 census data. Map generated using censusviewer.com.



APPENDIX 2. MAP OF ROGERS GROUP QUARRY NEAR MURFREESBORO, TENNESSEE

Notes: The small, inner green circle marks the Rogers Group Quarry near Murfreesboro, Tennessee. The larger green circle is a five-mile radius around the quarry location. The blue dots mark areas of population density using 2010 census data. Map generated using censusviewer.com.



APPENDIX 3. CENSUS BLOCK POPULATION GROWTH NEAR ROGERS GROUP QUARRY NEAR MURFREESBORO, TENNESSEE

Notes: Figures 3A-3C demonstrate population movements for Rutherford County, TN, with emphasis on the Rogers Group quarry. Population is measured using U.S. Census Bureau population data for years 2000, 2010, and 2016. Darker blues imply greater population.

Fig. 3A: Rutherford County, TN, 1990 Population Density

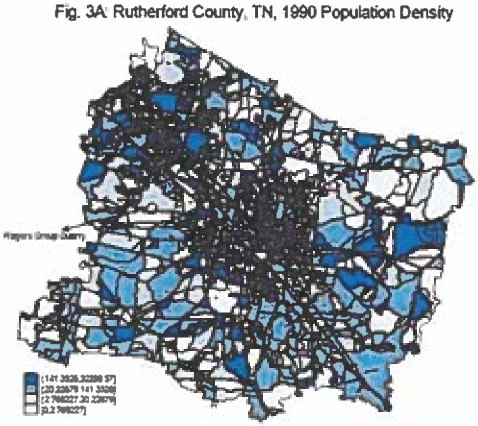


Fig. 3B: Rutherford County, TN 2000 Population Density

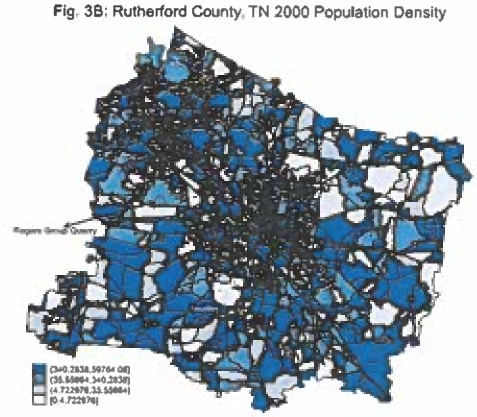
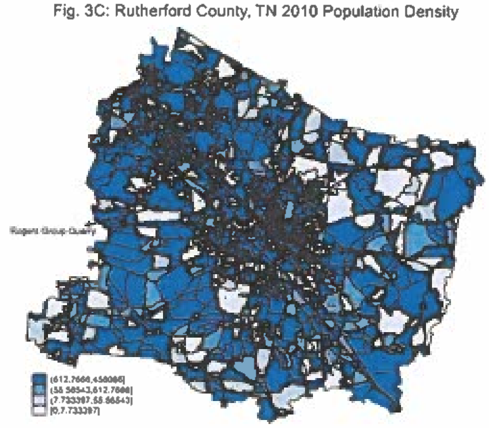
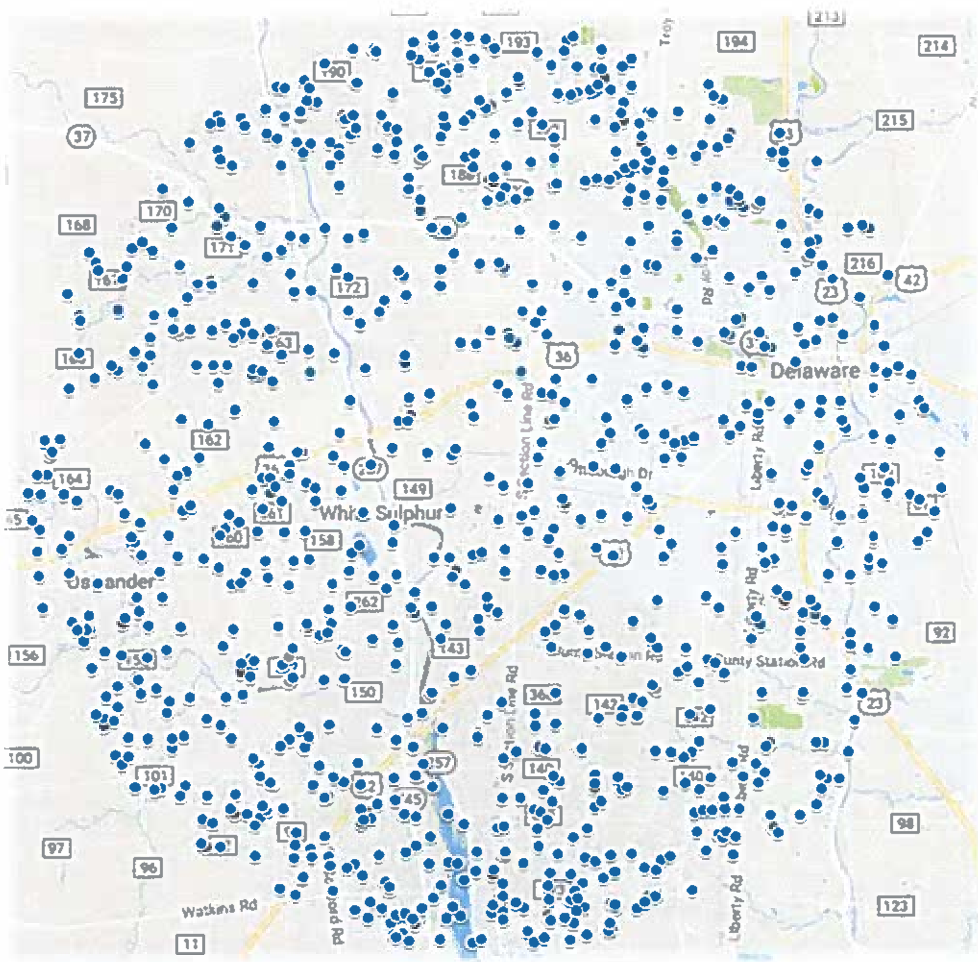


Fig. 3C: Rutherford County, TN 2010 Population Density



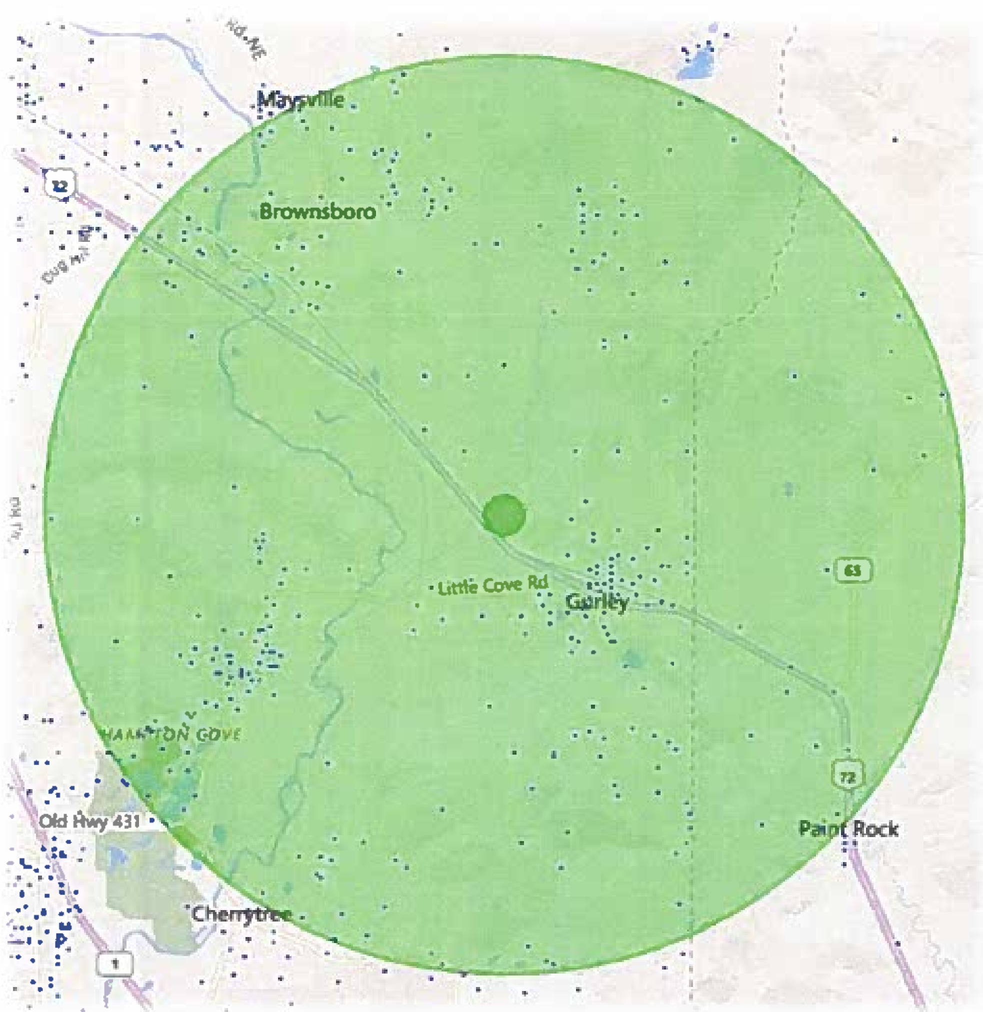
APPENDIX 4. ILLUSTRATIVE MAP OF RANDOM LOCATIONS USED FOR RANDOMIZED INFERENCE ANALYSIS FOR DELAWARE COUNTY

Notes: The blue dots represent the random locations chosen by the randomized inference simulation for Delaware County, Ohio. Map generated using Google maps.



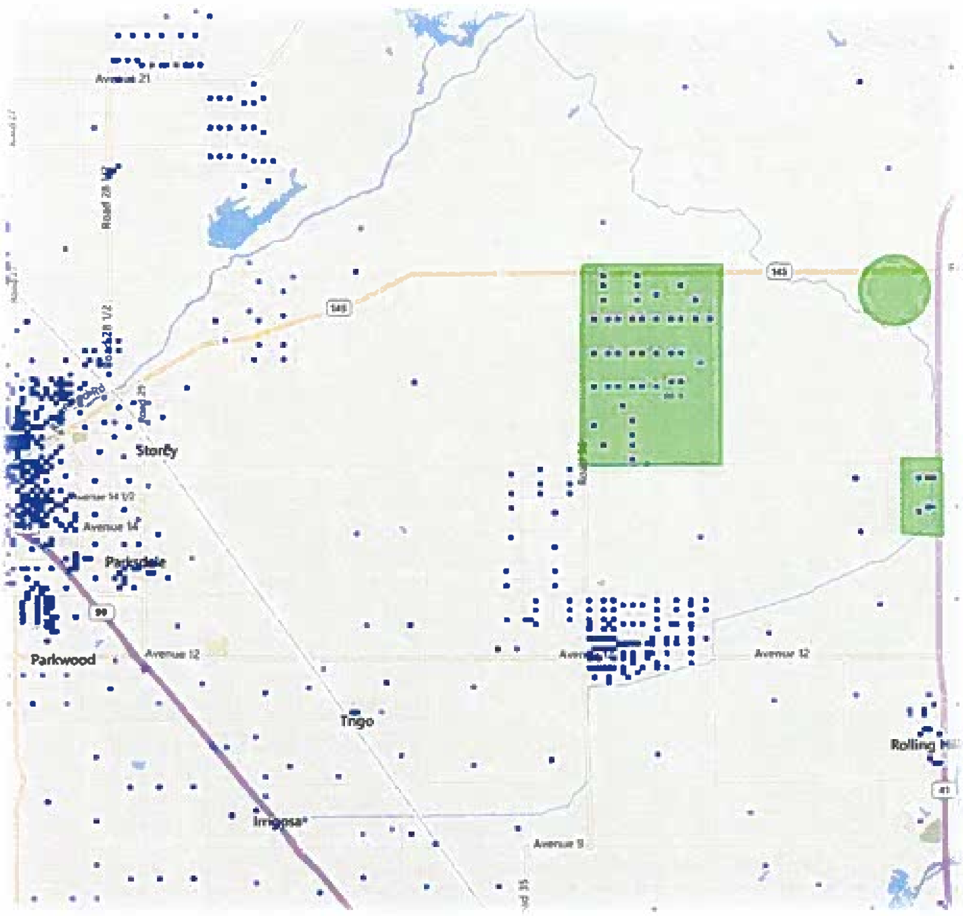
APPENDIX 5. VULCAN QUARRY NEAR GURLEY, ALABAMA

Notes: The small, inner green circle markets the Vulcan Quarry near Gurley, Alabama. The larger green circle is a five-mile radius around the quarry location. The blue dots mark areas of population density using 2010 census data. Map generated using censusviewer.com.



APPENDIX 6. MAP OF AUSTIN QUARRY SITE IN MADERA COUNTY, CALIFORNIA

Notes: The green circle marks the site of the proposed Austin Quarry in Madera County, California. The immediate two areas of population to the South and West of the quarry site—marked in green rectangles—are the "treated" areas. The blue dots mark areas of population density using 2010 census data. The control group is chosen from areas further west and north of Highway 145 toward Madera. Map generated using censusviewer.com.



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Phoenix Center Policy Paper Number 57:

What is the Effect of Rock Quarries on Home Prices? An Empirical Analysis of Three Cities

George S. Ford, PhD

(May 2022)

Phoenix Center Policy Paper No. 57
What is the Effect of Rock Quarries on Home Prices? An Empirical Analysis of Three Cities

George S. Ford, PhD†

Abstract: For many Americans, a home is their most valuable asset. Naturally, the threat of a reduction in home values causes concern, which leads to opposition to several sorts of economic development projects and essential infrastructure. Opposition to rock quarries is one example. Evidence on the effects of quarries on home values is scant; the studies are often limited to a single city, leading to questions about generalizability, and use home sales occurring long after the quarry begins operations, introducing selection bias. In this POLICY PAPER, I apply multiple empirical methods to data on homes sales from three cities in Ohio. I find no evidence to suggest quarries reduce home values. I also offer evidence to suggest that the typical approach to quantify such effects—a home's distance from the quarry—may be unreliable given the idiosyncrasies of real estate markets.

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I. Introduction

Hedonic models of home prices seek to explain sales prices by accounting for housing characteristics (e.g., square footage, acres, and so forth) and other factors that affect home values. Typically included in the set of covariates is the distance from a city's center or its central business district ("CBD"), or several such districts, with the expectation that home prices fall as distance from these employment centers rises.[1]

Along the same lines, researchers sometimes include the distance to an amenity or disamenity—a beach, an airport, a landfill—to quantify the effect of proximity to such establishments on home values.[2] For instance, rock quarries are sometimes subject to "not in my backyard" ("NIMBY") resistance due to their alleged effect on home values. Yet, research on the effect of rock quarries on home values is scarce. Opposition to quarries based on home valuations relies almost universally on Hite (2006), a brief report analyzing data from a few thousand homes sales around a single quarry in Delaware, Ohio.[3] Using an unconventional regression model and data on transactions within five miles of the quarry occurring decades after the quarry opened, the report finds a positive relationship between home prices and distance from the quarry. In contrast to Hite (2006), Rabianski and Carn (1987), Dorrian and Cook (1996), Bureau of Mines (1981), Grant (2017) and various other reports find no consistent relationship between

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[1] The "monocentric" assumption originated in the works of W. Alonso, LOCATION AND LAND USE: TOWARD A GENERAL THEORY OF LAND RENT (1964); E.S. Mills, STUDIES IN THE STRUCTURE OF THE URBAN ECONOMY (1972); R.F. Muth, CITIES AND HOUSING: THE SPATIAL PATTERN OF URBAN RESIDENTIAL LAND USE (1969).

[2] *See, e.g.*, J.P. Cohen and C.C. Coughlin, *Spatial Hedonic Models of Airport Noise, Proximity, and Housing Prices*, FEDERAL RESERVE BANK OF ST. LOUIS WORKING PAPER No. 2006-026 (2006) (available at: https://research.stlouisfed.org/wp/more/2006-026); M. Rahmatian and L. Cockerill, *Airport Noise and Residential Housing Valuation in Southern California: A Hedonic Pricing Approach*, 1 INTERNATIONAL JOURNAL OF ENVIRONMENTAL SCIENCE AND TECHNOLOGY 17–25 (2004) (available at: https://doi.org/10.1007/BF03325812); M. Thayer, H. Albers, and M. Rahmatian, *The Benefits of Reducing Exposure to Waste Disposal Sites: A Hedonic Valuation Approach*, 7 JOURNAL OF REAL ESTATE RESEARCH 265-282 (1992); R.B. Palmquist, *Estimating the Demand for the Characteristics of Housing*, 66 REVIEW OF ECONOMICS AND STATISTICS 394-404 (1984); P. Graves, J.C. Murdoch, M.A. Thayer and D. Waldman, *The Robustness of Hedonic Price Estimation: Urban Air Quality*, 64 LAND ECONOMICS 220-233 (1988).

[3] For a discussion of the Hite (2006) model, *see* G.S. Ford and R.A. Seals, *Quarry Operations and Property Values: Revisiting Old and Investigating New Empirical Evidence*, PHOENIX CENTER POLICY PAPER NO. 53 (March 2018) (available at: https://www.phoenix-center.org/pcpp/PCPP53Final.pdf).

property values and proximity to a quarry.[4] Two recent studies offer conflicting evidence. Malikov, Sun and Hite (2018) look again at home prices around the quarry in Delaware, Ohio, and report price attenuation for homes nearer the quarry. Ford and Seals (2018) estimate plausibly causal effects for two quarries using Difference-in-Differences ("DiD") and find no effect of the quarry on home prices. Also, Ford and Seals (2018) study the Delaware quarry and find no effect of the quarry on home values, though the available data precluded a DiD analysis for this quarry.[5]

In this POLICY PAPER, I return to the question of the effect of rock quarries on home prices, although many of our findings are also relevant for any other sorts of spatially-centered disamenities. Given the idiosyncrasies of real estate markets across cities, there is little reason to suspect the results on a single quarry can be generalized to other cities. Here, I use data on three cities in Ohio, including, once more, the city of Delaware. Estimates of the effects are based on Ordinary Least Squares regression ("OLS"), Robust Regression ("RREG"), Quantile Regression ("QREG"), Spatial Regression ("SREG"), and Semiparametric Regression ("SPR"). As in most studies of disamentities and rock quarries, all home sales occur after the quarry began operations, so selection bias may be an issue. Like Hite (2006) and Malikov, Sun and Hite (2018), I am unable to make causal claims. Nonetheless, this sort of evidence is routinely used to address the effect of quarries on home values, so it is worth undertaking such analysis.

To establish expectations, I begin with an analysis of the geographic scope of quarry blasting, since blasting is a root cause of the disamenity nature of a quarry. This analysis, based on standard methods, reveals a narrow geographic impact of blasting (less than one-half mile across a wide range of charge strengths). For the three quarries, I find no attenuation of prices based on proximity to the quarry. I likewise evaluate the statistical validity of distance-from-site variables in econometric models. As in Ford and Seals (2018), Randomized Inference reveals that these sorts of models can produce very high rejection rates for the distance-

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[4] A.M. Dorrian and C.G. Cook, *Do Rock Quarry Operations Affect Appreciation Rates of Residential Real Estate*, Working Paper (1996); J. Rabianski and N. Carn, *Impact of Rock Quarry Operations on Value of Nearby Housing, Prepared for the Davidson Mineral Properties* (August 25, 1987); M. Radnor, D. Hofler, et al., *Social, Economic and Legal Consequences of Blasting in Strip Mines and Quarries*, U.S. Bureau of Mines (May 1981); A. Grant, *Estimating the Marginal Effect of Pits and Quarries on Rural Residential Property Values in Wellington County, Ontario: A Hedonic Approach*, Master's Thesis, University of Guelph (June 2017).

[5] Ford and Seals (2018) also demonstrate that the positive results in Hite (2006) may be due to the unconventional estimation method.

from-site variable, suggesting distance-from-site models tend to over-reject the null hypothesis (of no effect). These empirical distributions of distance-from-site coefficients are typically quite wide, encompassing even very large distance-from-site coefficients. Some analysis of the data used in Malikov, Sun and Hite (2018), which is, in part, publicly available, is also provided, revealing sign changes on the distance-from-quarry coefficient under plausible circumstances.

II. Background

There exists a large literature on the effect of disamenities, like airports and landfills, on home values. Rock quarries have received less attention, though "not in my backyard" ("NIMBY") resistance to quarries or quarry expansions is commonplace. Opponents of the quarries, normally residents in the city or county of operation, must rely on scant evidence to support their positions on home valuations. Two analyses are typically offered to support resistance: (1) a six-page description of results from a consulting report by Hite (2006); and (2) a more thorough study of the same quarry (using later data) by Malikov, Sun, and Hite (2018).[6] Only the latter study provides a detailed accounting of the data and analyses, though much of the NIMBY resistance relies on Hite (2006). These reports, like most studies of (dis)amenities, rely on the "distance-from-site" methodology in a hedonic framework. To counter the NIMBY claim, quarry advocates sometimes rely on Ford and Seals (2018), among other studies, which finds no effect (either mere correlation or causal) of quarries on home prices.

Data on sales prices used by Hite (2006) and Malikov, Sun, and Hite (2018) are for sales occurring long after the quarry began operations; the quarry in Delaware, Ohio, opened in 1904. Malikov, Sun and Hite (2018) use data on home sales across the entire county, so much of the sample is for sales many miles from the quarry; the data also span multiple cities. Since quarries are not randomly sited and are often located in rural areas where land prices, home prices, and housing density are low, there is the obvious problem of selection bias.[7] While Malikov, Sun, and Hite (2018) use a sophisticated econometric approach, nothing in the model

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[6] A summary presentation of results for a student project by Sun (2018) on the effects of a surface mine (for gold and silver), for which there is no accompanying paper and no detailed description of the data or methods, is sometimes cited, though mineral mines use very different techniques than do rock quarries. B. Sun, *An Econometric Analysis of the Effect of Mining on Local Real Estate Values*, Unpublished Presentation (Undated).

[7] With the founding literature on home prices suggests prices fall as distance from the city center increases, it is little surprise that home prices may be lower around rock quarries located on the edge of town.

addresses selection bias so there can be no claim of a causal impact, and the authors never formally make a causal claim (though infer it).[8] In large part, the study appears to be more a presentation of a novel econometric methodology (semiparametric quantile spatial regression) than an attempt to quantify the causal effect of a quarry on home values. That is, the study is of academic interest more than of policy interest. Also, Ford and Seals (2018) find no effect of the Delaware quarry on homes prices, and I confirm that result here.

When looking at a single quarry, the generalizability of the result to other quarries is questionable. As demonstrated by Ford and Seals (2018), and again here, the coefficient on a distance-from-site covariate, which tend to statistically significance, may simply reflect the idiosyncrasies of individual real estate markets. Here, I look at three quarries to shed light on the generalizability of the findings.

A. *The Challenge and Advantages of Causal Analysis*

Though common in the literature, distance-from-site models have several serious shortcomings. First, there is selection bias. Available data for home sales often covers periods long after the amenity or disamenity is in place, precluding reliable causal estimation by methods such as Difference-in-Differences ("DiD").[9] Since the location of an amenity or disamenity is presumably not random, the risk of spurious correlation in distance-from-site relationships is high. Does the quarry reduce home prices, or are quarries located in areas where home prices are low? Studies like Hite (2006) and Malikov, Sun, and Hite (2018) cannot say, and my analysis here suffers from the same problem.

Disamenities are often placed away from population centers and where land prices (and thus home prices) are lower. Rock quarries often occupy hundreds of acres, so they are often places where land prices are lower, subject to the desirability of the geography. Public policy also influences site selection and (dis)amenities are sometimes clustered, thus making identification of a single (dis)amenity difficult. For instance, the quarry in Delaware, Ohio, sits on the edge of the city, adjacent to the municipal airport and an outdoor shooting range. Second, the available data on home characteristics varies among county assessors, so omitted variables may be a problem. Third, real estate markets are complex;

[8] The same holds for the Hite (2006) study.

[9] *See, e.g.*, J.D. Angrist and J. Pischke, MOSTLY HARMLESS ECONOMETRICS: AN EMPIRICIST'S COMPANION (2009); J.D. Angrist and J. Pischke, MASTERING METRICS: THE PATH FROM CAUSE TO EFFECT (2014); S. Cunningham, CAUSAL INFERENCE: THE MIXTAPE (2021); G.S. Ford and R.A. Seals, *supra* n. 3.

home values rise or fall from nearly any location, irrespective of the presence of an amenity or disamenity. Ford and Seals (2018) show that the null hypothesis (no effect) for a distance-from-site coefficient from nearly any location in a city is rejected at rates far exceeding the alpha level of the test. This finding forces the question about how unusual the estimated distance-from-site coefficient really is, irrespective of its statistical significance.

While I do not conduct a DiD analysis of home values here, a concise review of DiD analysis sheds light on why the distance-from-site approach is prone to bias. It also reveals the condition that must be satisfied for the results of such analysis to render a plausibly causal effect. Let us consider a hypothetical scenario. Say a quarry receives approval to begin operations on the outskirts of town. For several reasons, quarries are typically and intentionally located away from housing density where land prices are low. Before even the planning phase of the quarry, assume the average (quality-adjusted) price for a home near the quarry site is \$95,000, and the average price is \$100,000 for homes far from the future quarry site. This 5% price difference cannot be due to the quarry because the lower average price is present prior to the quarry even being proposed (by assumption).

After the quarry initiates operations, homes are bought and sold, and the prices are observed. Assume, for now, that the quarry has *no effect* on property values (and average prices do not change). If a researcher looked only at post-operations prices, then a 5% price difference is observed, though, by assumption, this price difference is not due to the quarry as the difference preceded the quarry. Nonetheless, this difference may be attributed falsely to the quarry. (The same would be true if home prices near the quarry were initially 5% higher than those far away).

The *true* effect of the quarry on home prices is revealed by the Difference-in-differences estimator,

$$\delta = (P_1^N - P_0^N) - (P_1^F - P_0^F), \tag{1}$$

where δ is the DiD estimator, P is price before (0) and after (1) the quarry begins operations for houses near (N) and far (F) from the quarry. In this "no effect" case, the DiD estimator is zero [(95,000 - 95,000) - (100,000 - 100,000) = 0], correctly identifying the causal effect of the quarry. Using only post-operation prices, the calculated statistic from empirical analysis is,

$$\Delta = P_1^N - P_1^F, \tag{2}$$

where Δ equals δ only when $P_0^N - P_0^F = 0$, which seems unlikely given the economics and policies related to siting a quarry. In this hypothetical, the Δ coefficient equals -$5,000, which is not the effect of the quarry. Thus, when a quarry's effect on home prices draws conclusions from an estimate of Δ and not δ, no plausible claim of a causal effect is possible.

As an alternative scenario assume that the quarry reduces prices for nearby homes to $90,000 (a reduction of $5,000), with more distance home prices remaining constant. Looking only at post-quarry transactions materially overstates the effect size [90,000 - 100,000 = -10,000], with selection bias accounting for a $5,000 overstatement. The DiD estimator, contrariwise, accurately quantifies the effect of the quarry [(90,000 – 95,000) – (100,000 – 100,000) = -5,000]. Absent special circumstances, an analysis restricted to home sales after the quarry becomes operational cannot quantify reliably the effect of the quarry on home prices.

Conducting a DiD study on home values and quarry operations, while desirable if not necessary, is complicated by the fact many quarries near housing density are decades old and new quarries are almost always located in more rural areas where housing density is low. Even in instances where a new quarry site is selected, obtaining adequate price data on home sales near a quarry site is challenging given low housing density. I do not conduct a DiD analysis here; instead, I use the traditional hedonic models. As such, I can make no causal claims. Still, my analysis speaks to the issue using the methods commonly relied upon and addresses the reliability of existing estimates of a quarry's effects and to the use of distance-from-site covariates generally.

B. *Forming Expectations*

Central to the distance-from-site analysis is that the effects of the (dis)amenity are larger the closer is the home to the (dis)amenity, with presumably stronger effects near the quarry that dissipate over distance. It makes sense, therefore, to consider the practical distances over which a rock quarry's operations may be felt. Local resistance to rock quarries often focuses on the use of explosives that create ground vibrations and sound waves ("overpressure"), both of which can cause annoyance if not damage to property if sufficiently intense. (Other concerns include truck traffic and the water table.) Advances in blasting technology and operator care over the last thirty years has greatly diminished these effects, even if such advances have not reduced NIMBY resistance. An analysis on the geographic scope of blasting may shed light on the distances over which a quarry's operations may influence home values.

The geographic scope of the blasting on a quarry's neighbors is measured by ground vibrations and overpressure. Ground vibration is measured in terms of Peak Particle Velocity ("PPV"), which measures the movement of particles at the surface. Such vibrations may be felt at nearby homes and may cause cosmetic damage (e.g., drywall). A typical (empirical) equation for PPV is,

$$PPV = 160\left(\frac{D}{\sqrt{W}}\right)^{-1.6}, \tag{3}$$

where D is the distance from the charge in meters and W is the charge mass (maximum pounds per 8 millisecond delay).[10] While the parameters of the equation may vary by circumstances (e.g., vibration frequency, rock characteristics, the water table), the listed parameters are recommended absent field blast data at a particular site. The Bureau of Mines' standard for drywall damage is 0.75 inches per second.[11] Home damage is a serious concern, but there is also the potential for human annoyance. Studies suggest that the human perception for blast vibration ground motion is about 0.03 inch/s (0.80 mm/s) and that complaints are unusual below 0.08 inches/s (2.03 mm/s).[12] In a study of

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[10] The parameter selection is based on the INTERNATIONAL SOCIETY OF EXPLOSIVES ENGINEERS BLASTER'S HANDBOOK (18th Edition) (2011) at p. 567; *see also*, R. Kumar, D. Choudhury, and K. Bhargava, *Determination of Blast-Induced Ground Vibration Equations for Rocks Using Mechanical and Geological Properties*, 8 JOURNAL OF ROCK MECHANICS AND GEOTECHNICAL ENGINEERING 341-349 (2016) (available at: https://www.sciencedirect.com/science/article/pii/S167477551600024X).

[11] D.E. Suskind, M.S. Stagg, J.W. Kopp, and C.H. Dowding, *Structure Response and Damage Produced by Ground Vibration from Surface Mine Blasting*, United States Bureau of Mines RI-8507 (1980), Appendix B.

[12] *See, e.g.*, Suskind *et al.*, *id.*; T. Ongen, G. Konak, and D. Karakus, *Vibration Discomfort Levels Caused by Blasting According to Gender*, 7 ENVIRONMENTAL AND EARTH SCIENCES RESEARCH JOURNAL 109-115 (2020) (available at: https://www.iieta.org/journals/eesrj/paper/10.18280/eesrj.070303); B.T. Lusk, *An Analysis and Policy Implications of Comfort Levels of Diverse Constituents with Reported Units for Blast Vibrations and Limits: Closing the Communication Gap*, Ph.D. Thesis the Faculty of the Graduate School of the University of Missouri-Rolla in Mining Engineering (2006); Q. Yao, X. Yang, and H. Li, *Comparative Analysis on the Comfort Assessment Methods and Standards of Blasting Vibration*, 17 JOURNAL OF VIBROENGINEERING 1017-1036 (2015); A.K. Raina, M. Baheti, A. Haldar, M. Ramulu, A.K. Chakraborty, P.B. Sahu, C. Bandopadhayay, *Impact of Blast Induced Transitory Vibration and Air-Overpressure/Noise on Human Brain—An Experimental Study*, 14 INTERNATIONAL JOURNAL OF ENVIRONMENTAL HEALTH RESEARCH 143-14 (2004); A.K. Raina, A. Haldar, A.K. Chakraborty, P.B. Choudhury, M. Ramulu, and C. Bandyopadhyay, *Human Response to Blast-Induced Vibration and Air-Overpressure and Indian Sceranio*, 63 BULLETIN OF ENGINEERING GEOLOGY AND THE ENVIRONMENT 209-214 (2004); K. Medearis, *The Development of Rational Damage Criteria for Low-Rise Structures Subjected to Blasting Vibrations*, Final Report for the National Crushed Stone Association (1976).

human perception of blasting at a rock quarry, Ongen, Konak, and Karakus (2020) report perception occurring only at a PPV of 0.03 inches/s (0.80 mm/s), no annoyance at a PPV of 0.033 inches/s (0.84 mm/s), and slight annoyance at a PPV of 0.09 inches/s (2.27 mm/s).[13]

In addition to ground vibration, a blast produces a shock wave. This overpressure—the pressure (above normal atmospheric pressure) caused by a shock wave— may be felt and heard. Overpressure is measured in linear decibels ("dBL").[14] To limit structural damage to property, the U.S. Bureau of Mines sets a threshold of 133 dBL.[15] Again, the threshold for human annoyance may be different than that for structural damage. The U.S. Bureau of Mines sets the annoyance threshold at 120 dBL. In Australia and New Zealand, the Environmental Council sets the annoyance threshold at 115 dBL.[16] In studying sonic booms, NASA found that none of participants viewed as annoying a sonic boom producing a dBL of 121 and only 10% of respondents were annoyed by a boom of 128 dBL.[17] To avoid annoyance, NASA recommended a sonic boom should not exceed 125 dBL. Overpressure may be estimated using the formula,[18]

$$P = 164.8\left(\frac{D}{\sqrt[3]{W}}\right)^{-0.0696}. \tag{4}$$

Using these two formulae, it is possible to establish the distance from a quarry at which nearby residences and businesses may experience either structural damage or annoyance.

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13 Ongen, *et al., id.*

14 dBL is a linear scale and thus different from the logarithmic scale typically used for sound.

15 D. E. Suskind, V.J. Stachura, M.S. Stagg, and J.W. Kopp, *Structure Response and Damage Produced by Airblast from Surface Mining*, United States Bureau of Mines RI-8485 (1979).

16 *Technical Basis for Guidelines to Minimise Annoyance Due to Blasting Overpressure and Ground Vibration*, Australian and New Zealand Environment Council (1990).

17 *Environmental Impact State for the Kennedy Space Center*, National Aeronautics and Space Administration (1979) at pp. 5-40.

18 Parameters are based on conversations with J. Straw, Vice President and Area Manager, GeoSonics, Inc. (https://www.geosonicsvibratech.com), which are based on testing at quarry locations. A typical charge weight for quarry operation is 78.75 kg/ft^3.

Table 1. Miles from Blast for Threshold PPVs and Overpressures

	PPV inch/s			Overpressure dBL		
W	0.75	0.08	0.03	133	125	115
50 kg	0.038	0.155	0.286	...	0.036	0.122
75 kg	0.047	0.190	0.350	...	0.042	0.140
100 kg	0.054	0.219	0.404	...	0.046	0.154
125 kg	0.060	0.245	0.452	0.020	0.050	0.166
150 kg	0.066	0.268	0.495	0.021	0.053	0.177
175 kg	0.071	0.290	0.535	0.023	0.056	0.186
200 kg	0.076	0.310	0.572	0.024	0.059	0.194

Table 1 summarizes the two measures for varying blast charges at different levels of PPV and Overpressure. For PPV, the values are 0.75 for drywall damage and 0.08 for annoyance and 0.03 for human detection. For overpressure, the values are 133 dBL for structural damage, 125 dBL based on NASA's threshold for annoyance, and 115 based on the Environmental Council's threshold for annoyance. The potential for damage is quickly exhausted (less than one-tenth of a mile), mild human annoyance is exhausted at less than one-third mile from the quarry, and human perception at about one-half mile. Overpressure does not appear to be problem for damage or annoyance at distances greater than two-tenths of a mile. The claim that a rock quarry affects homes prices up to ten miles, as reported by Malikov, Sun and Hite (2018) seems incredible, at least with respect to the influence of blasting.

C. *Randomized Inference*

Hedonic regression analysis with distance-from-site variables quantifies the relationship between home prices and distance from some location of interest. Usually, only a few distance-from-site variables are included in hedonic models. Yet, real estate markets are complex and may include a wide array of (dis)amenities. It is possible, if not likely, that in many cities a statistically-significant coefficient on a distance-from-site covariate will be observed from many locations, not simply the location(s) of a researcher's interest. Thus, rejecting the null hypothesis at a particular location using the traditional asymptotic approach (e.g., a t-test) may overstate how unusual is the price-to-distance relationship. Moreover, failing to account for all amenities, disamenities, or market idiosyncrasies (the latter being very difficult), the distance-from-site coefficient at one location may simply reflect the influence of another location.

Randomized Inference can shed some light on this problem. Randomized inference is a statistical technique that randomly assigns a treatment, in this case distance from a randomly-selected location, for the purpose of creating a reference distribution under the null hypothesis of "no effect."[19] How unusual a particular measured distance-from-site effect may be quantified by comparing the estimated coefficient (or its t-statistic) for a particular distance-from-site coefficient to this reference distribution. For instance, say the regression analysis indicates that a 10% increase in distance from a quarry reduces home prices by 5%, and this relationship has a one-tailed p-value of 0.05, allowing for the rejection of the null hypothesis of no effect. If, however, the effect of distance is also 5% for 30% of randomly-selected locations in a city, then the "true" one-tailed p-value would be 0.30 (or 60% in a two-tailed test), which does not permit a rejection of the null hypothesis (*i.e.*, the 5% effect is not very rare).

Property values rise and fall across the area of a city for a host of reasons, so testing for a price difference from a given location is prone to find prices rising or falling. Ford and Seals (2018), using data from Delaware, Ohio, find that a statistically significant coefficient on a distance-from-site variable is almost certain to appear. Selecting one thousand locations at random within a city, Ford and Seals (2018) find the null hypothesis of "no effect of distance" was rejected in 93% of cases at the 10% level. A statistically-significant positive or negative distance-from-site coefficient is almost guaranteed. Of course, the observed rejection rate may vary by city, model specification, variables included, and the estimation method.

I apply Randomized Inference for the cities in our sample. One thousand locations are randomly chosen, and a hedonic regression is used to estimate the distance-from-site coefficient. The distance-to-quarry coefficient can then be compared to this null-reference distribution to determine whether the coefficient indicates an "unusual" relationship by computing the one-tail p-values. Or, the estimated distance-to-quarry coefficient can be evaluated against the 90% or 95% confidence interval of the reference distribution, thus mimicking the traditional approach of using 10% or 5% significance levels.

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19 R.A. Fisher, THE DESIGN OF EXPERIMENTS (1951).

III. Data

Data on home sales are obtained for three cities in Ohio of similar size: the cities of Delaware, Findlay, and Lima.[20] These data are obtained from the relevant county assessor's webpage. Prices from arms-length transactions of single-family homes within five miles of the quarry (as in Hite 2006) and on ten acres or less are included in the samples.[21] Data are obtained for years 2010 through 2021. Some summary statistics are provided in Table 2.[22] Prices and home sizes in Delaware are much higher than in the other cities, and home prices are correlated with median income.

Table 2. Cities in Sample

City	Sample Size	Average Price	Average Sqft	Average Price/Sqft	Population (2019)	Median Income (2019)
Findlay	2,843	154,227	1,600	95.4	41,335	51,002
Delaware	2,439	234,378	1,901	124.9	40,568	69,087
Lima	1,169	86,049	1,351	64.6	37,117	35,779

Delaware and Findlay are an interesting pair. The Delaware quarry is the only one analyzed in Hite (2006) and Malikov, Sun, and Hite (2018), and is also studied in Ford and Seals (2018). Like Delaware, the quarry in Findlay is in the Southwest corner of the city and sits adjacent to the municipal airport (a disamenity frequently studied in the literature). We might expect, therefore, similar results for the distance-from-site covariate in both cities. Note, however, that given these quarries' proximity to these other disamentities (an airport in both and an outdoor

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[20] The locations of the quarries are: Findlay (41.013530, -83.690632); Delaware (40.281032, -83.136392); and Lima (40.751028, -84.083442). Delaware is in Delaware County; Findlay is in Hancock County; and Lima is in Allen County.

[21] A valid sale is an "arm's length, open market transaction as of a specific date whereby there is a willing buyer and seller, each acting in what he/she considers his/her best interest; a reasonable time is allowed for exposure in an open market; payment is made in terms of cash or comparable financial arrangements; and the price represents the normal consideration for the property sold unaffected by special or creative financing or sales concessions granted by anyone associated with the sale (https://wedge1.hcauditor.org/page/Glossary)." Valid sales are typically by Warranty Deed and these samples are restricted to Warranty Deeds or comparable deeds. Deeds such as Quit Claim and Survivorship Deeds are excluded since these deeds, while valid transfers, are not arms-length transactions. A minimum price of $10,000 is imposed and mobile homes are excluded.

[22] Population and income data available at: https://datausa.io. Also see home value statistics from Zillow: Findlay (https://www.zillow.com/findlay-oh/home-values); Delaware (https://www.zillow.com/delaware-oh/home-values); Lima (https://www.zillow.com/lima-oh/home-values).

shooting range in Delaware), it is impossible to say which "disamenity" might be correlated with lower home prices. Normally, we expect airports and shooting ranges to be sited away from higher-value housing, so low prices may simply reflect the choice of site rather than any causal effect on home prices. By most standards, the proximity to another disamenity (or two) would disqualify the city for analysis, but these prior studies on the Delaware quarry have ignored this possibility.

As is standard in hedonic models of home prices, data is collected on a variety of home characteristics. Some county assessors provide more detail than others and the lack of some characteristics may lead to omitted variables bias and fail to address selection bias. Home and area characteristics included, when possible, are square footage, acreage, indicators for the number of bedrooms and (full and half) bathrooms, basement square footage, an indicator for single-story homes, indicators for the number of fireplaces (one, two, or three or more), the age of the home at the sale date, an indicator for homes remodeled in the ten years prior to the sale, the distance (in miles) to the city center and the rock quarry, indicators for the assessor's grade of the quality of construction materials and the condition of the home, indicators for the type of garage (attached, detached, finished, unfinished), and sale-year fixed effects. Demographic data on median income, the share of the White population, and the share of vacant homes is also used.[23]

IV. Regression Model

Home prices are affected by many factors, so I proceed with multivariate regression analysis. As is standard, the regression model takes the general form,

$$P_{it} = \Delta M_i + \beta X_{it} + \alpha Z_{it} + \tau_t + \varepsilon_{it} \ , \qquad (5)$$

where P_i is the sale price of home i at time t, M_i is the home's distance in miles from the rock quarry, X_{it} is a vector of home- and transaction-specific characteristics such as square footage, acres, and distance from the city center, Z_{it} is a vector of area characteristics such as median income, τ_t is a year fixed effect, and ε_{it} is the econometric disturbance term. As home prices vary considerably, the dependent variable is the natural log of price. Standard errors are clustered at the census tract level when feasible. The same model is used for OLS, RREG, and QREG.

Housing markets are an archetype case of spatial correlation—the price of a home depends, in part, on the prices of nearby homes (which also affect the

23 Data available at: https://docs.safegraph.com/docs/open-census-data.

valuation for mortgage approval). In OLS, the assumption is that the disturbances (ε) are independent, so the presence of spatial relationships requires an alternative estimation approach. Failing to account for these spatial relationships represents a form of omitted variables bias (though there are other justifications for spatial regression), which may or may not bias the coefficients.[24] For all cities in this analysis, Moran's test indicates the presence of spatial correlation. So, in addition to the traditional regression analysis, I perform spatial regression including a spatially-lagged dependent variable and spatial errors (a Spatial Durbin Model, or "SDM"). Spatial analysis is based on a row -normalized spatial weight matrix (W) where distance is truncated at three miles. The spatial regression model is,

$$\begin{aligned} P_{it} &= \Delta M_i + \beta X_{it} + \alpha Z_{it} + \tau_t + \theta WP + \mu_{it} \\ \mu_{it} &= \lambda_t W \mu_{it} + \varepsilon_{it} \end{aligned} , \tag{6}$$

where WP is the spatial lag of price and μ_{it} is the spatial error term. With a spatial regression model, the effect of a variable has a direct, indirect, and total effect, though here the sign on the Δ coefficients are of primary interest. For comparison purposes, I also estimate the Spatial Lag Model ("SAR"),

$$P_{it} = \Delta M_i + \beta X_{it} + \alpha Z_{it} + \tau_t + \theta WP + \mu_{it} \ , \tag{7}$$

and the Spatial Error Model ("SEM"),

$$P_{it} = \Delta M_i + \beta X_{it} + \alpha Z_{it} + \tau_t + \lambda W \varepsilon_i + \mu_{it} \ . \tag{8}$$

I also estimate a semiparametric relationship between home prices and quarry-distance,

$$P_{it} = g(M_i) + \beta X_{it} + \alpha Z_{it} + \tau_t + \theta WP + \nu_{it} \ , \tag{9}$$

where $g(M_i)$ permits a non-parametric and flexible relationship between prices and quarry distance. Since g(Mi) is not a parameter, the semi-parametric results are graphed (though confidence intervals may be computed). The other covariates enter parametrically and include the WP regressor (the spatial lag).

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[24] *See, e.g.*, J. LeSage and R.K. Pace, INTRODUCTION TO SPATIAL ECONOMETRICS (2008); M.D. Ward and K.S. Gleditsch, SPATIAL REGRESSION MODELS (2018).

Outliers are a potential problem in home sales data due to the idiosyncrasies of transactions and perhaps coding problems. I have tried to limit such problems by looking only at arms-lengths transactions, but it may be worth evaluating the effect of potential outliers. I mark outliers as those transactions with a Cook's D exceeding $4/N$.[25] RREG and QREG are also employed to limit the effect of outliers.

A. *Findlay, Ohio*

I begin my analysis with Findlay, Ohio, in Hancock County. The county assessor provides extensive data on home characteristics. Like Delaware, the quarry in Findlay is in the Southwest corner of the city and adjacent to the municipal airport. Presumably, if the distance-to-quarry coefficient truly measures the effect of the quarry, then the Δ coefficients should be similar across the two cities. For Findlay, there are 2,843 homes sales meeting the sample restrictions over the 2010-2021 period. There are two distance-from-site covariates (measured in miles) including distance from the city center and distance from the rock quarry. About 5.6% of sales are identified as outliers based on Cook's D; these outliers are marked with a dichotomous indicator.

Four models are estimated including two by OLS (with one including the outlier indicator), one by RREG and another by QREG. Given the large number of covariates, a detailed summary of the estimates is placed in Appendix A (for all models and cities). The estimated coefficients are mostly as expected. Home prices rise in square footage and acreage, fall in age, and rise over time. Prices are higher as the condition of the home is better.

Table 3. Summary of Regression Results, Findlay

Variable	Model A OLS	Model B OLS	Model C RREG	Model D QREG
ln(Quarry Dist.)	-0.030	-0.033	-0.031***	-0.042***
ln(City Center Dist.)	0.011	0.001	0.032***	0.034***
ln(sqft)	0.386***	0.409***	0.484***	0.482***
ln(acres)	0.041	0.086**	0.067***	0.059***
Outlier Indicator	No	Yes	No	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Standard Errors	Clustered	Clustered	...	Robust
Observations	2,843	2,843	2,843	2,843
R^2	0.645	0.723	0.838	...

Stat. Sig. * 10% ** 5% *** 1%

25 R.D. Cook, *Detection of Influential Observations in Linear Regression*, 19 TECHNOMETRICS 15-18 (1977).

Table 3 provides a summary of the results for a few key parameters. As expected, the coefficient on square footage is positive, large, and statistically significant at better than the 1% level; prices rise with larger lots. A positive coefficient is estimated for the distance-from-city center covariate, but the coefficient is statistically different from zero only in RREG and QREG. Turning to the quarry, the quarry-distance variable has negative coefficients across the board suggesting home prices fall as distance-from-the-quarry increases. The quarry-distance coefficients are statistically different from zero only in Models C and D. Home prices, conditioned on many variables, tend to be lower as distance from the quarry increases.

Table 4. Summary of Spatial Regression Results, Findlay

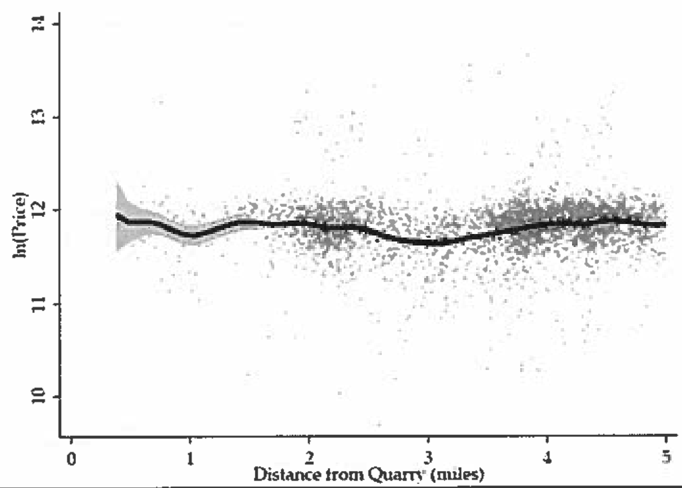
Variable	Model E SDR	Model F SDR	Model G SAR	Model H SEM
ln(Quarry Dist.)	-0.030	-0.036	-0.009	-0.056**
ln(City Center Dist.)	-0.027	-0.042**	-0.001	0.011
ln(sqft)	0.345***	0.366***	0.341***	0.361***
ln(acres)	0.038**	0.085***	0.015	0.107***
Spatial Lag	0.912***	0.907***	0.880***	...
Spatial Error	0.941***	0.953***	...	3.012***
Outlier Indicator	No	Yes	No	No
Year Fixed Effects	Yes	Yes	Yes	Yes
Standard Errors	Robust	Robust	Robust	Robust
Observations	2,843	2,843	2,843	2,843

Stat. Sig. * 10% ** 5% *** 1%

Turning the spatial regression model, Moran's test statistic is 144.3, which is statistically significant at the 1% level. As expected, the data are spatially related. A summary of Spatial Regression results is provided in Table 4; standard errors are robust to heteroskedasticity. Again, the coefficients on the quarry-distance covariate are negative and of similar size to the non-spatial models, but now most of the coefficients are statistically insignificant. Only in the SEM variant is the quarry-distance coefficient statistically different from zero (at the 5% level). In the spatial models, home prices are mostly uncorrelated with distance from the quarry.

I turn now to semiparametric regression where the relationship between prices and quarry distance is non-parametric. For ease of interpretation, the distance from the quarry covariate is measured in miles (not its natural log). Results are illustrated in Figure 1, which includes the confidence interval. Consistent with the regression analysis, prices tend to fall as distance from the quarry increases, though the effect is small. The low housing density near the quarry is apparent in the scatter plot and the large confidence interval around the estimated relationship when near the quarry. While some statistically significant coefficients are found, across all the models there is very little evidence to suggest the quarry is affecting home prices.

Figure 1. Semiparametric Regression, Findlay



Following Ford and Seals (2018), an empirical distribution of a distance-from-site coefficient is crafted using Randomized Inference. One thousand locations are chosen randomly, and then the distance-from-site coefficient is estimated.[26] The quarry-distance covariate is excluded (but replaced by the distance from the random site) but all other variables are included in the regression, so the model most closely resembles Model A from Table 3 with a coefficient on the quarry-distance variable of -0.030 with a p-value of 0.285. The 95% confidence interval on the simulated coefficient distribution is -0.095 to 0.074, a wide range that easily encompasses the coefficient value of -0.030. The -0.03 coefficient cuts off 26.1% of the empirical distribution (a one-tail cutoff, a two-tail p-value of 52.2%). Across all simulations, the null hypothesis for the coefficient on simulated locations is rejected 11.8% of the time at the 10% level for tract-clustered errors, which is close to the alpha level. For robust standard errors, the rejection rate is 33.6%, more than three-times the alpha level. The choice of standard errors is important. These rejection rates are well below that reported in Ford and Seals (2018), suggesting randomized inference may produce different rejections rates in different cities (confirmed *infra*) and for models with different covariates (our model has many more covariates than in Ford and Seals 2018). For instance, removing the census-

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26 The maximum distance from the city center in the sample is six miles, so the random locations are chosen within five miles of the city center.

level variables from the model increases the rejection rates to 16.9% for clustered and 58.2% for robust standard errors.

B. *Delaware, Ohio*

Like Hite (2006), Malikov, Sun, and Hite (2018), and Ford and Seals (2018), data on home prices from the city of Delaware, Ohio, are analyzed. The sample include 2,439 home sales subject to the established criteria. Like Findlay, the quarry is in the Southwest corner of the city and adjacent to the municipal airport, which perhaps should disqualify this city from analysis (there are two treatments). The outdoor shooting range just North of the quarry may represent a third treatment. Nonetheless, the city of Delaware has been studied before, so it worth looking at again.

Table 5. Summary of Regression Results, Delaware

Variable	Model I OLS	Model J OLS	Model K RREG	Model L QREG
ln(Quarry Dist.)	-0.019	-0.022	0.011	0.009
ln(City Center Dist.)	0.066**	0.049	0.063***	0.070***
ln(sqft)	0.557***	0.596***	0.530***	0.535***
ln(acres)	0076***	0.081***	0.090***	0.075***
Outlier Indicator	No	Yes	No	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Standard Errors	Clustered	Clustered	…	Robust
Observations	2,439	2,439	2,439	2,439
R^2	0.705	0.736	0.881	…

Stat. Sig. * 10% ** 5% *** 1%

Table 5 summarizes both the OLS, RREG and QREG results. About 6.4% of observations are marked as outliers. Prices rise in distance from the city center, square footage, and acreage. The Δ coefficients on the quarry-distance covariate are of mixed sign across model types but none are statistically different from zero and all are quite small. Homes prices are uncorrelated with distance from the quarry.

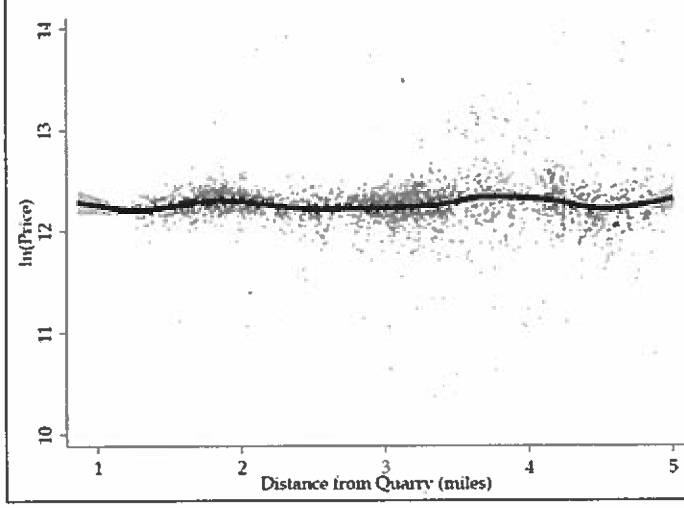
Table 6. Summary of Spatial Regression Results, Delaware

Variable	Model M SDR	Model N SDR	Model O SAR	Model P SEM
ln(Quarry Dist.)	-0.078*	-0.081**	-0.025	-0.034
ln(City Center Dist.)	0.088***	0.038*	0.014	0.072***
ln(sqft)	0.555***	0.582***	0.522***	0.551***
ln(acres)	0.067***	0.073***	0.070***	0.068***
Spatial Lag	-0.271***	-0.133	0.293***	...
Spatial Error	0.903***	0.915***	...	0.582***
Outlier Indicator	No	Yes	No	No
Year Fixed Effects	Yes	Yes	Yes	Yes
Standard Errors	Robust	Robust	Robust	Robust
Observations	2,439	2,439	2,439	2,439

Stat. Sig. * 10% ** 5% *** 1%

Turning to the Spatial Regressions summarized in Table 6, Moran's test statistic is 120.7, which is statistically significant at the 1% level. For the spatial models, the coefficients on the quarry-distance covariate are always negative and statistically different from zero in the two OLS models. If anything, there is a decay in home prices as distance from the quarry increases.

Figure 2. Semiparametric Regression, Delaware



Semiparametric regression, illustrated in Figure 2, offers little more insight than does the regression analysis. Consistent with much of the regression analysis, there is no apparent relationship on prices as distance from the quarry increases, and the thin market near the quarry produces a wide confidence interval.

Randomized Inference is conducted using Model I to determine whether the coefficient is truly unusual. One thousand random locations are selected within seven miles of the city center including locations more than five miles from the quarry. The 95% confidence interval on the empirical coefficient distribution is -0.064 to 0.184, a very wide range that easily encompasses the coefficient value of -0.019 from Model I. The coefficient is not unusual at all, but the t-test indicates the same. Across all simulations, the null hypothesis for the coefficient on simulated locations is rejected 16.1% of the time at the 10% level for tract-clustered errors. For robust standard errors, the rejection rate is 38.5%. As in Ford and Seals (2018), rejection rates for distance coefficients are above the alpha level, though not as high as the earlier study reports.

C. *Lima, Ohio*

If the three quarries analyzed here, the quarry in Lima is closest to the city's center. Of the three cities, Lima has the smallest population and lowest median income, the lowest home prices, and the smallest homes. A sample of 1,169 home sales meeting the sample criteria are included in the analysis. Results are summarized in Table 7 for OLS, RREG, and QREG models. About 4.4% of sales are identified as outliers.

Table 7. Summary of Regression Results, Lima

Variable	Model Q OLS	Model R OLS	Model S RREG	Model T QREG
ln(Quarry Dist.)	0.019	-0.025	-0.110**	-0.018
ln(City Center Dist.)	0.085	0.081	0.074**	0.082*
ln(sqft)	0.490***	0.439***	0.537***	0.469***
ln(acres)	0.136**	0.124**	0.054	0.093**
Outlier Indicator	No	Yes	No	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Standard Errors	Clustered	Clustered	...	Robust
Observations	1,169	1,169	1,169	1,169
R^2	0.342	0.421	0.606	...

Stat. Sig. * 10% ** 5% *** 1%

For Lima, three of the four quarry-distance coefficients are negative but only one is statistically significant (RREG). The one positive coefficient is not statistically different from zero. In Lima, there is little-to-no evidence of the quarry being correlated with lower home prices. Prices rise as distance from the city center increases (with two of four coefficients statistically significant) and as home and lot sizes increase.

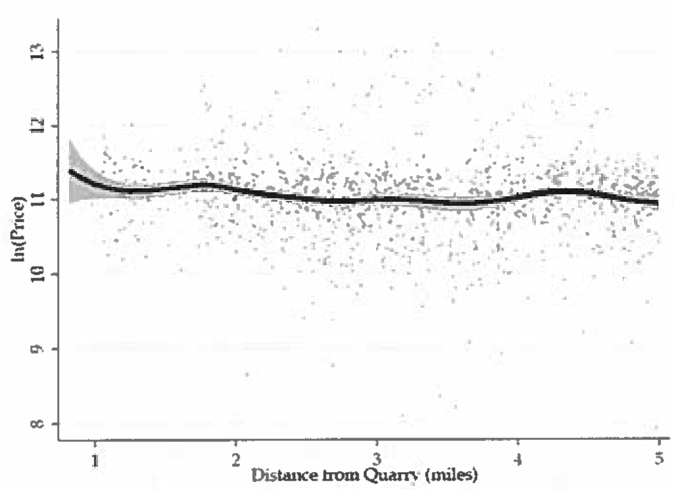
Table 8. Summary of Spatial Regression Results, Lima

Variable	Model U SDR	Model V SDR	Model W SAR	Model X SEM
ln(Quarry Dist.)	-0.065	-0.116	-0.073	-0.011
ln(City Center Dist.)	0.147*	0.158**	0.101**	0.182**
ln(sqft)	0.477***	0.424***	0.475***	0.484***
ln(acres)	0.141***	0.128**	0.138***	0.142***
Spatial Lag	0.520***	0.607***	0.589***	...
Spatial Error	0.234	0.132	...	0.621***
Outlier Indicator	No	Yes	No	No
Year Fixed Effects	Yes	Yes	Yes	Yes
Standard Errors	Robust	Robust	Robust	Robust
Observations	1,169	1,169	1,169	1,169

Stat. Sig. * 10% ** 5% *** 1%

Results from the spatial regression (summarized in Table 8) are comparable. Moran test is 35.5 with probability less than 0.01. For the Spatial Regressions, the quarry-distance covariates are negative but never statistically different from zero at standard levels. Spatial models have very similar coefficients to the non-spatial models with the exception of the two distance variables (as might be expected).

Figure 3. Semiparametric Regression, Lima



Semiparametric regression, illustrated in Figure 3, shows declining prices as distance from the quarry increases, a result consistent with the regression analysis. Confidence intervals are again wide nearer the quarry. There is nothing in the figure, or in the regression results, to suggest that the quarry reduces home prices.

Nor do we expect that the quarry increases home prices but view the negative coefficients as largely an artifact of distance-from-site covariates. Indeed, Randomized Inference on Model Q produces an empirical distribution with a wide range. The 95% confidence interval of the distance coefficients is -1.45 to 1.38, whereas the coefficient on quarry-distance from Model Q is 0.02. The overall rejection for clustered errors is only 74.6% and 81.5% for robust standard errors. Plainly, the generalizability of distance-from-site models is suspect.

V. Analysis of Prior Evidence

A sketch of the data from the Malikov, Sun and Hite (2018) are available online.[27] The data do not permit a reproduction of the paper's results, so only a limited analysis of the data is permitted. For instance, parcels and their locations are not identified, precluding spatial analysis (though OLS and spatial regression produce similar results above). The data covers the entire county (not just Delaware city) and spans years 2009 through the third-quarter of 2011. The data does not include a distance-from-city-center variable or the year of sale indicators, which are omitted variables. There are 5,500 observations in the sample.

Using county level data includes homes quite distant from the quarry (as high 15 miles). In Hite (2006) and here, distance from the quarry was limited to five miles. Presumably, the effects, if any, of the quarry would be limited to a few miles, as suggested by the analysis above. So, I estimate the model when limiting the distance to the quarry to five miles (Model Z). Standard errors are clustered at the block-group level, since a variable in the dataset is block-group level. Results are summarized in Table 9.

Table 9. Summary of Regression Results

Variable	Model Y	Model Z
ln(Quarry Dist.)	0.068***	-0.124***
ln(sqft)	0.693***	0.662***
ln(acres)	0.089***	0.122***
Outlier Indicator	No	No
Year Fixed Effects	No	No
Standard Errors	Clustered	Clustered
Observations	5,500	1,173
R^2	0.658	0.514
Stat. Sig. * 10% ** 5% *** 1%		

27 Data available at: http://qed.econ.queensu.ca/jae/2019-v34.1/malikov-sun-hite.

For the full sample (Model Y) of the Malikov, Sun, and Hite (2018) study, the coefficient on the quarry-distance variable is positive and statistically different from zero. When limiting the date to home sales within five-miles of the quarry (Model Z), the coefficient is negative and statistically different from zero. A review of the data indicates that the average home size rises sharply at about six miles, so it appears there is an anomaly in the real estate market far from the quarry that may be driving the positive coefficient.[28] The results from a distance-from-site hedonic model appear very sensitive to model specification and the data used.

VI. Conclusion

For many Americans, a home is their most valuable asset. Naturally, the threat of a reduction in home values causes concern. Opposition to rock quarries, which are typically located in rural areas with low housing density, is motivated, in large part, by a fear of a loss in home values. Yet, the geographic scope of a quarry's activities is narrow and usually less than one-half mile. Modern quarrying methods have greatly reduced the influence of quarry operations on surrounding areas. Evidence supporting the effect of a quarry on home values is scant, which is something I attempt to rectify here with the most extensive study to date. Evidence from three cities for thousands of home sales reveals no robust effect of quarries on home values.

Like most prior studies, I do not estimate plausibly causal effects. Ideally, Difference-in-Differences methods, or some other causal model, would be used, as in Ford and Seals (2018). An impediment to causal analysis is the difficulty in obtaining sufficient samples of home sales around new quarry sites given their mostly rural locations. Correlation studies are most frequently cited before regulators, so these results are useful in that respect. However, I stress that this study, as well as the commonly cited Hite (2006) study, as well as Malikov, Sun and Hite (2018), need not offer plausibly causal estimates of the effect of quarries on home sales.

I note that efforts to establish the effect of a (dis)amenity on home prices is not merely an academic exercise. Such studies may be relied upon for public policy decisions restricting property rights of landowners and potentially affecting millions of dollars in economic activity. Distance-from-site regressions, as I demonstrate here, are unreliable and often plagued by selection bias. Results are often sensitive to the richness of the model, the estimation method, and the

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[28] The average square footage within five miles of the quarry is 1,901. Between five and ten miles from the quarry, the average home size is 2,887.

geographic scope of the data. A serious effort to assess the robustness of any estimate, using different methods, models, data, and inference procedures (including Randomized Inference), seems prudent if not essential.

APPENDIX:

Variable Definitions	
Variable	**Description**
ld_quarry	Natural log of distance from quarry in miles.
ld_center	Natural log of distance from the city center in miles
lsqft	Natural log of home's square footage.
lacres	Natural log of home's lot size in acres.
basementshare	Percentage of square footage in basement.
onestory	House has one story.
lage	Natural log of age of home.
remodel10	Home remodeled in the 10 years prior to sale.
airc	Home has central air conditioning.
bedroomsN	Home as N bedrooms. "m" indicates "or more."
fullbathN	Home has N full bathrooms. "m" indicates "or more."
halfbathN	Home has N half bathroom. "m" indicates "or more."
fireplaceN	Home has N fireplaces. "m" indicates "or more."
gradeN	Grade of N for housing construction.
condN	Condition N of household.
garage_	AF (attached finished); AU (attached unfinished); DF (detached unfinished); DU (detached unfinished); BA (basement attached); CP (carport); N indicates count of garages.
lmedinc	Natural log of median income in census block group.
white	Share of white population in census block group.
vacant	Share of vacant homes in census block group.
outlier	Outlier indicator.

Table A-3. Findlay, Ohio				
	Model A	Model B	Model C	Model D
ld_quarry	-0.0299	-0.0325	-0.0313***	-0.0417***
ld_center	0.0107	0.00132	0.0318***	0.0335**
lsqft	0.386***	0.409***	0.484***	0.482***
lacres	0.0414	0.0864***	0.0666***	0.0586***
basementsh~e	0.215***	0.220***	0.188***	0.183***
onestory	0.0193	0.00819	-0.0019	0.00453
lage	-0.0477**	-0.0555***	-0.105***	-0.103***
remodel10	0.123**	0.0918	0.0647**	0.0868**
airc	0.174***	0.132***	0.109***	0.126***
bedrooms2	0.0109	-0.0757	0.00393	-0.0112
bedrooms3	0.0503	-0.0464	0.0372	0.0186
bedrooms4	0.0825	-0.0259	0.0308	0.0147
bedrooms5m	-0.0455	-0.0956	-0.0124	-0.0486
fullbath2	0.159***	0.149***	0.115***	0.114***
fullbath3	0.280***	0.298***	0.159***	0.157***
fullbath4m	0.246	0.421**	0.336***	0.395***
halfbath1	0.0553***	0.0535***	0.0478***	0.0388***
halfbath2m	0.246***	0.293***	0.120***	0.111***
fireplace1	0.0812***	0.0655**	0.0409***	0.0540***
fireplace2m	0.108**	0.130*	0.0617***	0.0397
gradeB	-0.416***	-0.328**	-0.252***	-0.243***
gradeC	-0.554***	-0.489***	-0.386***	-0.375***
gradeD	-0.655***	-0.557***	-0.482***	-0.484***
condG	0.584**	-0.0595	-0.0667	0.116
condA	0.578**	-0.1	-0.0905*	0.114
condF	0.352	-0.19	-0.129**	0.0185
garage_AF	0.123***	0.0976***	0.0496***	0.0674***
garage_AU	0.0892**	0.0673***	0.0309***	0.0470***
garage_DF	0.0852	0.105	0.0196	0.0256
garage_DU	0.0646	0.0952*	0.0166	0.00765
garage_BA	0.0882	0.314**	-0.0222	-0.00473
garage_CP	-0.119	0.135	-0.0807	-0.109
lmedinc	0.0984*	0.0971**	0.0837***	0.0675***
white	0.302**	0.323**	0.144***	0.208***
vacant	-0.151	-0.141	-0.0632	-0.0834
outlier		-0.776***		
_cons	7.136***	7.908***	7.737***	7.631***
Year Fixed Effects	Yes	Yes	Yes	Yes
N	2,843	2,843	2,843	2,843
R2	0.645	0.723	0.838	

Sig. Level: * 10% ** 5% *** 1%

Table A-3. Findlay, Ohio

	Model A	Model B	Model C	Model D
ld_quarry	-0.0298	-0.036	-0.00921	-0.0562**
ld_center	-0.0268	-0.0416*	-0.00144	0.011
lsqft	0.345***	0.368***	0.341***	0.361***
lacres	0.0384**	0.0854***	0.0145	0.107***
basementsh~e	0.190***	0.195***	0.200***	0.193***
onestory	0.0216	0.0119	0.0191	0.0111
lage	-0.0189*	-0.0294***	-0.0187*	-0.0265**
remodel10	0.138***	0.108**	0.133***	0.116***
airc	0.156***	0.116***	0.171***	0.101***
bedrooms2	0.00348	-0.0825**	0.0127	-0.0899**
bedrooms3	0.0428	-0.053	0.0526	-0.0602
bedrooms4	0.0679	-0.0399	0.0840*	-0.0506
bedrooms5m	-0.0506	-0.100*	-0.0376	-0.107*
fullbath2	0.134***	0.125***	0.140***	0.118***
fullbath3	0.252***	0.269***	0.254***	0.270***
fullbath4m	0.225***	0.393***	0.246***	0.362***
halfbath1	0.0439***	0.0428***	0.0480***	0.0423***
halfbath2m	0.241***	0.289***	0.239***	0.284***
fireplace1	0.0630***	0.0489***	0.0627***	0.0453***
fireplace2m	0.103***	0.122***	0.107***	0.103***
gradeB	-0.391***	-0.300***	-0.407***	-0.285***
gradeC	-0.505***	-0.437***	-0.527***	-0.422***
gradeD	-0.602***	-0.501***	-0.629***	-0.479***
condG	0.510***	-0.107	0.508***	-0.0987
condA	0.504***	-0.146*	0.491***	-0.123
condF	0.274***	-0.241***	0.260***	-0.209**
garage_AF	0.100***	0.0770***	0.0962***	0.0869***
garage_AU	0.0800***	0.0595***	0.0812***	0.0618***
garage_DF	0.0735	0.0974	0.0796	0.0864
garage_DU	0.0691	0.0976**	0.0716	0.0982***
garage_BA	0.0977	0.317***	0.0871	0.336***
garage_CP	-0.12	0.134*	-0.132	0.137*
lmedinc	0.0343	0.0364	-0.00608	0.111***
white	0.160*	0.176**	0.189**	0.183
vacant	-0.164	-0.153	-0.16	-0.147
outlier		-0.760***		-0.742***
_cons	-2.541**	-1.769*	-1.706***	8.189***
Year Fixed Effects	Yes	Yes	Yes	Yes
lprice	0.912***	0.907***	0.880***	
e.lprice	0.941***	0.953***		3.012***
var(e.lprice)	0.105***	0.0818***	0.107***	0.0814***
N	2,843	2,843	2,843	2,843

Sig. Level: * 10% ** 5% *** 1%

Table A-5. Delaware, Ohio				
	Model I	Model J	Model K	Model L
ld_quarry	-0.0194	-0.0222	0.0106	0.00898
ld_center	0.0661**	0.0489	0.0629***	0.0702***
lsqft	0.557***	0.596***	0.529***	0.535***
lacres	0.0758***	0.0805***	0.0895***	0.0754***
onestory	0.0775**	0.0860**	0.0765***	0.0853***
lage	-0.0358**	-0.0314*	-0.0481***	-0.0422***
remodel10	0.0439***	0.0508***	0.0602***	0.0405***
airc	0.0437	0.0191	-0.0221**	0.016
fullbase	0.149***	0.150***	0.145***	0.151***
partbase	0.118***	0.113***	0.129***	0.136***
bedrooms2	0.0283	-0.260***	0.156**	0.251***
bedrooms3	0.140**	-0.183**	0.192***	0.315***
bedrooms4	0.117**	-0.215**	0.174**	0.300***
bedrooms5m	0.0981*	-0.186**	0.0941	0.234***
fullbath2	0.0361	0.0406	0.0715***	0.0665***
fullbath3	0.144**	0.144**	0.157***	0.153***
fullbath4m	0.190**	0.212**	0.186***	0.165***
halfbath1	0.0297	0.0297	0.00161	0.00818
halfbath2m	0.217***	0.261***	0.133***	0.157***
fireplace1	0.0346*	0.0330*	0.0348***	0.0324***
fireplace2	0.157**	0.166**	0.0703***	0.0731*
fireplace3m	0.396***	0.513***	0.301***	0.341***
lmedinc	0.101*	0.112*	0.0703***	0.0780***
white	0.0902	-0.0233	0.0952*	0.0558
vacant	0.0482	0.0143	-0.185**	-0.309***
garage1	0.0983**	0.0728**	0.0287**	0.0569***
garage2	0.109**	0.0869**	0.0445***	0.0687***
garage3	0.108**	0.123***	0.131***	0.152***
garage4m	0.195***	0.233***	0.146***	0.148***
outlier		-0.378***		
_cons	6.272***	6.356***	6.978***	6.652***
Year Fixed Effects	Yes	Yes	Yes	Yes
N	2,439	2,439	2,439	2,439
R2	0.705	0.736	0.881	
Sig. Level: * 10% ** 5% *** 1%				

Table A-6. Delaware, Ohio

	Model I	Model J	Model K	Model L
ld_quarry	-0.0778*	-0.0810**	-0.0246	-0.0337
ld_center	0.0879***	0.0383*	0.0139	0.0716***
lsqft	0.555***	0.582***	0.522***	0.551***
lacres	0.0669***	0.0730***	0.0696***	0.0677***
onestory	0.0633***	0.0745***	0.0705***	0.0653***
lage	-0.0294***	-0.0246***	-0.0278***	-0.0287***
remodel10	0.0408**	0.0478***	0.0398**	0.0417**
airc	0.0415**	0.0163	0.0493**	0.0423**
fullbase	0.139***	0.133***	0.133***	0.137***
partbase	0.109***	0.0992***	0.106***	0.108***
bedrooms2	0.0514	-0.248**	0.0651	0.0492
bedrooms3	0.176	-0.162	0.185	0.175
bedrooms4	0.156	-0.192	0.161	0.151
bedrooms5m	0.148	-0.15	0.141	0.141
fullbath2	0.0312	0.0416**	0.0387**	0.0340*
fullbath3	0.134***	0.134***	0.133***	0.141***
fullbath4m	0.198***	0.225***	0.190***	0.199***
halfbath1	0.0265	0.0311**	0.0291*	0.0267
halfbath2m	0.202***	0.252***	0.208***	0.203***
fireplace1	0.0291**	0.0286**	0.0328***	0.0308**
fireplace2	0.152***	0.161***	0.160***	0.154***
fireplace3m	0.390***	0.515***	0.398***	0.389***
lmedinc	0.125***	0.120***	0.0589**	0.103***
white	0.0953	0.0323	0.222**	0.105
vacant	0.0685	0.077	0.122	0.0323
garage1	0.0920***	0.0743***	0.104***	0.0928***
garage2	0.0958***	0.0804***	0.112***	0.0974***
garage3	0.126***	0.143***	0.124***	0.128***
garage4m	0.217***	0.247***	0.215***	0.221***
outlier		-0.405***		
_cons	9.345***	7.987***	3.256***	6.264***
Year Fixed Effects	Yes	Yes	Yes	Yes
lprice	-0.271***	-0.133	0.293***	
e.lprice	0.903***	0.915***		0.582***
var(e.lprice)	0.0652***	0.0573***	0.0660***	0.0660***
N	2,439	2,439	2,439	2,439
Sig. Level: * 10% ** 5% *** 1%				

Table A-7. Lima, Ohio

	ModeQ	Model R	Model S	Model T
ld_quarry	0.0185	-0.0254	-0.110**	-0.0178
ld_center	0.0854	0.081	0.0738	0.0822
lsqft	0.490***	0.439***	0.537***	0.469***
lacres	0.136**	0.124**	0.0539	0.0931**
basementshare	0.262**	0.317**	0.292**	0.294
onestory	0.00474	0.0125	0.123***	0.0622
lage	-0.290***	-0.269***	-0.294***	-0.267***
remodel10	0.0369	0.0134	0.126**	0.0521
airc	0.0383	0.0843**	0.185***	0.124***
fullbase	0.00846	-0.0221	-0.0231	-0.0262
bedrooms2	0.0905	0.256	-0.000842	0.0675
bedrooms3	0.128	0.282	-0.0157	0.0549
bedrooms4	-0.0346	0.0509	-0.0484	-0.00189
bedrooms5m	0.388	0.169	0.15	0.268*
fullbath2	0.022	0.0201	0.0736*	0.0611
fullbath3	-0.148	0.268	-0.0671	-0.136
fullbath4m	0.362	0.503	-0.0121	0.44
halfbath1	0.0109	0.0289	0.0863**	0.0623*
halfbath2m	-0.303**	-0.741**	-0.126	-0.286
fireplace1	0.0494	0.0535	0.0937**	0.0438
fireplace2m	0.0548	0.0399	0.104	0.0627
gradeB	-0.0611	0.656	-0.733**	-0.29
gradeC	-0.378	0.438	-1.033***	-0.58
gradeD	-0.655	0.141	-1.343***	-0.898**
garage1	0.0153	0.0115	0.0552	0.0584*
garage2	0.0512	-0.00986	0.0112	0.0174
garage3	0.258*	0.0308	0.106	0.116
lmedinc	0.185*	0.247**	0.365***	0.240***
white	-0.097	-0.0152	0.0495	0.0301
vacant	-0.347	-0.446*	-0.389**	-0.375*
outlier		1.203***		
_cons	7.132***	5.773***	5.339***	6.657***
Year Fixed Effects	Yes	Yes	Yes	Yes
N	1,169	1,169	1,169	1,169
R2	0.333	0.432	0.591	

Sig. Level: * 10% ** 5% *** 1%

Table A-8. Lima, Ohio

	Model U	Model V	Model W	Model X
ld_quarry	-0.0654	-0.116	-0.0728	-0.0109
ld_center	0.147*	0.158**	0.101	0.182**
lsqft	0.477***	0.424***	0.475***	0.484***
lacres	0.141***	0.128***	0.138***	0.142***
basementsharee	0.253	0.315*	0.26	0.245
onestory	-0.00787	-0.00536	0.00659	-0.0185
lage	-0.278***	-0.253***	-0.284***	-0.275***
remodel10	0.0176	-0.00967	0.0164	0.0221
airc	0.0174	0.0587	0.0253	0.017
fullbase	0.0219	-0.00563	0.0194	0.0195
bedrooms2	0.101	0.27	0.0998	0.101
bedrooms3	0.154	0.311*	0.153	0.149
bedrooms4	0.00679	0.0949	0.000812	0.00597
bedrooms5m	0.407	0.194	0.402	0.401
fullbath2	0.00796	0.00387	0.0166	0.00293
fullbath3	-0.159	0.261	-0.145	-0.173
fullbath4m	0.454	0.599	0.463	0.415
halfbath1	0.000382	0.0165	0.00212	0.00102
halfbath2m	-0.309	-0.752***	-0.315	-0.303
fireplace1	0.0408	0.0411	0.0396	0.0488
fireplace2m	0.0432	0.0249	0.0482	0.0452
gradeB	-0.0228	0.693*	-0.0338	-0.027
gradeC	-0.318	0.5	-0.333	-0.33
gradeD	-0.551	0.252	-0.57	-0.569
garage1	0.0114	0.00475	0.0193	0.00653
garage2	0.0508	-0.00981	0.0521	0.0486
garage3	0.241	0.0132	0.251	0.229
lmedinc	0.123*	0.183***	0.119*	0.148**
white	-0.103	-0.00632	-0.129	-0.0813
vacant	-0.242	-0.343	-0.228	-0.287
outlier		1.211***		
_cons	3.384	1.947	2.293*	7.409***
Year Fixed Effects	Yes	Yes	Yes	Yes
lprice	0.401**	0.407**	0.512***	
e.lprice	0.326	0.396*		0.585***
var(e.lpri~)	0.371***	0.324***	0.372***	0.373***
N	1,169	1,169	1,169	1,169
Sig. Level: * 10% ** 5% *** 1%				

Property Value Impacts of the SGI Charmian Quarry and Processing Facility in Hamiltonban Township, Adams County PA

Status: Final Report
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About Econsult Solutions, Inc.

This report was produced by Econsult Solutions, Inc. ("ESI"). ESI is a Philadelphia-based economic consulting firm that provides businesses and public policy makers with economic consulting services in urban economics, real estate economics, transportation, public infrastructure, development, public policy and finance, community and neighborhood development, planning, as well as expert witness services for litigation support. Its principals are nationally recognized experts in urban development, real estate, government and public policy, planning, transportation, non-profit management, business strategy and administration, as well as litigation and commercial damages. Staff members have outstanding professional and academic credentials, including active positions at the university level, wide experience at the highest levels of the public policy process and extensive consulting experience.

1. Introduction

Specialty Granules, LLC (SGI) is a national manufacturer of mineral granules for the residential and commercial roofing markets. The SGI Charmian plant was established in 1923 in Hamiltonban Township, Adams County. The location had also been used for mining prior to SGI's ownership. Most of the granules SGI produces are used to manufacture asphalt-based roofing shingles and it is the only granule production facility serving asphalt shingle manufacturers in the Northeast. The Charmian plant produces enough granules to protect approximately 1 million homes (both new and re-roofing) per year with asphalt shingles. The next-closest granule products plants to the northeast market are in Wisconsin and North Carolina.

SGI has applied for a new surface mining permit to continue its currently permitted and operating metabasalt quarry operations through development of an approximately 112-acre mining area referred to as the Northern Tract adjacent to and northeast of the existing Pitts Quarry area. SGI has asked Econsult Solutions, Inc. to estimate the impact, if any, that the quarry has on nearby property values. This report details our analytical approach and findings of our analysis.

2. Background

A common complaint raised by opponents to the development of new quarries or the expansion of existing quarries is the potential impact on near-by residential property values.

It is well recognized that residential property values may be impacted by a variety of factors, including the characteristics of the property itself (e.g., lot size/land area, building square footage, structure condition), general economic and employment conditions (e.g., recession vs. expansion cycles), and characteristics of the surrounding area. The industry standard method used in real estate economics to evaluate the relative importance of each attribute, or variable, on property values involves hedonic regression models (also referred to as hedonic pricing models). Hedonic modeling starts with actual reported sales prices from arms-length transactions and provides, through a set of multiple statistical analyses, estimates of the average impact that any property attribute (e.g., lot size or square feet of residence) or neighborhood attribute (e.g., location in relation to some other land use) contributes to property values seen in market transactions while controlling for the impact of other variables. As discussed below, ESI prepared a hedonic regression model that used actual sale prices reported in Adams and Franklin Counties to evaluate the potential impact of proximity to or distance from the SGI Charmian Facility.

In addition to modeling, we conducted a literature search of the effect of quarries on property value. There is extensive literature applying hedonic regression models to study the effects of certain perceived environmental disamenities on residential property values. The results of the studies with regards to the impact that proximity to landfills, hazardous waste sites, and power plants have on residential property values are mixed depending on each individual circumstance. In contrast, there is relatively limited literature as to whether a negative property value effect results from quarries. In addition, many of the studies that do exist are non-peer-reviewed.

The most commonly cited study of potentially negative residential property value impacts of quarries was a relatively short paper prepared by Professor Patricia Hite of a quarry near Delaware, Ohio.[1] However, as discussed in more detail below, the results of the Hite paper have recently been called into question.[2]

The Hite paper found a positive relationship between residential property values and distance from the Delaware, Ohio quarry, which would imply a negative impact on residential property values – as one moves closer to the quarry, residential property values decline. Additional studies that purported to find a negative impact of quarries, including Erickcek (2006), the Center for Spatial Economics (2009),

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[1] D. Hite, Summary of Analysis: Impact of an Operational Gravel Pit on House Values: Delaware County, Ohio, Working Paper (2006) (available at: http://www.accpg.org/docs/Gravel%20Pit%20Interim%20Zoning/Storey%20Pit/exhibit_b.pdf)

[2] See: Ford and R. Seals, Quarry Operations and Property Values: Revisiting Old and Investigating New Empirical Evidence , The Phoenix Center (March 2018) (available at: http://www.phoenix-center.org/pcpp/PCPP53Final.pdf) for a criticism of the Hite paper.

and Smith (2014)[3] among others, did not conduct their own econometric modelling, but rather extrapolated the results of Hite's report to different locations. As such, these additional studies do not supply any additional support for the notion that quarries have a negative impact on property values. In contrast, as discussed below, two recent studies did not find a negative impact of quarries.

A recent paper from the Phoenix Center (2018)[4] points out many of the shortcomings of the Hite paper, including the length of the paper (250 words), no details regarding the modeling methodology used and little information on data used in the analysis. The Phoenix Center attempted to replicate the results of the Hite study using data from the same quarry and the same methods as the original paper (e.g., using price rather than the log of price[5] and using non-linear least squares[6]). The Phoenix Center study found that reported transaction prices of residential properties decreased as the distance from the quarry increased. The coefficient for distance from the quarry from the regression model (-.141) was similar in size but had the opposite sign from the results reported in the Hite paper (.125). These coefficients represent the average impact of a given housing or neighborhood attribute on property valuations, while controlling for the impact of other variables. Thus, one model utilizing non-standard methodology purported to find a decrease in property values near the Ohio quarry, while a second model prepared using better documented and more accepted methodology showed an increase in property values near the Ohio Quarry.

In additional to attempting to replicate the results of the Hite study, the Phoenix Center analysis also analyzed the data using a variety of model specifications[7]. The Phoenix Center analysis looked at a variety of alternative specifications to test the impact of distance from the quarry on property values. Across all alternative model specifications, the price-distance relationship was negative, that is, controlling for other variables, properties further away from the quarry tended to have lower prices and that relationship was statistically significant. The negative price-distance relationship is robust to estimation method and distance specifications.

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[3] G.A. Erickcek, An Assessment of the Economic Impact of the Proposed Stoneco Gravel Mine Operation on Richland Township, W.E. Upjohn Institute for Employment Research (August 15, 2006) (available at: http://www.stopthequarry.ca/documents/US%20Study%20on%20the%20impact%20of%20pits% 20quarries%20on%20home%20prices.pdf); The Potential Financial Impacts of the Proposed Rockfort Quarry, Center for Spatial Economics (February 26, 2009) (available at: http://wcwrpc.org/FinancialImpacts_RockfortQuarryCanada.pdf);
G. Smith, Economic Costs and Benefits of the Proposed Austin Quarry in Madera County, Report (October 23, 2014) (available at: http://www.noaustinquarry.org/wp-content/uploads/2016/08/Austin-Quarry-Economics- Report.pdf).

[4] G. Ford and R. Seals, Quarry Operations and Property Values: Revisiting Old and Investigating New Empirical Evidence , The Phoenix Center (March 2018) (available at: http://www.phoenix-center.org/pcpp/PCPP53Final.pdf)

[5] "Log of price" involves translation of a series of prices into their respective natural-log value, which makes it easier to evaluate the average percentage change.

[6] The functional form of the model chosen by Hite is highly irregular in hedonic house price models. The model is non-linear which required the use the non-linear least squares estimation technique to estimate the model, rather the ordinary least squares estimation technique which is standard practice in the hedonic house price literature. The Phoenix Center paper was unable to find an instance in the literature where the specification used by Professor Hite is used and in addition, they were able to find a number of other studies by Professor Hite where ordinary least squares techniques and the more common functional forms were used rather than the non-linear least squares technique.

[7] A "model specification" is part of the process of building a statistical model: specification consists of selecting an appropriate functional form for the model and choosing which variables to include.

The Phoenix Center study also undertook a similar analysis for properties surrounding the Rogers Group Quarry near Murfreesboro, Tennessee. Across all model specifications the price-distance relationship was negative, controlling for other variables, properties a further distance from the quarry tended to have lower prices and statistically significant.

In addition, Grant (2017)[8] analyzed the impacts of quarries on property values in Wellington County, Ontario. The analysis found a small positive impact associated with being close to a quarry, meaning prices were slightly higher near the quarry .

[8] A. Grant, Estimating the Marginal Effect of Pits and Quarries on Rural Residential Property values in Wellington County, Ontario: A Hedonic Approach. (June 2017). (available at: https://atrium.lib.uoguelph.ca/xmlui/bitstream/handle/10214/10903/Grant_Alison_201706_MSc.pdf?sequence=3&isAllowed=y)

3. Property Value Impact of SGI's Quarry in Hamiltonban, Adams County PA

To determine the residential property value impact of SGI's Quarry in Hamiltonban, ESI undertook a rigorous statistical analysis of 561 arms-length residential property transactions in Adams and Franklin Counties located within three miles of the quarry over the 2000 to 2019 period.[9] Data on reported property transactions was obtained from the Adams County Tax Services Department and the Franklin County Geographic Information Services Department.[10] This data set is large enough to allow for statistically significant findings.

3.1. Analytical Approach

Hedonic regression models are an industry-standard technique used to statistically estimate the effects of property characteristics on residential property values. Hedonic modeling can provide estimates of the average impact that any housing or neighborhood attribute contributes to property valuations while controlling for the impact of other variables. Hedonic modeling offers valuable information about the relative contribution of property characteristics, such as proximity to the SGI quarry, to the value of real property controlling for the other variables that impact prices.

The hedonic regression model used is as follows:

$$House\ Value_i = f(S, N, T, Quarry)$$

Where:

S is the vector of structural characteristics of the house, including total square feet of the house, and lot size.

N is a vector of neighborhood socioeconomic characteristics measured at the Census Tract level. These include household income and percentage of houses that are owner occupied and other demographic variables.

***T** is a vector of indicator variables for year of sale to control for overall market conditions in each year.*

Quarry is distance of the quarry to each of the individual houses

[9] We also did the analysis using data from all 35,310 arms-length transactions in Adams and Franklin Counties. We found the results to be similar to the model results using data from within three miles of the quarry.

[10] The property transaction data and property characteristics data was purchased from the appropriate departments in each county in May 2019.

This hedonic model allowed us to isolate the impact of being close to the quarry on the value of residential properties located near the quarry, while controlling for the impact of other variables.

The regression model was estimated using data from 561 arms-length transactions of single-family homes in Adams and Franklin counties that are located within 3-miles of the SGI facility. The property transaction data was carefully screened and cleaned to remove non-arms-length sales such as transactions between family members. In addition, transactions with missing or unusual characteristics were also excluded. Specifically, we excluded transactions that involved structures that were less than 500 or more than 5,000 square feet in size, had sales prices that were less than $10,000 or greater than $5,000,000, or that were missing the sale date, sale price, square footage, or acreage data.

The transactions span the 2000 to 2019 period which covers the period before and after the housing crash in 2007. The impact of the housing crash and other market-wide temporal influences on house prices was accounted for by including a series of time variables that are equal to 1 if a transaction occurred in a given year, and 0 otherwise. This allowed us to control for the impact of factors, such as the housing market crash, that would impact all residential properties that transact in a given year.

Each transaction was geo-coded (assigned a unique latitude and longitude) based upon its address and assigned a spatial location. The data was read into ArcView GIS along with a shapefile of the location of the quarry. For each transaction, the distance to the SGI quarry was calculated using Geographic Information System (GIS) tools. Given the size of the quarry we calculated the distance of each residential parcel to three different locations on the quarry site. The locations include:

1. crusher and processing facility,
2. the area where current quarrying is occurring, and
3. the proposed expansion site.

The sites are illustrated in Figure 1.

Figure 1: Quarry Locations

The regression model used the natural log of residential property price as the dependent variable, which is the most commonly used specification in the hedonic house price literature. By using the natural log of price, rather than price itself, as the dependent variable, the coefficients have the interpretation of being the percent change, rather than dollar change, in the price of the residential property as a result of a change in the independent variables. For example, if the size of th lot were to increase by one unit (acre), the residential property value would increase by X.X percent. In addition, using the natural log of house prices assumes a nonlinear relationship between the price of the residential property and their inherent attributes (e.g. square footage or lot size). The implicit price is not a constant, but a function of the quantity of the attribute being bought – the value of additional square foot of house size or acre of lot size depends on the how big the house or the lot is.

3.2. Findings

Figure 2 summarizes the results of the hedonic regression model. The regression model was estimated using four different distance measures – once for each of the distance variables described above as well as for the minimum value of the three distance variables.

Figure 2: Regression Results

	Model 1		Model 2		Model 3		Model 4	
Log of distance to processing facility	-0.049							
Log of distance to the current quarry			-0.056					
Log of distance to the proposed quarry					-0.086			
Log of the minimum distance to the quarry							-0.033	
Living area	0.001	***	0.001	***	0.001	***	0.001	***
Living area squared	0.000	***	0.000	***	0.000	***	0.000	***
Lot size	0.032	***	0.032	***	0.032	***	0.032	***
Percent of owner-occupied homes (Census Tract)	-0.140		-0.045		-0.096		-0.169	
Population density (Census Tract)	0.001		0.001		0.001		0.001	
Median hold income (000's $)	0.018		0.018	*	0.020	*	0.020	
Adams County	0.050		0.035		-0.008		0.048	
Sale year 2001	0.076		0.072		0.078		0.077	
Sale year 2002	0.144		0.142		0.146		0.147	
Sale year 2003	0.406	***	0.405	***	0.408	***	0.408	***
Sale year 2004	0.557	***	0.554	***	0.552	***	0.560	***
Sale year 2005	0.719	***	0.716	***	0.720	***	0.722	***
Sale year 2006	0.697	***	0.695	***	0.700	***	0.699	***
Sale year 2007	1.148	***	1.149	***	1.142	***	1.146	***
Sale year 2008	0.864	***	0.861	***	0.865	***	0.866	***
Sale year 2009	0.769	***	0.771	***	0.764	***	0.772	***
Sale year 2010	0.954	***	0.954	***	0.957	***	0.954	***
Sale year 2011	0.748	***	0.746	***	0.747	***	0.750	***
Sale year 2012	0.823	***	0.821	***	0.820	***	0.826	***
Sale year 2013	0.792	***	0.787	***	0.791	***	0.796	***
Sale year 2014	0.565	***	0.563	***	0.568	***	0.568	***
Sale year 2015	0.747	***	0.746	***	0.744	***	0.748	***
Sale year 2016	0.790	***	0.785	***	0.789	***	0.792	***
Sale year 2017	0.805	***	0.801	***	0.806	***	0.807	***
Sale year 2018	0.941	***	0.938	***	0.937	***	0.944	***
Sale year 2019	0.977	***	0.976	***	0.979	***	0.978	***
Intercept	8.971	***	8.923	***	8.885	***	9.002	***
Observations	561		561		561		561	
R-squared	0.2532		0.2535		0.2539		0.2530	

**** statistically significant at the 1% level, ** at the 5% level, and * at the 10% level*

In a hedonic regression model, the average impact of a given housing or neighborhood attribute on property valuations, while controlling for the impact of other variables, is given by the coefficients from the regression model. The coefficients from our analysis are presented in Figure 2.

The effect of the quarry on house values is obtained from the estimated coefficients on the quarry variables in the regressions. The coefficients give the % change in residential property values, given a unit change in the distance from the quarry. For example, the estimated coefficients from the model variables indicates what the average % change in residential property prices for each additional mile further from the quarry, controlling for other housing characteristics.

The model results indicate that the coefficients on the distance variables range from -0.033 to -0.086. Translated, for each mile that a house is located further away from the quarry, residential property prices **decrease** by between 3.3 percent and 8.6 percent.

For example, the average sales price for houses located nearby the quarry is $156,000 and the median value is $164,000. If those houses were moved so that they were one mile away from the quarry, their value would decrease between 3.3 percent and 8.6 percent. For the average house, this would amount to a reduction in value of between $5,070 and $13,400 and for the median house a reduction of between $5,330 and $14,100.

The t-values of each variable indicate the strength of the statistical association between residential property values and the independent variables, in this case distance to the quarry. A value greater than 1.96 or less than -1.96 indicate a "statistically significant" (i.e. strong and non-random) relationship. The t-values for the quarry distance variables range from -0.40 to -0.89, which indicates that the relationship between residential property values and distance to the quarry is weak and that the quarry does not have a statistically significant impact on nearby property values.

The r-squared of the regression models in Figure 2 is similar in size to the r-squared values from the Hite study and the analysis undertaken by the Phoenix Center. This means that models presented in Figure 2 have a similar "fit" as the models estimated by Hite and the Phoenix Center.

In addition to using data from within three miles of the quarry, we also estimated the models using data for all transactions in Adams and Franklin Counties over the 2000 to 2019 time period.[11] Across all distance specifications the price distance relationship was negative and statistically significant. To examine the potential for the distance relationship to be non-linear in nature, we classified properties into one of the following distance bands, less than one mile, one to two miles, two to three miles, and greater than three miles. Across the less than one, one to two miles, and two to three-mile distance bands, the regression coefficients from the models were not statistically significant.

Based on our analysis, we find that the SGI quarry has not had a negative impact on nearby property values based upon actual reported sale price data and analysis that controls for other property

[11] The regression models using data from the entire county used 35,310 observations.

variables. The results are robust to the data used (properties only within three miles of quarry vs from both counties) and distance specification (linear distance vs. distance bands). Given the fact that the intensity of the operations of the quarry is not going to change, the continued operations of the quarry should not have a negative impact on near-by property values.

BLASTING IN OHIO'S QUARRIES AND SURFACE COAL MINES

Revised December 2018

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On a typical workday in Ohio, over a quarter million pounds of explosives are safely detonated in quarries and surface coal mines.

The word "blasting" often conjures up visions of destruction - mushroom clouds, gigantic craters, high-rise buildings collapsing, bridges falling and cars exploding. However, on a typical workday in Ohio, over a quarter million pounds of explosives are safely detonated in quarries and surface coal mines. The Ohio Department of Natural Resources, Division of Mineral Resources Management is the agency responsible for regulating the environmental effects of mining and blasting. This article will address some of the commonly asked questions and misconceptions regarding blasting.

Why is blasting necessary?

Blasting is the most cost effective way to fracture rock so that it can be excavated by earth-moving equipment. This, in turn, reduces the costs of building materials, such as gravel and concrete, energy produced from coal, and many other products derived from estone, coal and other minerals.

Is dynamite still used?

People living near quarries and coal mines often express concern about "the dynamiting going on over there." In fact, dynamite, a nitroglycerin-based explosive, is rarely used today in Ohio's quarries and surface coal mines. The most widely used explosives are ANFO, emulsions, and ANFO/emulsion blends. ANFO is a mixture of ammonium nitrate (AN) and fuel oil (FO). The AN is in the form of a prill (small, bead-like pellet), which absorbs the fuel oil. An emulsion is essentially a waterproof version of ANFO. Both are far less hazardous than dynamite and break more rock per unit of cost.

How far do fractures extend from a blasthole?

Blastholes are normally drilled vertically and arranged in a grid pattern. Typical blasthole diameters range from two to seven inches in quarries and five to nine inches in surface coal mines, with typical depths from 10 to 70 feet. Upon detonation, fracturing of rock generally occurs no greater than 20 to 30 feet from any blasthole, depending largely upon hole diameter and the densities of the rock and explosive. A common misconception is that fracturing extends far beyond the mine property - even miles from the blast site. If this were true, the blastholes could be placed much farther apart than the commonly used spacing of six to 18 feet in quarries and 12 to 25 feet in surface coal mines, and blasting would be much more economical since less drilling and explosives would be necessary.

Another common misconception associated with blasting is that significant fracturing occurs far below the bottom of a blasthole. In fact, most of the gas pressure forces created by the detonation of the explosive radiate outward along the length of the cylindrical blasthole. Depending upon the hole diameter, type of explosive and nature of the rock, gas-pressure forces below the bottom of the blasthole are comparatively minimal and fracturing of rock is generally limited to several feet. In most surface coal mines, a buffer of only three to five feet between the bottom of the blastholes and the top of the coal seam adequately protects the coal (which is brittle to begin with) from being fractured and contaminated by the rock material immediately above it. Failure to protect the coal from fracturing can increase the cost of cleaning the coal and significantly reduce the mine operator's profits.

What causes ground vibration and how is it measured?

When a blast detonates, some of the explosive energy not utilized in breaking rock travels through the ground in all directions as wave motion, similar to the ripple created in a pond when a stone hits the water. This wave motion, or ground vibration, travels mainly along the surface at speeds of 5,000 to 20,000 feet per second, depending upon the density and thickness of the rock and soil. Its energy decreases rapidly with distance from the blast and normally decays to levels undetectable by humans beyond several thousand feet. Because explosives are expensive and vibration represents wasted energy, it is to the blaster's advantage to utilize as much of the energy as possible in fragmentation, thereby minimizing vibration.

Blasting seismographs are used to measure ground vibration in terms of particle velocity, which is the speed at which each particle in the ground oscillates as the wave motion passes. This would be similar to measuring the speed of a fishing bobber in a pond as it moves up and down when a ripple passes under it. Particle velocity is measured in inches per second, but beyond several hundred feet from a blast the actual movement of the ground, or displacement, is generally only a tiny fraction of an inch, about the thickness of a piece of paper, or less. So it is important to understand that a particle velocity reading expressed in inches per second refers to the speed at which the ground moved, and not the amount of movement.

How is ground vibration controlled?

Blasters control ground vibration mainly by limiting the weight of explosives detonated within any instant of time. They do this by using millisecond delay detonators (blasting caps) to separate the firing time of each hole from adjacent holes. In a typical 50-hole blast, the result would be 50 smaller and separate explosions instead of one large blast. A common misconception is that the number of blastholes determines the resulting intensity of vibration. However, given the same charge-weight per delay and the same distance to a house, a 100-hole blast can be designed to produce no more vibration than a 10-hole blast.

What is airblast and how is it measured?

When a blast detonates, some energy is lost to the atmosphere in the form of noise and/or concussion. This phenomenon is caused by the venting of gases through cracks and fissures and the upward and outward movement of the rock on top and in front of the blastholes. The resulting increase in the air pressure is commonly called airblast. Like ground vibration, airblast levels decrease rapidly with distance from the blast. However, airblast travels only at the speed of sound, around 1,100 feet per second, depending upon air temperature, and can be greatly influenced by wind direction and speed, and by an occasional atmospheric temperature inversion which can bend it back toward the earth and focus its energy several miles away.

Airblast is usually measured with a special microphone connected to the same type of seismograph that measures ground vibration. The most common units of airblast measurement are pounds per square inch (psi) and the decibel (dB), which is based on a logarithmic sound-pressure scale related to human hearing. The threshold of hearing begins at zero decibels. An increase of six decibels represents a doubling of air pressure. As an example, an airblast measured at 126 dB would have twice the air pressure of an airblast at 120 dB. (See Figure 1 - Airblast Effects.)

How is airblast controlled?

Airblast is controlled mainly by the use of stemming material (drill cuttings or crushed stones that are shoveled back into the blasthole after the explosives have been loaded to a predetermined depth from the surface), and by not loading explosives into portions of holes with cracks, voids or mud seams. These techniques minimize the escape of gases and confine the explosive energy where it is needed to efficiently break rock.

What are the ground vibration and airblast limits?

Seismographic monitoring is required if the explosive charge-weight per delay will exceed the maximum allowed by a specific formula, based on the distance to the nearest dwelling. When a seismograph is used to record a blast at any dwelling, the airblast must not exceed 133 dB (in Figure 1), and the ground vibration must not exceed the frequency-dependent limits, or "Z-curve" (in Figure 2). The Z-curve is a sliding scale that allows higher particle velocities at higher frequencies, up to a maximum of 2.0 in/sec.

Ohio's limits are based on extensive research by the former United States Bureau of Mines (USBM), which evaluated the effects of blast-induced ground vibration and airblast on residential structures. The limits were designed to prevent the most cosmetic type of damage–hairline cracks in drywall and older plaster-on-lath–even if the blasting is repeated on a daily basis for many years. The limits provide even greater protection to foundation walls, concrete slabs, wells and buried utilities.

Who may conduct blasting?

Only a certified blaster may conduct blasting in Ohio's quarries and surface coal mines. To become certified, a blaster must obtain 2 years of blasting crew experience including on-the-job training, attend 40 hours of classroom training, and pass an exam covering blast design, safety, vibration control and monitoring, and state and federal blasting regulations. Once certified, a blaster must attend 24 hours of continuing education during every 3-year renewal period.

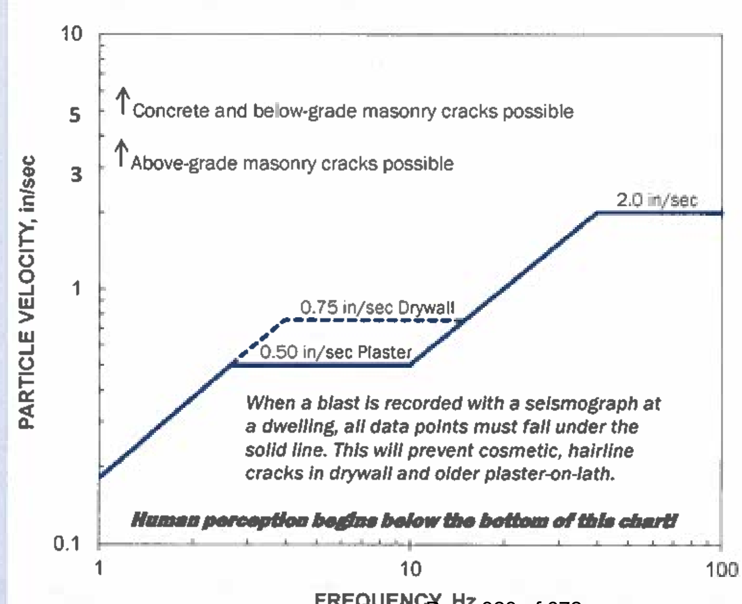
If the dishes rattle, is my home being damaged?

Even when blast vibrations are far below the legal limit, highly perceptible vibration can be experienced inside the home; windows and dishes might rattle, knickknacks and pictures might move or fall if not securely fastened, and hanging lamps might sway. These effects can be generated by ground vibration or airblast acting separately or together, and can last from one to three seconds or more, depending upon the distance from the blast, geologic influences and other factors. Despite these sometimes startling effects, there is no direct correlation between how a blast "feels" or sounds and its potential for causing structural damage to a home. In fact, cultural stresses (e.g., doors slamming, kids jumping, people pounding nails) and natural stresses (e.g., sunlight, wind, rain, temperature and humidity fluctuations and changes in soil moisture) can place greater stresses on a home than legal blast vibrations.

Figure 1. Airblast Effects

dB	psi	
180	3.0	Conventional structures severely damaged
		Plaster cracks at 176 dB
170	1.0	Most windows break at 171 dB
160	0.3	
150	0.1	Some windows may break at 151 dB
140	0.03	Exceeded by strong wind gusts in Ohio
130	0.009	ODNR/DMRM limit is 133 dB
120	0.003	Startling to people inside homes
100	$3x10^{-4}$	
80	$3x10^{-5}$	
60	$3x10^{-6}$	Conversational speech

Figure 2. Ground Vibration Limits for Ohio Coal and Industrial Minerals Permits



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Article

Geochemical Characterization of Trace MVT Mineralization in Paleozoic Sedimentary Rocks of Northeastern Wisconsin, USA

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Abstract: Disseminated Mississippi Valley-type (MVT) mineralization occurs throughout northeastern Wisconsin, USA, and is recognized as the source of regionally extensive natural groundwater contamination in the form of dissolved arsenic, nickel, and other related metals. Although considerable attention has been given to arsenic contamination of groundwater in the region, limited attention has been focused on characterizing the bedrock sources of these and other metals. A better understanding of the potential sources of groundwater contamination is needed, especially in areas where groundwater is the dominant source of drinking water. This article describes the regional, stratigraphic, and petrographic distribution of MVT mineralization in Paleozoic rocks of northeastern Wisconsin, with a focus on sulfide minerals. Whole-rock geochemical analysis performed on 310 samples of dolomite, sandstone, and shale show detectable levels of arsenic, nickel, cobalt, copper, lead, zinc, and other metals related to various sulfide mineral phases identified using scanning electron microscopy. MVT minerals include pyrite, marcasite, sphalerite, galena, chalcopyrite, fluorite, celestine, barite, and others. We describe the first nickel- and cobalt-bearing sulfide mineral phases known from Paleozoic strata in the region. Arsenic, nickel, and cobalt are sometimes present as isomorphous substitutions in pyrite and marcasite, but discrete mineral phases containing nickel and cobalt elements are also observed, including bravoite and vaesite. Locally abundant stratigraphic zones of sulfide minerals occur across the region, especially in the highly enriched Sulfide Cement Horizon at the top of the Ordovician St. Peter Sandstone. Abundant quantities of sulfides also appear near the contact between the Silurian Mayville Formation and the underlying Maquoketa and Neda formations in certain areas along and east of the Niagara escarpment. This article illustrates how a detailed geochemical and mineralogical investigation can yield a better understanding of groundwater quality problems.

Keywords: Wisconsin; Paleozoic; vaesite; bravoite; sulfide; nickel; cobalt; arsenic

1. Introduction

Mississippi Valley-Type (MVT) lead-zinc ore deposits are carbonate-hosted accumulations of sulfide and associate minerals that are dominated by sphalerite, galena, iron sulfides, and other associated minerals. They typically occur in Phanerozoic dolostone (with some in limestone or sandstone) located on the flanks of sedimentary basins, orogenic forelands, or foreland thrust belts [1–3]. MVT ore deposits are located throughout the world, but were named for deposits that occur along the

Mississippi River Valley in North America. Large, well-studied deposits occur in the United States and Canada [1–5], Europe (especially Ireland and Poland) [3,5–7], and elsewhere. Modern interpretations of the origin of MVT ore deposits generally include large-scale brine migration driven within platform carbonates by large-scale tectonic events [3].

The upper Mississippi Valley region of southwest Wisconsin, eastern Iowa, and northwestern Illinois, USA (Figure 1) contains a historic Mississippi Valley-type (MVT) ore district [8]. Although the lead mineralization in the region was discovered during the late 17th century, these deposits did not receive major attention until the early 19th century. It was in this region that the first large "metals rush" in the United States took place in what is known as the Upper Mississippi Valley Zinc-Lead Ore District. Galena, and later sphalerite, were the two principal minerals of interest in small ore bodies located near folds and faults hosted by Paleozoic carbonate rocks [8]. The likelihood of a hydrothermal origin for these deposits was recognized by the mid-20th century by Heyl *et al.* and McLimans [8,9]. Research by Sverjensky, Garven, Bethke, Rowan and others during the 1980s and 1990s led to the general acceptance that these deposits were the result of northward basin-scale brine migration from the Illinois basin [1,2,10,11]. The economic viability of these deposits faded during the later 20th century, and the last mine in the district closed in 1979.

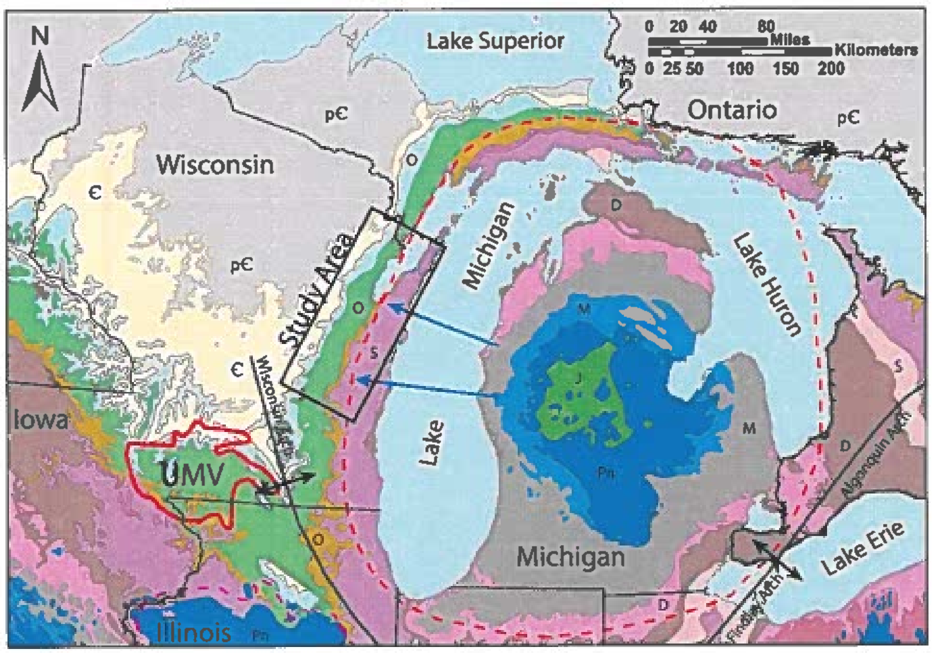

Figure 1. Bedrock geologic map of the western Great Lakes region of North America showing the locations of major geologic structures near the states of Wisconsin and Michigan. Geologic rock systems are as follows: pЄ = Precambrian, Є = Cambrian, O = Ordovician, S = Silurian, D = Devonian, M = Mississippian, Pn = Pennsylvanian, J = Jurassic. Red dashed lines denote the Illinois and Michigan structural basins. Black lines with double arrows indicate the positions of structural arches. "UMV" indicates the location of the Upper Mississippi Valley Lead-Zinc Ore District as defined by Heyl *et al.* [8]. Blue arrows indicate inferred flow paths of hydrothermal fluids originating in the Michigan basin. Base map modified after [12,13].

Similar MVT mineralization is also present throughout eastern Wisconsin, which was initially thought to represent outlying deposits of the main ore district [14,15]. Limited exploration for MVT mineralization took place in southeastern Wisconsin during the early 1980s through subsurface coring program in eight southeastern Wisconsin counties by Mobil Mineral Resources, Inc. [16]. However, extensive Pleistocene glacial overburden, coupled with a limited understanding of the distribution and character of geologic structures and the absence of economic petroleum deposits, has hampered efforts to fully characterize the region's subsurface geology. This article focuses on a broad region of Paleozoic-hosted MVT mineralization in northeastern Wisconsin located about 250 km (150 miles) northeast of the Upper Mississippi Valley Zinc-Lead ore district and the Illinois basin (Figure 1).

During the 1970s and 1980s, Paleozoic rocks in Wisconsin received further attention from carbonate sedimentologists who focused on Ordovician rocks as a potential ancient analog for the formation of low-temperature dolomite. This model, known either as the "Dorag" model or the mixing-zone model, involved interaction between fresh water and seawater along a coastal mixing zone in southern Wisconsin [17]. Despite an early call for a hydrothermal origin for the dolomite [18], the low-temperature interpretation continued to be favored by most sedimentologists who worked in the region. In fact, the Dorag model became a paradigm for dolomitization models elsewhere, and remained so throughout much of the 1980s and 1990s (e.g., [19–21]).

The geochemical interpretations for the origin of the dolomite and MVT mineralization in eastern Wisconsin were in stark contrast with one another until conclusive data were presented that supported a hydrothermal origin for both [22,23]. This hydrothermal system was interpreted to be a distinct, unrelated flow system from the one that formed the Upper Mississippi Valley ore district. Subeconomic MVT mineralization extends throughout the entire region of eastern Wisconsin into the Upper Peninsula of Michigan. Luczaj [22,23] used petrographic, isotopic, and fluid-inclusion data to propose a common hydrothermal origin for the MVT mineralization, pervasive epigenetic dolomitization, and K-silicate mineralization in the region. His research mainly focused on an evaluation of the mixing-zone *versus* hydrothermal epigenetic dolomitization models for the formation of pervasively dolomitized strata in the region.

1.1. Geologic Setting of the Study Area

The study area in eastern Wisconsin region lies on the western edge of the ancestral Michigan basin and is located to the east of the Wisconsin arch and to the south of the Superior Craton (Figure 1). As much as 500 to 800 m of Lower and Middle Paleozoic quartz sandstone, dolostone, and shale are present (Figures 2 and 3), and the strata thicken and dip gently toward the Michigan basin (Figure 4) where they are overlain by younger Paleozoic and Mesozoic sedimentary rocks.

Numerous gentle folds, faults, and fractures are observed in Paleozoic rocks in the region, despite a geographic position near the middle of the North American craton away from orogenic belts. Dip-slip and strike-slip faults are present within the study area, based upon water well records and quarry exposures, but few are directly observed because they are concealed by extensive Pleistocene glacial drift [23–25]. The carbonate rocks throughout the study area are completely dolomitized over all stratigraphic intervals. Faults and joints were certainly preferred conduits for mineralizing groundwater because sulfide minerals are preferentially precipitated along these surfaces throughout most of the study area. Stratigraphic reconstructions and organic maturity data suggest that the thickness of eroded sediments in eastern Wisconsin was probably much less than 1–1.5 km at any time during the burial history of these rocks [23].

1.2. Origin of the MVT Mineralization in Eastern Wisconsin

Luczaj [22,23] proposed the existence of a regional hydrothermal system in eastern Wisconsin that was active during the Late Devonian–Mississippian periods. The precise timing is not well defined, but could be earlier than the Late Paleozoic system responsible for mineralization of the Upper Mississippi Valley Zinc-Lead ore district [26]. The rocks in eastern Wisconsin preserve a pervasive hydrothermal signature and contain abundant epigenetic dolomite, subeconomic MVT mineralization, and minor authigenic K-silicate mineralization. Fluid-inclusion, stable isotopic, and petrographic evidence suggests that the MVT mineralization, K-silicate mineralization, and dolomitization in eastern Wisconsin are genetically related to the same regional hydrothermal system that operated at temperatures between about 60 and 120 °C, with sulfide mineralization likely occurring between about 80 and 110 °C [22,23]. This ancient system was responsible for precipitation and replacement of a suite of MVT sulfide minerals that includes pyrite and marcasite (FeS_2), galena (PbS), sphalerite (ZnS), chalcopyrite ($CuFeS_2$), fluorite (CaF_2), and other related minerals. It is this hydrothermal system that also precipitated the arsenic, nickel, and cobalt-bearing sulfide minerals in the region, including unusually enriched sulfide cement horizons (SCH) in sandstones such as the St. Peter Sandstone of the Middle Ordovician Ancell Group (Figure 2).

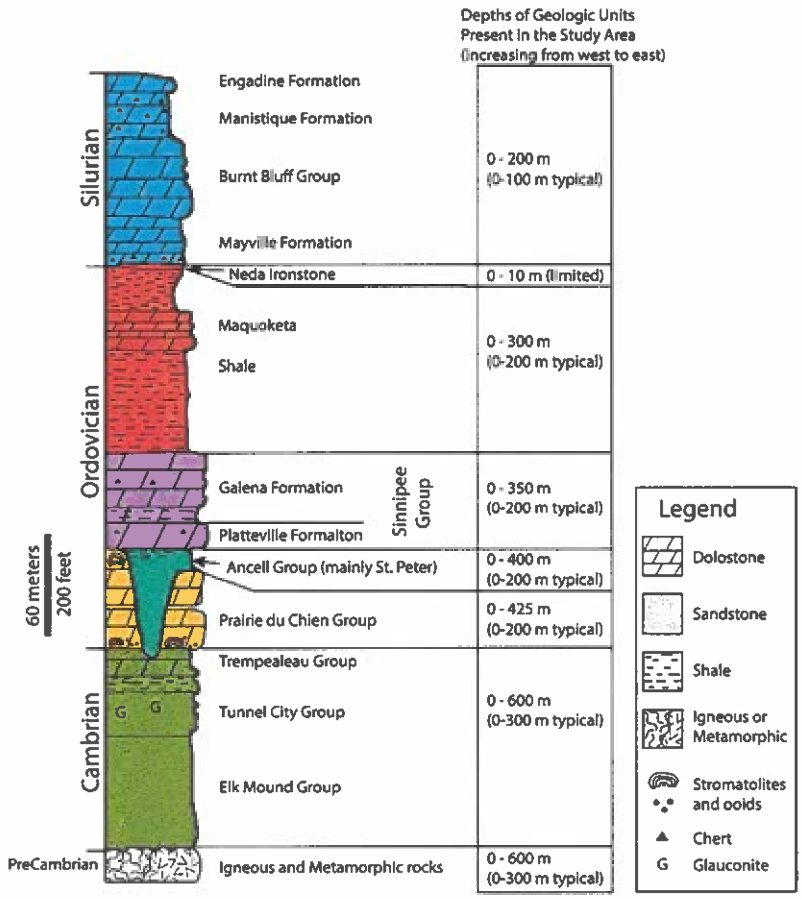

Figure 2. Simplified stratigraphic column for Paleozoic rocks in northeastern Wisconsin, USA [13]. Pleistocene sediments and younger Silurian and Devonian strata for southeastern Wisconsin are not shown here for simplicity, but can be found elsewhere [27,28].

The sequence of mineralization in the study area is somewhat variable, but generally consists of early dolomite and quartz, followed by K-feldspar and MVT mineralization, followed by late calcite. Dolomite precipitation continues throughout the main stage of sulfide mineralization. However, unlike many MVT-related dolomites, the dolomite of eastern Wisconsin is almost exclusively planar (non-saddle). Only a few small vugs with examples of saddle dolomite have been observed in the study area, and cathodoluminescence suggests they have the same cement stratigraphy as some of the planar dolomite [23]. Some late-stage euhedral planar dolomite crystals are up to 1 cm in diameter.

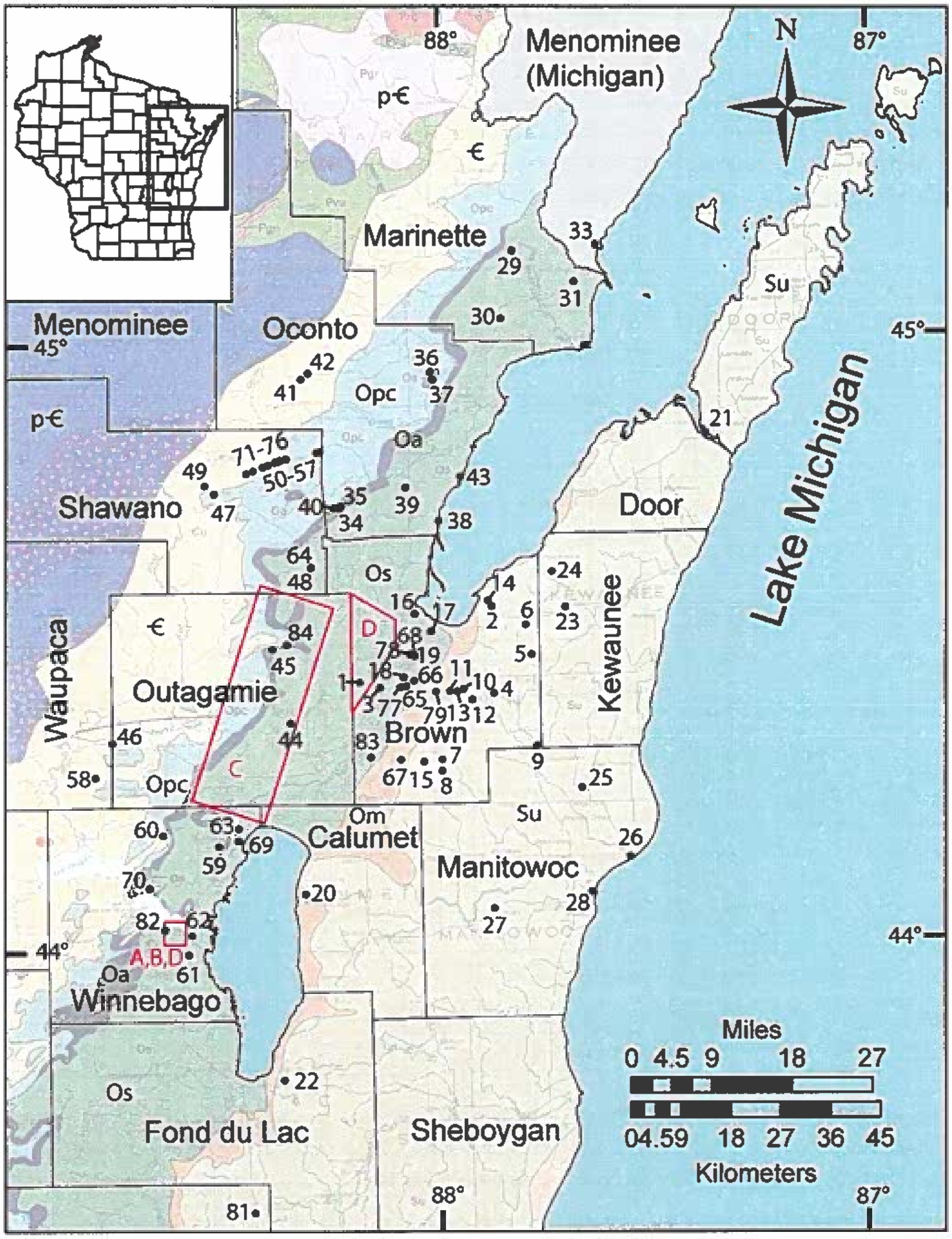

Figure 3. Map with sample locations (outcrops, quarries, drill cores, well cuttings) throughout the study area in northeastern Wisconsin. Thin lines and names indicate county boundaries. Inset map shows the study area location in the state of Wisconsin, USA. Red areas with letters indicate groundwater studies performed in the region (A is reference for Gotkowitz *et al.* [29], B is Thornburg and Sahai [30], C is Burkel and Stoll [31], and D is Schreiber *et al.* [32]). Additional references for region-wide studies include Riewe *et al.* [33] and Johnson and Riewe [34], as well as a cancer study by Knobeloch *et al.* [35] that focused on Winnebago and Outagamie counties. Base map after Mudrey *et al.* [36] shows the following units: pЄ = Precambrian, Є = Cambrian sandstones, Opc = Ordovician Prairie du Chien Group, Oa = Ordovician Ancell Group, Os = Ordovician Sinnipee Group, Om = Ordovician Maquoketa-Neda formations, and Su = Silurian dolostones.

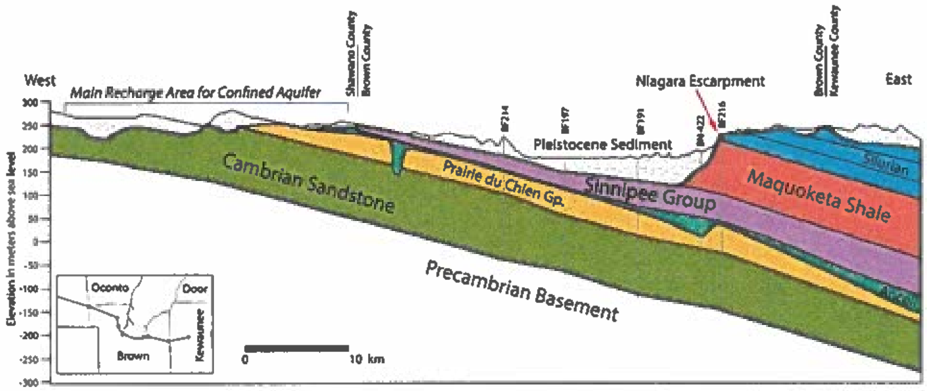

Figure 4. West to east geologic cross-section through portions of Shawano, Brown, and Kewaunee counties near Green Bay, Wisconsin. Paleozoic strata typically dip southeastward between about 5 and 7.5 m/km toward the ancestral Michigan basin. Vertical lines with labels indicate well codes for selected existing and backup wells in the Green Bay region of Brown County. Vertical exaggeration is 45 times. Modified after [13].

1.3. Relevance to Water Quality Issues

Dissolved arsenic has been recognized as a significant water quality problem that affects millions across the world and can lead to health problems including lung, bladder, and skin cancers. Bangladesh, for example, is widely known for having high dissolved arsenic resulting from sulfide mineralization, with the situation being described as a public health emergency (e.g., [37]). Three main regions in Wisconsin exhibit elevated levels of arsenic in groundwater [13,35]. Since its discovery in the late 1980s as part of a routine feasibility study for a landfill proposed in Winnebago County [33], the problem of arsenic contamination in the region's groundwater has received significant attention, with most work occurring in Winnebago and Outagamie counties (Figure 3). Eastern Wisconsin's MVT mineralization is recognized as the source of regionally extensive groundwater contamination in the form of dissolved arsenic, nickel, and other related metals [13]. The focus of previous research in the region [29–34,38–40] was to characterize the distribution and release mechanisms of arsenic in well waters and aquifer host rocks (mainly Ancell Group), primarily in parts of the eastern Wisconsin counties of Winnebago, Outagamie, and Brown (Figure 3). Geochemical mechanisms proposed for arsenic release include oxidation of arsenic-bearing sulfide minerals (most significant), reductive dissolution of iron (hydr)oxides, and release of sorbed arsenic from mineral surfaces [29,30,39].

Arsenic (As) concentrations vary from less than 1 μg/L to over 15,000 μg/L [33,41] in the study area, which contains several tens of thousands of private water wells and hundreds of municipal and other high capacity wells. In some townships (roughly 100 km^2), 20%–40% of the wells tested above the 10 μg/L health standard set for As in drinking water by the United States Environmental Protection Agency [13]. Although wells are less commonly tested for nickel and cobalt, these metals were also observed in some wells at elevated concentrations, especially in Winnebago and Outagamie counties. An evaluation of publicly available data through the Wisconsin Department of Natural Resources [41] indicates that in four counties in the study area (Winnebago, Outagamie, Brown, and Green Lake), cobalt exceeded the Wisconsin groundwater quality enforcement standard of 40 μg/L in 5.4% to 8.8% of the wells tested. Nickel showed a similar pattern, with six counties in the study area (Winnebago, Outagamie, Brown, Marinette, Fond du Lac, and Manitowoc) exceeding the Wisconsin groundwater quality enforcement standard of 100 μg/L in 1.8% to 5.7% of the wells tested. The National Uranium Resource Evaluation (NURE) [42,43], an older dataset from 1976 to 1979, also showed elevated dissolved Ni, Co, and As in the study area. Most of the wells with exceedances draw water from the Cambrian-Ordovician sandstone aquifers, especially the Ancell Group. Even municipal wells in Brown County 240–320 m deep have been impacted by elevated As, Co, and Ni during aquifer storage and recovery (ASR) tests or when valve leaks occurred that allowed oxygenated surface water into the Cambrian aquifer [44–46].

The most seriously impacted well studied in the region was one in northeastern Outagamie County and was drawing from the Ancell Group (St. Peter Sandstone). The well had the following chemistry (tested 1991–1992): pH = 2.05, As = 4300 μg/L, Co = 5500 μg/L, Cd = 220 μg/L, Cr = 84 μg/L, Ni = 11,000 μg/L, Al = 15,000 μg/L, and Pb = 400 μg/L [13,41]. The incidence of As, Co, and Ni in drinking water wells across the study area demonstrates the need for a better understanding of the link between groundwater quality and MVT mineralization in the region.

Additional work by Knobeloch and others [35] (Figure 3) on the health implications of arsenic in the study area has indicated an increased prevalence of skin cancer in the region. In 2004, the Wisconsin Department of Natural Resources designated a "Special Well Casing Pipe Depth Area" for all of Outagamie and Winnebago counties, which included special requirements for drilling methods, disinfection methods, and grouting requirements [13]. Arsenic is a major priority among regulators and local health departments in the region. Less attention has been paid to counties to the north, and they do not have special well casing requirements, despite their nearly identical geology.

The chemistry of a groundwater system is controlled in large part by the composition of its host rock [47]. Sulfide minerals in eastern Wisconsin Ordovician carbonate rocks coat the walls of joints, bedding planes, faults, and macropores in these dolostones [23]. In Cambrian and Ordovician sandstones, sulfides are observed as isolated nodules, stringers, and sometimes as continuous zones of cementation, especially in the Ancell Group. Oxidation of these sulfide minerals has been shown to be the major source of arsenic and other metals of concern in eastern Wisconsin [29,30,39]. This occurs most often near recharge areas where the aquifers are shallow (Figure 4) or in areas of intense drawdown where the aquifer becomes partially dewatered.

While an initial stratigraphic and petrographic framework was known for bedrock mineralization in Winnebago and Outagamie counties, limited data were available regarding the whole-rock and trace element composition of the bedrock, especially in areas to the north in Marinette, Oconto, and Shawano counties (Figure 3). A better understanding of potential sources of groundwater contamination is needed, especially in these rural areas where domestic well supplies are the dominant source of drinking water.

Although the MVT minerals are unlikely to be mined within the study area, they will continue to affect groundwater quality indefinitely. Groundwater is an important source of drinking water in Wisconsin. The percentage of the population that consumes water produced by private or municipal wells ranges from 18% to 100% of the population in each county. Overall, approximately 55% of the population in the study area uses groundwater, with most surface water users limited to a few of the larger municipalities in Brown, Winnebago, and Outagamie counties [48]. Many municipalities in the study area that currently use surface water have wells that penetrate the Cambrian-Ordovician sandstones in the region (Figure 4) that are kept as a backup in the event of a pipeline malfunction.

This article presents an analysis of the regional, stratigraphic, and petrographic distribution of MVT mineralization in Paleozoic rocks of northeastern Wisconsin and had two main objectives. The first was to document the origin and characteristics of the MVT-related mineralization in eastern Wisconsin. This included field and laboratory mineralogical observations along with a regional whole-rock geochemical study of bedrock from several Paleozoic stratigraphic units, with a focus on heavy metals composition. In this context, we present the first evidence in northeastern Wisconsin of discrete nickel- and cobalt-bearing mineral phases, along with a complete list of MVT-related minerals known from the region. A second objective was to provide a regional foundation for current and future groundwater studies in the region in order to better understand the causes of dissolved arsenic and other metals in the groundwater of northeastern Wisconsin. We hope this work will provide a baseline for future economic geologists and groundwater specialists in this region and in others with similar geology.

2. Materials and Methods

The study area includes several counties in northeastern Wisconsin, comprising approximately 13,000 km^2 (Figure 3). The sources of rock samples from the study area included quarries, outcrops, well cuttings, and limited drill cores. Design of a sampling strategy for geochemical characterization was affected by two major limitations. First, the distribution of outcrop and core samples was not random in either the stratigraphic or regional sense due to extensive Quaternary glacial deposits throughout the entire study area. Outcrops are more common near escarpments formed where Silurian and Ordovician dolostones overlie weaker shale or sandstone. Quarry locations are preferentially distributed near the base of the Silurian Mayville Formation, near the base of the Platteville Formation, and near the base of the Prairie du Chien Group carbonates (Figure 2). This outcrop distribution inevitably led to a biased stratigraphic sampling. A second limitation was that physical access to samples near quarry high walls is restricted for safety reasons. We made reasonable attempts to sample multiple stratigraphic levels wherever possible, including sets of well cuttings and drill cores.

2.1. Sample Collection

For whole-rock geochemical analysis, we collected and designated two principal categories of samples. Samples that were representative of the stratigraphic horizon or those that were taken at random are designated as "Matrix" specimens. Online Supplementary Materials Table S1 contains location numbers and sample descriptions. In contrast, sampling that was deliberately biased in an attempt to analyze the most sulfide-rich materials along fractures, bedding planes, and the SCH are designated as "Enriched".

The Paleozoic stratigraphic section (Figure 2) was divided into six principal stratigraphic units for the purpose of collection and analysis. These are the Cambrian sandstones, the Prairie du Chien Group (PDC) carbonates, the Ancell Group sandstone and shale, the Sinnipee Group carbonates, the Maquoketa Shale/Neda Ironstone, and the Silurian carbonates. Numerous samples were obtained from each of these stratigraphic units.

2.2. Scanning Electron Microscopy with Energy Dispersive Spectroscopy (SEM-EDS)

Samples of polished rock slabs, crystal-lined vugs, and well-cutting chips were carbon-coated before analysis. Samples were analyzed with a TESCAN Scanning Electron Microscope (SEM), model VEGA TS 5136SB with an excitation voltage of 30 kV. Elemental analysis was conducted using Energy Dispersive Spectroscopy (EDS) on a Genesis Spectrum EDAX detector. SEM images were obtained using backscattered electrons (BSE). This technique was used to explore the chemistry and petrographic distribution of metal sulfide minerals and associated minerals in over 30 selected samples.

2.3. Whole-Rock Geochemistry and Data Analysis

Matrix samples submitted for whole-rock analysis were typically 1–2 kg, except for drill cores and cuttings, which typically had a mass of at least 0.02 kg. Specimens indicated as "Enriched" were as large as possible, but generally were at least 0.2 kg. Digestion of 208 whole-rock samples was performed in 2007–2008 by ALS Chemex of Thunder Bay, Ontario, Canada, using Conventional 35-element Inductively Coupled Plasma–Atomic Emission Spectroscopy (ICP-AES) (ALS Method ME_ICP41) after Aqua Regia Digestion in a graphite heating block. Subsequent analysis of an additional 102 samples was performed in 2013 by ALS Minerals of Vancouver, British Columbia, Canada using two methods. Specifically, conventional 51-element ICP-AES (ALS Method ME_MS41) and ultra-low detection ICP-AES (ALS Method ME-MS41L) were performed after Aqua Regia Digestion in a graphite heating block. The results of these analyses yielded whole-rock concentrations for 35 or 51 different elements (depending on analysis), including arsenic (As), cadmium (Cd), cobalt (Co), chromium (Cr), copper (Cu), nickel (Ni), lead (Pb), zinc (Zn), molybdenum (Mo), and vanadium (V). Lower detection limits for some of the elements analyzed improved between 2008 and 2013, but this mostly affected elements that were not the focus of this study. Additional "overlimit" analyses, conducted with standard laboratory methods, were required for certain samples in which sulfur (S), iron (Fe), and phosphorous (P) exceeded instrument limits. ALS Minerals is accredited by the Standards Council of Canada and reports analytical precision of $\pm$ 10% for the methods used in this study. Quality control procedures included sample duplicates during sample crushing, and sample blanks in every analytical run.

Sample numbers, localities, analytical methods, and whole-rock geochemistry for a selected list of elements are presented in Online Supplementary Materials Table S1. Raw whole-rock geochemistry data for all samples are presented in Tables S2A and S2B.

Correlations were estimated between $\log_{10}$-transformed concentrations for selected elements. Elemental concentrations that were below detection limits were set to 0.55 times their detection limit for a given element to avoid missing data after log transformation [49]. Both Pearson's r and Spearman's ρ (a non-parametric measure of correlation) were calculated as a sensitivity analysis due to some remaining non-linearity between some pairs of elements even after transformation, with both measures available in Supplementary Materials Tables S2C and S2D. R version 3.3.0 for Windows was used for all analyses and the construction of plots.

3. Results

3.1. Field and Core Observations

Observations made at quarries and outcrops clearly indicate that the regional distribution of MVT mineralization extends throughout the study area northward into the state of Michigan. The most abundant minerals found in vugs and fractures tended to be dolomite and calcite, with quartz present locally. Sulfide mineralization was dominated by pyrite and marcasite, but sphalerite, chalcopyrite, and galena were also observed in hand specimens. Additional macroscopic minerals included fluorite, celestine, strontianite, and barite.

The distribution of sulfide minerals (and related weathering products) in the host sedimentary rocks was heterogeneous, but stratigraphically predictable. Throughout northeastern Wisconsin, the stratigraphic unit with the most sulfide mineralization was the top of the Ordovician Ancell Group (dominated by the St. Peter Sandstone in this portion of the state). This zone of naturally enriched iron sulfide mineralization, known as the Sulfide Cement Horizon (SCH), occurs across eastern Wisconsin from the Illinois border in the south to the Michigan border in the north ([13,23], this study). In the study area, the SCH was exposed on the quarry floors or in sump trenches at several quarries in Shawano, Oconto, Marinette, Outagamie, and Winnebago counties and areas southwest of the study area (Figure 5). No distinct ore deposits made any one part of the study area more concentrated than another. Cores and cuttings also show that the SCH is present down dip to the east of the outcrop belt, from near the surface in quarries to depths of several hundred meters (Figures 2 and 4). Nodules and intergranular cements of pyrite and marcasite were abundant where this group of rocks is rarely exposed. In one quarry near the city of Oshkosh in Winnebago County, a pink coating of amorphous material similar to erythrite (hydrated cobalt arsenate) and annabergite (hydrated nickel arsenate) was observed as a weathering product near the SCH in the St. Peter Sandstone, and was confirmed by SEM-EDS analysis. Another quarry in Green Lake County (southwest of the study area) contained primarily calcite and sphalerite cement in the SCH. A thin (~10–50 cm) layer of dark brown shale above the St. Peter Sandstone was interpreted to be the Glenwood Shale and was present at many locations. It contained abundant fine-grained sulfides, including pyritized arthropod and bryozoan fossils in some quarries.

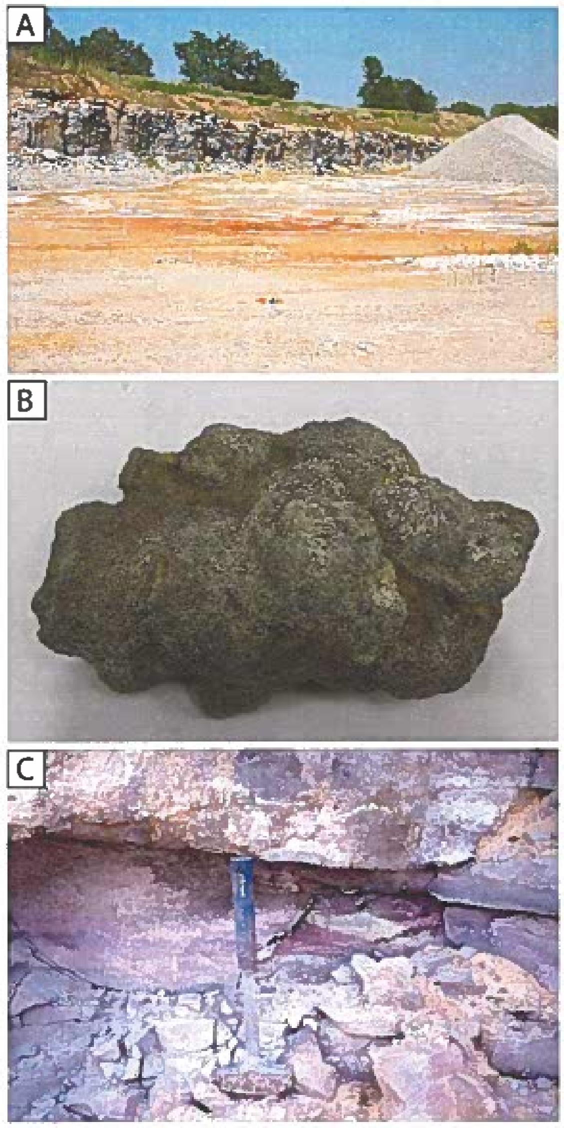

Figure 5. Exposures of the Sulfide Cement Horizon (SCH) in the upper portion of the St. Peter Sandstone (Ancell Group): (**A**) Discolored floor of a dolostone quarry showing the chemical alteration present at the top of the SCH at Location 34 in Oconto County. The quarry wall is the overlying Platteville Formation of the Sinnipee Group (human for scale). (**B**) A typical nodule of pyrite and/or marcasite-cemented quartz sandstone from the SCH at Locality 84 in Outagamie County (96-OUT-1), about 9 cm wide here. (**C**) Pink coating on Sulfide Cement Horizon at Locality 82 in Winnebago County (hammer for scale).

The next most mineralized stratigraphic zone occurred near the contact between the Silurian Mayville Dolomite and the underlying Ordovician Maquoketa Shale and Neda formations (Figure 6). Where present, the Upper Ordovician Neda Ironstone and related strata appeared to have sulfides associated with the upper extent of those units. In places, the mass of sulfides was striking, with large (10–40 cm thick) accumulations of pyrite easily identified, especially in central Brown County along portions of the Niagara Escarpment. This sulfide mineralization typically extended upward into the lower few meters of the Silurian Mayville Dolomite. In at least one case, a local aggregate producer had problems with the "aesthetic" quality of its product due to rust stains from the weathering of pyrite fragments in asphalt and concrete products. This interval was best exposed in quarries and natural outcrops along Scray Hill in the towns of Ledgeview and Glenmore in central Brown County. Significant, but lesser amounts of pyrite were present at this contact and within the upper part of the Maquoketa Formation where the Neda Formation is not present.

Figure 6. View of an approximately 70 cm tall section present in a bedrock sump trench at the Scott Construction Ulmen Quarry in central Brown County, Wisconsin (Location 13). Sulfides occur at the contact between the Silurian Mayville Formation (top 30 cm) and the Ordovician Neda-Maquoketa formations (lower 40 cm) and are responsible for the Fe-oxide staining.

The Ordovician Sinnipee Group carbonates contained significant quantities of metal sulfides, even at stratigraphic intervals farther away from the SCH in the Ancell Group. Sulfide mineralization was locally abundant along bedding planes, in vertical fractures and joints, and as vug fillings and intercrystalline cements. The mineralization was recognized throughout the Sinnipee Group, and some vertical fractures were mineralized by pyrite, K-silicates, and calcite cements throughout over 15 m of vertical exposure.

Some mineralization occurred within the Prairie du Chien Group and the Cambrian sandstones. Chalcopyrite, quartz, pyrite, and sphalerite were observed in the Prairie du Chien Group, with one notable location in western Outagamie County (Location 46) containing smoky quartz, amethyst, galena and malachite. Pyrite and marcasite nodules were observed in drill cores and cuttings from the Cambrian sandstones, with chalcopyrite, sphalerite, and galena observed locally. The top of the Jordan Sandstone (the uppermost Cambrian unit in northeastern Wisconsin) has also been observed to host zones enriched in pyrite and marcasite [34].

The carbonate units with the least amount of sulfide mineralization were the Silurian dolostones, which represent the youngest strata in the study area. Cores, abundant quarry exposures, and outcrops of the Silurian dolostones indicate that most sulfides are restricted to the lower few meters of the Mayville Formation. However, trace amounts of iron sulfides were present in various forms throughout the Silurian section. The presence of iron-stained vertical joints suggests that this unit, which is regionally karsted, has had much of its sulfide mineralization removed through near-surface weathering during the Cenozoic Era.

3.2. Petrographic Analysis Using SEM with EDS

Samples of polished rock slabs, polished thin sections, crystal-lined vugs, and well-cuttings chips were analyzed to determine minerals present, to outline mineral paragenesis, and to identify whether or not separate mineral phases were present that could be identified as the source of certain heavy metals present in regional groundwater.

Separate mineral phases containing Fe, Zn, Pb, Cu, and other metals were observed in samples from many locations, especially where parts of the middle and lower Ordovician section are exposed (Figures 7–10). Typically, pyrite and marcasite (FeS_2) were the dominant sulfide phases present. Pyrite exhibited several crystal habits, including cubes, octahedrons, and pyritohedrons up to 1 cm in length. Marcasite occured as bladed—and sometimes cockscomb—habits with a greenish or bluish metallic, iridescent coating of unknown origin. Sphalerite (ZnS) was the next most commonly observed sulfide phase, with generally rounded, irregular crystals up to 5 cm. Galena (PbS) was far less common, and was typically found as small cubic crystals a few millimeters in size, but crystals up to 1 cm were also found in the southern part of the study area. Chalcopyrite crystals are 1 to 3 mm in size and display a typical disphenoid crystal form.

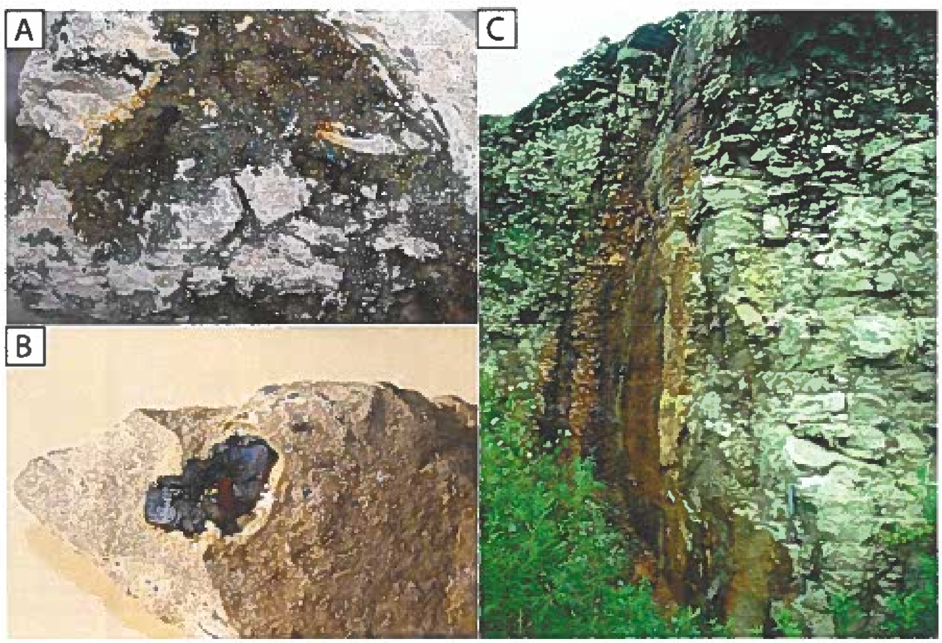

Figure 7. Photographs of selected MVT minerals in Ordovician carbonate strata from northeastern Wisconsin. (**A**) Fe-sulfide cemented dolostone breccia at Locality 48. View is approximately 12 cm across. (**B**) Dolostone hosted galena and sphalerite with hydrothermal dolomite from Locality 82 in Winnebago County. Vug is 2 cm across. (**C**) A small strike-slip fault with several centimeter-wide filling of iron sulfides) at Locality 59 in Winnebago County (note hammer for scale).

Two copper-bearing minerals were observed in the study area. The crystal morphology and EDS spectrum of the most common Cu-bearing phase suggests that it is chalcopyrite ($CuFeS_2$). This has been observed at several locations in Oconto, Winnebago, and Outagamie counties (Figures 3 and 9). Botryoidal and fibrous malachite has been observed in growths up to 3 mm long at one location in western Outagamie County in association with pyrite and chalcopyrite (Figure 9). Malachite has also been observed in association with chalcopyrite south of the study area at the Morris Pit in Green Lake County, Wisconsin [50].

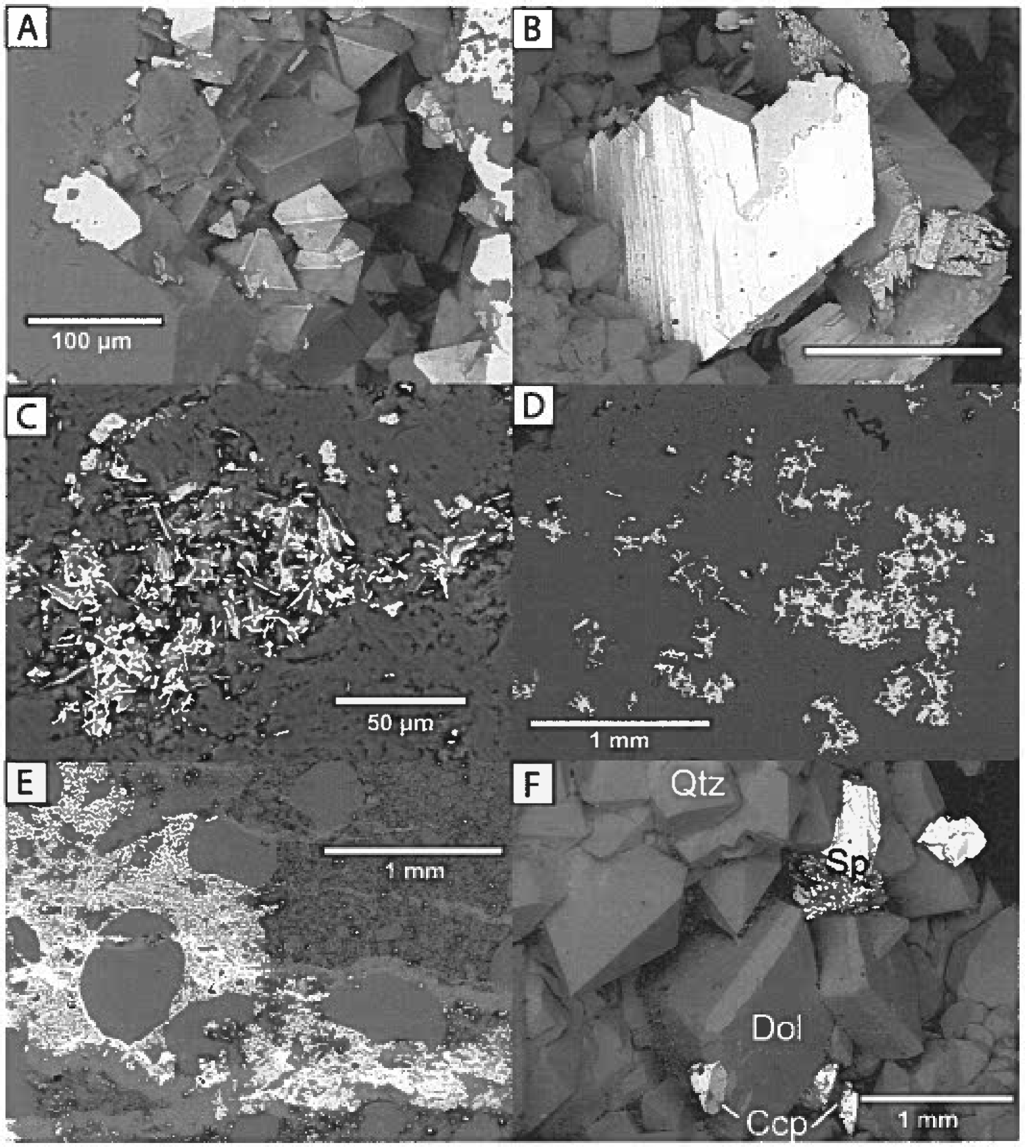

Figure 8. SEM-BSE images of polished sections and vug-filling cements illustrating the character of Mississippi Valley-type mineralization in northeastern Wisconsin: (**A**) Octahedral pyrite is intergrown with dolomite in vug from Locality 59 in Winnebago County (96-WIN-2). Left and right edges are flat, polished surfaces. (**B**) Bladed marcasite (bright) on dolomite (gray) from Locality 48 in Shawano County (07-SH-MCK-5). (**C**) Fine bladed marcasite and cubic pyrite intergrown with dolomite from Locality 48 (07-SH-Mck-0) in Shawano County. (**D**) Polished section showing dolomite (gray) and later pyrite (bright) filling pores and replacing parts of the dolomite at Locality 3 in Brown County (07-BN-LQ-1). (**E**) Fracture-filling cements from a quartz sandstone layer in the lower Platteville Formation at Locality 29 in Marinette County (Sample 07-MT-FP-2). Round gray grains are detrital quartz sand. Bright white areas in fracture are pyrite cement, whereas medium gray cements are calcite. Gray spotted areas coprecipitated with pyrite are an unknown authigenic K-Al-Silicate mineral cement, possibly illite or K-feldspar. (**F**) Late dolomite intergrown with chalcopyrite and sphalerite and associated with quartz from Locality 46 (07-NL-45E) in Outagamie County.

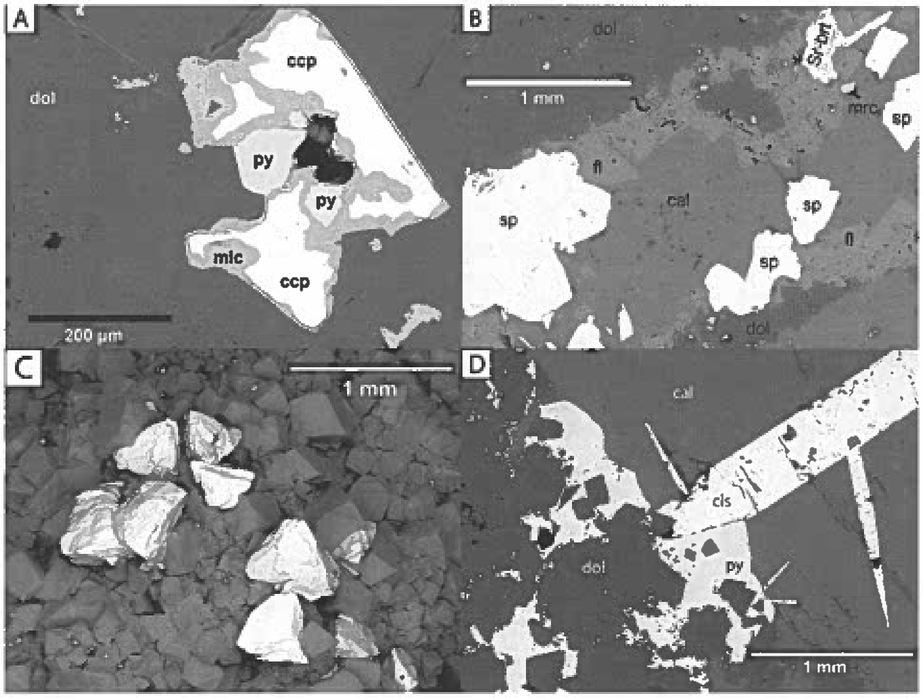

Figure 9. SEM-BSE images of Cu, Cr, Sr, and Ba-bearing minerals from the study area: (**A**) polished thin section from Locality 46 in the Oneota Formation (lower Prairie du Chien Group) of western Outagamie County; (**B**) highly variable mineralogy in a few millimeter-wide fracture from Locality 33 in Menominee County, Michigan; (**C**) chalcopyrite (bright) on dolomite (gray) from Locality 39 in Oconto County; and (**D**) an assemblage of dolomite, celestine, pyrite and late calcite from the Platteville Formation at Locality 3 in Brown County. Labeled minerals are dolomite (dol), calcite (cal), botryoidal malachite (mlc), pyrite (py), chalcopyrite (ccp), sphalerite (sp), strontium-barite (Sr-brt), marcasite (mrc), fluorite (fl), and celestine (cls).

The vast majority of pyrite and marcasite analyzed from the region had no detectable peaks for Ni, Co, or As using SEM-EDS techniques. However, detections of Ni, Co, and As in sulfide minerals were made in some cases (Figure 10; Table 1). Detection of a discrete As peak was limited to one specimen, with values of ~2 to 4 weight percent (~0.5 to 1 mole percent), based on EDS analysis. Although this is higher than the As concentration described by Thornburg and Sahai [30] for As-bearing pyrite in which isomorphic substitution of As was interpreted, it is still likely that the As occurs in a similar form here, and not in a discrete mineral phase such as arsenopyrite.

Despite its occurrence in southern parts of Wisconsin [8,14,51,52], millerite (NiS) has not been documented in this study area of northeastern Wisconsin. Additional references to minor amounts of millerite, bravoite, violarite, honessite, cobaltite and smaltite are given for the Upper Mississippi Valley lead-zinc district in southwestern Wisconsin by Heyl *et al.* [8,52].

Detection of numerous microscopic crystals of sulfide minerals enriched in Ni and Co was made in samples from Brown and Oconto counties (Figure 10; Table 1). These microscopic occurrences are the first examples of Ni- and Co-bearing minerals found in northeastern Wisconsin. Crystals contain widely varying proportions of Ni-Co-Fe, based on SEM-EDS analysis. Figure 11 shows normalized mole percent values for the sulfide minerals containing Ni, Co, and Fe listed in Table 1. Nickel proportions up to 89 mole percent and cobalt proportions up to 24.6 mole percent suggest that the occurrence of these elements is not simply restricted to isomorphous substitution within pyrite, as appears to be the case with arsenic from a few locations in the study area [30]. Based upon crystal morphology and SEM-EDS composition, bravoite and vaesite are the most likely mineral species present for the Ni and Co-rich crystals.

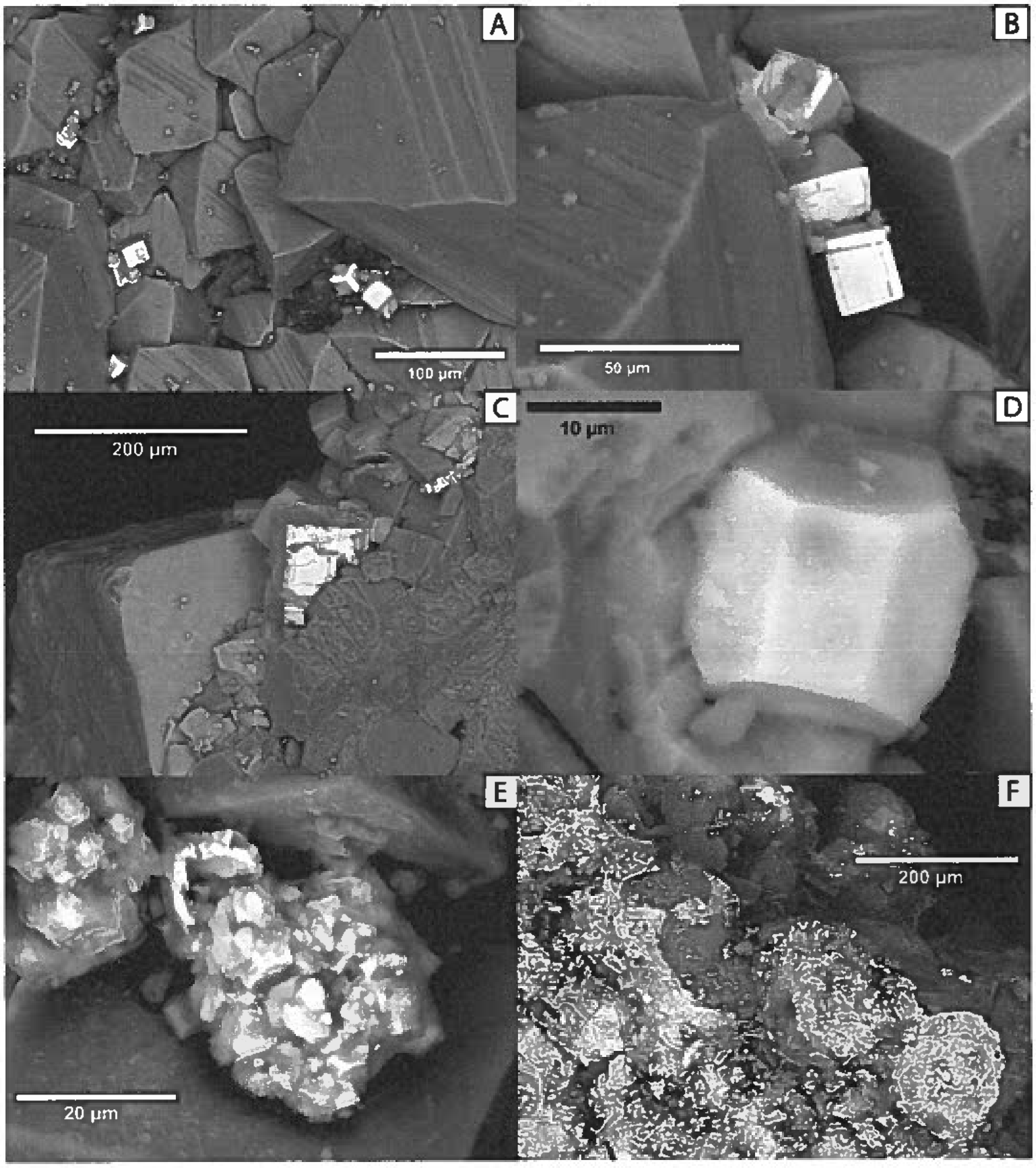

Figure 10. SEM-BSE images of selected Ni, Co, and As-bearing MVT minerals from three localities in the study area in northeastern Wisconsin. SEM-EDS data for (**A–E**) are shown in Table 1: (A,B) Locality 39 in Oconto County; (C–E) Locality 83 in Brown County; and (**F**) Locality 82 in Winnebago County. (A) Cubic bravoite (Ni, Co, Fe)S_2 on coarse dolomite (Sample 07-OCO-MTV-2; crystals 3-8). (B) Three crystals of cubic bravoite (2a–c) associated with nickelian pyrite (2d) (Sample 07-OCO-MTV-2; crystals 2a, 2b, 2c, and 2d). (C) Bright cubic crystal (center) with regions of both bravoite and vaesite associated with fluorite (medium gray, left) and dolomite (dark gray, lower right) (Sample AP-24; 510-515 ft; crystal 2). (D) Bravoite crystal (Ni, Co, Fe)S_2 showing both cubic and pyritohedron forms (Sample AP-24; 510-515 ft; crystal 4). (E) Arsenic-bearing nickelian pyrite in finely crystalline masses. Sample AP-24; 520-525 ft; crystal cluster A. (F) Amorphous pink coating of Co-Ni-As-Zn-bearing material (Figure 5) that is likely a sulfate or an arsenide, possibly erythrite (Sample 97-WIN-3).

Table 1. Concentrations of elements in selected crystals of Ni-Co-Fe-As-sulfide minerals from Brown and Oconto Counties. Values are reported in weight % generated from the EDAX Software. Sample AP-24 refers to the Village of Wrightstown Test Well in Brown County (Locality 83). Designations 1a, 1b, *etc.* refer to analysis points broadly from the core to the rim of crystal 1. Sample 07-OCO-MTV-2 refers to the Montevideo quarry in Oconto County (Locality 39). Dashes indicate no detection by the software.

Sample; Crystal	Ni	Co	As	Fe	C	O	Mg	Si	S	Cl	Ca
AP-24; 510-515 ft; 1a	30.69	9.91	-	6.22	18.19	11.49	-	-	20.44	-	3.05
AP-24; 510-515 ft; 1b	28.70	6.32	-	4.62	16.30	14.16	-	-	26.13	1.61	2.15
AP-24; 510-515 ft; 1c	27.55	1.59	-	2.80	16.78	13.07	-	-	37.46	-	0.76
AP-24; 510-515 ft; 1d	32.10	1.42	-	2.77	21.33	7.13	-	-	33.72	-	1.54
AP-24; 510-515 ft; 2	35.31	1.49	-	2.75	-	10.98	-	-	49.48	-	-
AP-24; 510-515 ft; 3	24.55	9.98	-	5.67	17.97	14.04	1.46	0.82	20.80	2.12	2.59
AP-24; 510-515 ft; 4	17.75	3.41	-	4.01	27.59	16.35	2.37	-	26.36	-	2.15
AP-24; 520-525 ft; A1	1.84	0.75	2.27	13.08	43.34	24.47	3.06	0.45	7.89	0.66	2.18
AP-24; 520-525 ft; A2	3.16	1.36	4.09	19.41	35.64	20.57	3.44	0.50	7.36	0.59	3.90
07-OCO-MTV-2; 1	20.25	1.41	-	4.21	19.68	23.93	1.77	-	27.06	-	1.68
07-OCO-MTV-2; 2a-1	18.99	0.90	-	3.95	25.00	25.00	-	-	25.36	-	0.80
07-OCO-MTV-2; 2a-2	15.76	1.20	-	5.55	26.04	28.08	1.06	-	21.20	-	1.11
07-OCO-MTV-2; 2b	19.05	1.29	-	3.99	22.83	26.25	-	-	26.58	-	-
07-OCO-MTV-2; 2c	17.12	1.26	-	4.71	20.19	32.61	-	-	23.21	-	0.90
07-OCO-MTV-2; 2d	2.47	-	-	29.70	-	31.84	2.08	-	32.45	-	1.47
07-OCO-MTV-2; 3	18.66	1.23	-	4.21	25.53	26.01	1.48	-	21.06	-	1.83
07-OCO-MTV-2; 4	17.66	1.61	-	4.57	32.29	20.54	1.74	-	19.23	-	2.35
07-OCO-MTV-2; 5	20.80	1.50	-	4.99	32.73	20.87	1.63	-	15.48	-	2.00
07-OCO-MTV-2; 6	22.24	1.65	-	4.97	32.35	20.34	1.64	-	14.48	-	2.33
07-OCO-MTV-2; 7	21.19	1.38	-	3.75	26.49	20.64	-	-	26.54	-	-
07-OCO-MTV-2; 8	15.00	1.24	-	4.37	29.88	27.63	-	-	20.90	-	0.98
07-OCO-MTV-2; 9	15.27	1.13	-	4.25	20.90	30.33	2.89	0.65	22.91	-	1.67

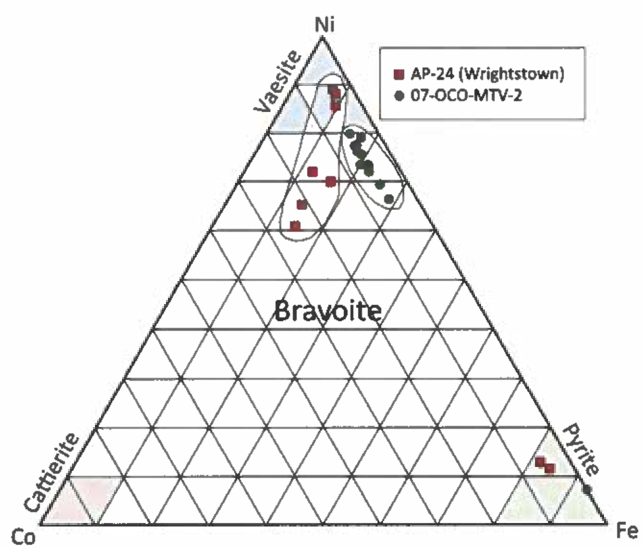

Figure 11. Ternary plot of mole percent normalized compositions indicating the relative proportions of nickel, cobalt, and iron for various members of the pyrite group. Data are for samples listed in Table 1. Red squares are for samples AP-24 (Locality 83), and green circles are for 07-OCO-MTV-2 (Locality 39). Region of bravoite, along with end members pyrite, vaesite, and cattierite are shown, as described by Kerr [53].

The precise mineralogy of these Ni and Co phases is challenging to determine due to the size of the crystals (tens of micrometers). Crystal morphology varied from indistinct to cubic to cube-pyritohedron forms (Figure 10), which is possible in the solid solution series of the pyrite group. In cases where the crystal approaches the NiS_2 end-member composition, the mineral vaesite (NiS_2) is the most likely candidate [53]. Other crystals with elevated Co and Fe are best described as bravoite ($(Ni\text{-}Co\text{-}Fe)S_2$). In the absence of X-ray data, strict identification of these minerals is not possible, but their compositions are shown in Figure 11.

In contrast to the above metals, none of the samples examined with the SEM displayed separate mineral phases for arsenic, such as arsenopyrite. While the presence of arsenopyrite cannot be ruled out in these rocks, it seems likely that As is substituting for Fe as a trace element in the iron sulfides, as has been suggested by Thornburg and Sahai [30]. For a limited sample set, they concluded that As was present in isomorphous substitution with pyrite/marcasite, which can be released by oxidation and subsequently sorb onto ferric oxyhydroxides.

Some fractures and vugs contained a complex microscopic array of minerals in the MVT assemblage (e.g., Figure 9B). In one 2 mm-wide fracture intercepted by a drill core, sphalerite, galena, fluorite, dolomite, marcasite, Sr-barite, and calcite were observed in close association with each other.

With only one exception near the Wisconsin–Michigan border (Locality 33), all galena observed in northeastern Wisconsin falls south of an east–west regional fault that is possibly associated with a crustal boundary in the Precambrian basement rocks known as the Spirit Lake Tectonic Zone [25]. The reason for this distribution is unknown, but it might be related to the metals concentrations in Precambrian bedrock through which hydrothermal deep groundwater likely passed [54,55].

3.3. Paragenetic Sequence of Mineralization

Table 2 lists the diagenetic minerals observed in Paleozoic sedimentary rocks in the region. Although no single diagram can precisely synthesize the full complexity of the mineral paragenesis in the study area, Figure 12 illustrates the general mineralization sequence in northeastern Wisconsin.

Table 2. Complete list of Mississippi Valley-type and associated diagenetic minerals observed in Paleozoic rocks of northeastern Wisconsin.

Mineral Group	Minerals Observed [1]
Carbonates	Dolomite, calcite, strontianite, malachite (rare)
Sulfates	Barite, celestine, Sr-barite, gypsum; anhydrite[2] (minor)
Sulfides (and related)	Pyrite, marcasite, sphalerite, chalcopyrite, galena, bravoite, vaesite, nickelian-pyrite, As-bearing-pyrite, erythrite?
Phosphates	Apatite/fluorapatite
Silicates	Quartz, K-feldspar, illite?, amethyst[3], smoky quartz[3]
Halides	Fluorite

[1] Additional rare MVT and alteration minerals not observed in this study can be found in [40] for one quarry in Winnebago County; [2] Anhydrite was identified in one sample with the assistance of David Tuschel using Raman spectroscopy at HORIBA Scientific in Edison, New Jersey, USA; [3] Amethyst and smoky quartz were observed at Locality 46 in western Outagamie County.

In general, pervasive dolomitization and silicate mineralization are the earliest events. Early quartz appears to have formed at temperatures $\leqslant$ ~50 °C, due to the presence of all-liquid fluid inclusion assemblages entrapped within quartz overgrowths. Later quartz and the majority of the dolomite were formed from a Na-Ca-Mg-Cl brine at temperatures of ~80–100 °C as temperatures warmed [23]. Iron sulfides occurred throughout much of the sequence, but the main stage of MVT mineralization included sphalerite, galena, chalcopyrite, pyrite, marcasite, and Ni-Co-Fe-sulfide minerals (Figures 8–10). The MVT mineralization was intergrown with two episodes of dolomite, with most MVT minerals closely associated with late planar dolomite (Figures 7 and 8). Middle and late-stage dolomite, as well as MVT minerals, appear to have formed by similar brines at temperatures of 80–110 °C during what appears to be peak heating. Siderite was not documented in the region, although some dolomite was ferroan. The timing of K-silicates (K-feldspar and possibly illite), relative to other diagenetic phases, is difficult to determine in cases where it occurs as cements within quartz arenites. However, some of it is clearly coeval with abundant iron sulfide mineralization in vertical fractures observed in the northern part of the study area (Figure 8E).

New evidence (Figure 9) suggests that at least some of the sulfate minerals precipitated during the MVT stage of mineralization. Sr-barite, barite, and celestine were observed with fluorite, sphalerite, and pyrite in some samples, likely forming during the waning stages of mineralization. Other late-stage minerals include beef-vein and intergranular gypsum, as well as late-stage calcite. Conditions of calcite mineralization are not well known, but at least some late calcite in Silurian rocks contains all-liquid inclusions, suggesting a lower temperature of entrapment [23]. Strontianite was also found in the region as a relatively late mineral, but its precise location in the sequence is not well-constrained.

The order of mineralization shown in Figure 12 should be used with caution. As a regionally derived diagram, local or stratigraphic variations may not be expressed fully. Many minerals are also found as isolated occurrences or with only one other mineral. Nevertheless, the diagram presents the only complete synopsis of the paragenetic sequence of mineralization in the study area.

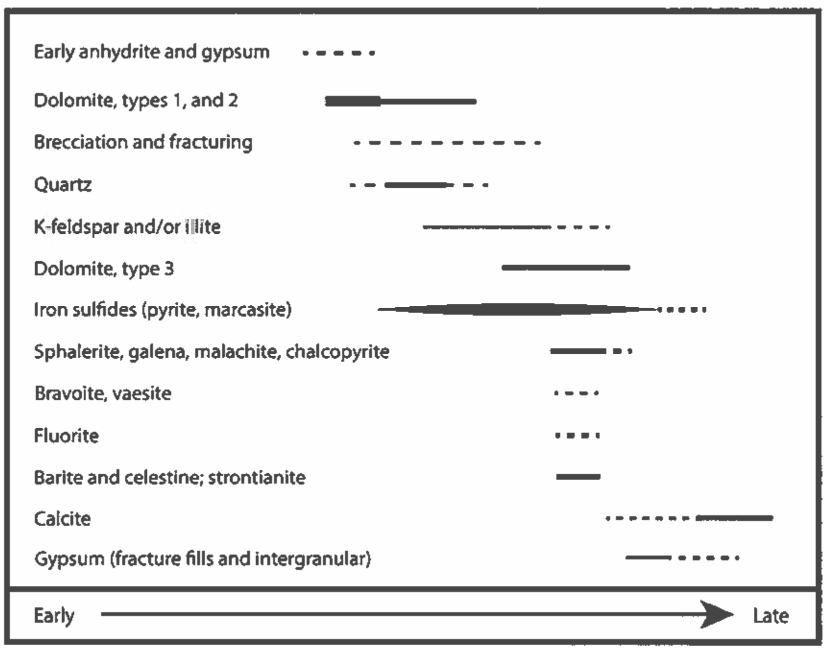

Figure 12. Generalized paragenetic sequence for Paleozoic rocks in northeastern Wisconsin.

3.4. ICP-AES Analytical Results and Discussion

Analytical results for all 310 samples are presented in Online Supplementary Materials Tables S1 and S2. The main purpose for analyzing the whole-rock chemistry of these strata was to look for regional and stratigraphic trends in the character of the mineralization, with a focus on heavy metals. Table 3 presents descriptive statistics for selected metals in all samples in the study that were designated as "Matrix" and "Enriched." Table 4 illustrates the typical (median) whole-rock concentrations for selected metals in representative "matrix" samples of bedrock from the region. Averages were not calculated because the data were heavily skewed right, as is common when measuring concentrations. Metals concentrations varied widely, from below detection limits to far above the median concentrations for the host rocks, which was consistent with observations of hand specimens and thin sections.

Table 3. Minimum, minimum *detected*, median, maximum, and the interquartile range of concentrations for iron and trace metals in Paleozoic whole-rock samples from northeastern Wisconsin. For Fe, the unit is percentage, while all other elements are measured in mg/kg (ppm). Reported values are for all samples in the study (matrix and enriched, n = 310). ND is a value below the detection limit for that respective element.

	Fe (%)	As	Cd	Co	Cr	Cu	Mo	Ni	Pb	V	Zn
Minimum [1]	0.06	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Minimum *detected* value	0.06	0.40	0.001	0.40	1.0	0.9	0.05	0.7	0.38	1.0	0.6
Median	0.57	4.00	ND	1.66	4.0	5.0	0.10	3.0	4.00	6.0	3.0
Maximum	28.4	499	4.20	133	152	1620	25.0	1110	584	353	3720
Interquartile range	0.89	9.00	0.01	2.58	4.9	9.5	0.90	8.0	7.41	6.0	6.0

[1] Some analyses from early in the study were below the detection limits for many metals due to the analytical methods available.

Table 4. Median metal concentrations (interquartile range in parentheses) for ***matrix*** samples from Paleozoic rock strata of northeastern Wisconsin (sample sizes in parentheses next to strata names). For Fe, the unit is percentage, while all other elements are measured in mg/kg (ppm). A Precambrian data point was excluded from this table due to having only one observation in that geologic unit.

Rock Unit	Fe (%)	As	Co	Cr	Cu	Mo	Ni	Pb	V	Zn
Silurian (33)	0.16 (0.21)	4.00 (6.00)	1.00 (0.50)	2.0 (2.0)	2.0 (2.0)	ND (0.00)	ND (1.0)	4.00 (3.60)	1.0 (2.0)	ND (3.0)
Maquoketa-Neda (11)	8.52 (13.31)	132 (151)	13.00 (24.50)	7.0 (7.0)	48.0 (7.0)	2.00 (3.34)	24.0 (25.1)	50.00 (55.15)	22.0 (64.0)	14.0 (11.0)
Sinnipee Group (111)	0.59 (0.25)	2.00 (5.00)	1.00 (1.20)	3.0 (3.0)	3.0 (2.8)	ND (0.29)	2.7 (3.3)	3.60 (3.85)	5.0 (3.0)	2.0 (4.5)
Ancell Group (18)	1.24 (1.07)	5.71 (4.16)	4.89 (6.99)	8.2 (13.8)	13.5 (12.9)	0.25 (0.79)	11.8 (31.6)	6.14 (8.86)	8.1 (14.4)	7.8 (8.4)
PDC Group (75)	0.40 (0.17)	3.00 (6.00)	1.70 (1.25)	3.0 (3.0)	6.0 (8.0)	ND (0.24)	2.0 (3.0)	2.00 (2.95)	9.0 (5.9)	3.0 (6.5)
Cambrian (19)	0.67 (0.68)	1.02 (7.35)	3.17 (8.69)	12.0 (4.6)	6.9 (13.4)	1.17 (1.11)	5.2 (8.0)	1.56 (5.07)	6.0 (7.2)	2.4 (1.4)

Based on field observations and elemental analysis, three specific stratigraphic horizons showed the most significant mineralization. These were the top of the Ancell Group, the Ordovician-Silurian contact, and, to a lesser extent, the Sinnipee Group dolostone. All three of these zones typically contained elevated metals concentrations, especially in "enriched" samples from the SCH, or along mineralized bedding planes, faults, or fractures. Figure 13 shows box-plots (on the $\log_{10}$ scale) for selected metals from Table 3. Elevated metals occurred in several Cambrian and Ordovician units, but the Silurian dolostones generally exhibited lower concentrations. Additional box-plots for these and other metals are presented in Supplementary Materials Figure S3. It is important to note that all stratigraphic units show some potential for locally elevated metals concentrations, including the Prairie du Chien Group and the Cambrian sandstones, which serve as an important regional aquifer system along with the Ancell Group [56,57].

Table 5 presents Spearman's ρ correlations, estimated for a subset of $\log_{10}$-transformed metals concentrations relevant to the study. Figure 14 shows scatter plots for selected metals concentrations, again on the $\log_{10}$ scale. While most pairs of elements in Table 5 show moderate correlations, the highest values occurred for Ni *vs.* Fe, Ni *vs.* Co, Pb *vs.* Fe, Co *vs.* Fe, and Cr *vs.* V. This result is consistent with the SEM-EDS observations of As-, Ni-, and Co-bearing sulfide minerals, suggesting that they are likely related to the same mineralization event.

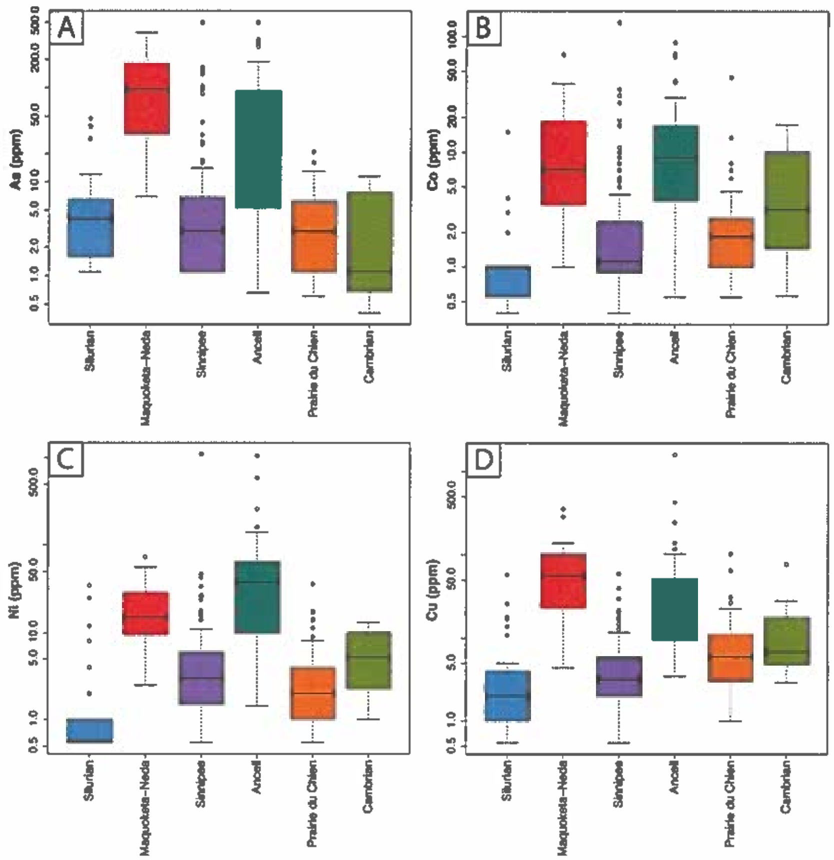

Figure 13. Box-plots on the $\log_{10}$ scale for selected metals ((**A**) As, (**B**) Co, (**C**) Ni, and (**D**) Cu) for 309 samples (single Precambrian point excluded), separated by major stratigraphic units (Figures 2 and 4). Metals concentrations are highest in the Maquoketa-Neda and the Ancell Group, while the Silurian dolostone units tend to have the lowest concentrations for most metals. Colors correspond to those used in Figures 2 and 4.

Table 5. Estimated Spearman's ρ correlations amongst $\log_{10}$-transformed variables for selected elements. For all but one of the estimates (Zn *vs.* Fe of enriched samples), p-values were smaller than 0.02, with most < 0.0001. An expanded analysis showing Pearson's r, Spearman's ρ , and all p-values is presented in Supplementary Materials Tables S2C and S2D.

Log_{10}-Transformed Variables	Spearman's ρ All Samples	Spearman's ρ Enriched Samples	Spearman's ρ Matrix Samples
Cr *vs.* V (O-S subset) [1]	0.940	-	-
Ni *vs.* Fe	0.744	0.587	0.642
Ni *vs.* Co	0.718	0.690	0.654
Pb *vs.* Fe	0.619	0.676	0.470
Co *vs.* Fe	0.612	0.449	0.529
K *vs.* B	0.594	0.694	0.578
Co *vs.* As	0.588	0.554	0.495
Cr *vs.* V	0.541	0.769	0.503
As *vs.* Fe	0.522	0.579	0.313
Cu *vs.* Fe	0.499	0.379	0.392
Ni *vs.* As	0.437	0.540	0.201
Zn *vs.* Fe [2]	0.326	0.156	0.354

[1] This row represents a subset of 17 enriched and matrix samples from Kittell Falls, Fonferek's Glen, and Ulmen Quarry along a portion of the Niagara Escarpment in central Brown County. Outcrops occur along the Ordovician-Silurian Contact. [2] The p-value for the correlation of Zn *vs.* Fe for enriched samples was 0.324.

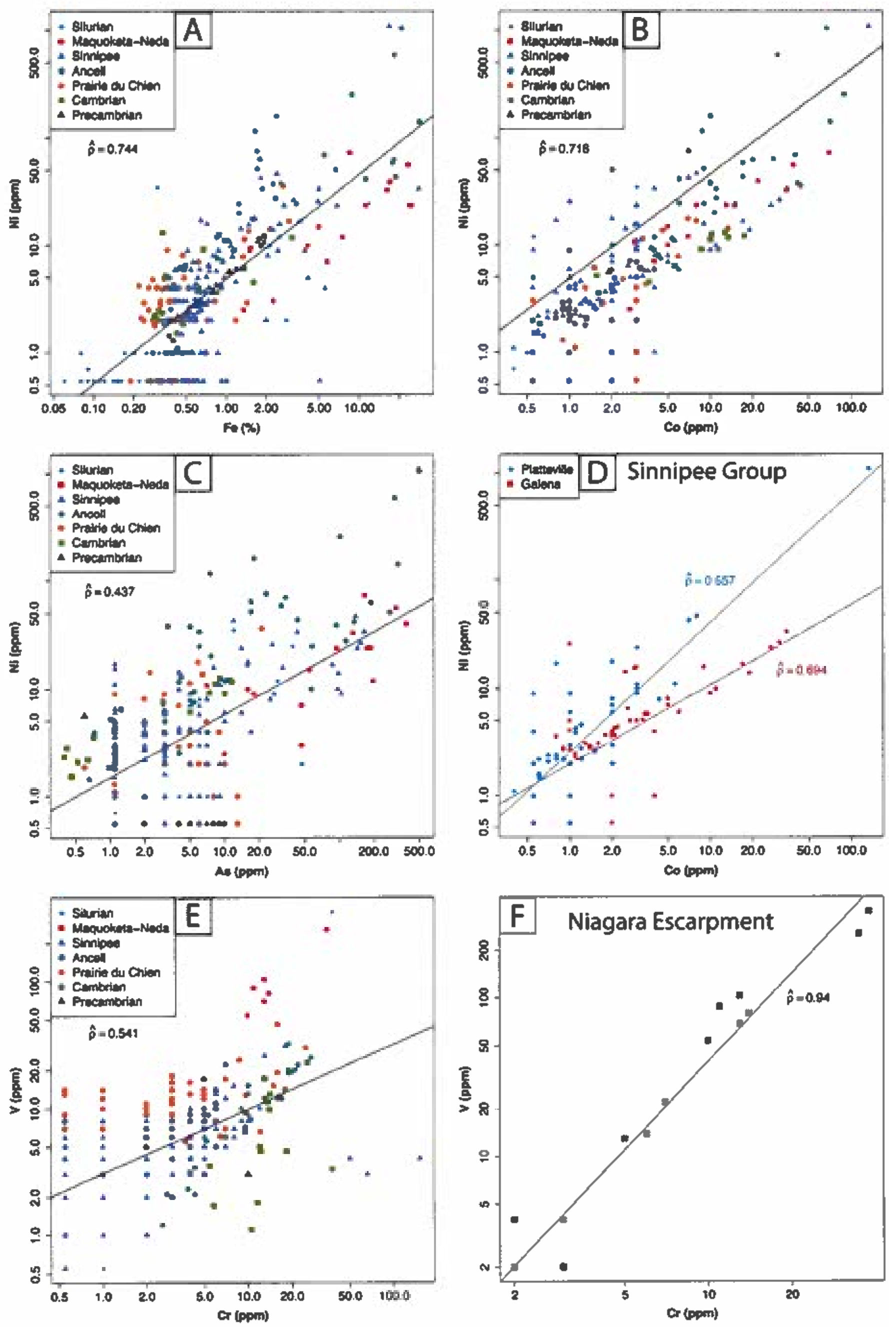

Figure 14. Scatter plots ($\log_{10}$ axes) of selected metals from whole-rock ICP-AES analyses on rock specimens from northeastern Wisconsin. Legends indicate the particular stratigraphic unit sampled. **(A)** Nickel (Ni) *vs.* iron (Fe) for all samples, separated by stratigraphic unit; **(B)** Nickel (Ni) *vs.* cobalt (Co) for all samples, separated by stratigraphic unit; **(C)** Nickel (Ni) *vs.* arsenic (As) for all samples, separated by stratigraphic unit. Several samples exhibited elevated Ni, consistent with the presence of observed Ni-bearing minerals (see text); **(D)** Nickel (Ni) *vs.* cobalt (Co) for the two formations of the Sinnipee Group in northeastern Wisconsin (Platteville and Galena); **(E)** Vanadium (V) *vs.* chromium (Cr) for all samples in the study, separated by stratigraphic unit. Note the V-enriched samples (red squares and blue diamond in upper right area of plot) from central Brown County; **(F)** Vanadium (V) *vs.* chromium (Cr) for all samples from three localities along a portion of the Niagara Escarpment in central Brown County.

Strong correlations for Ni *vs.* Fe ($\hat{\rho}$ = 0.744), Ni *vs.* Co ($\hat{\rho}$ = 0.718), and Co *vs.* Fe ($\hat{\rho}$ = 0.612) suggest that these three elements are related to the same mineralization event (Figure 14). Ni and Co are well correlated in all sample subsets (Table 5), suggesting that these elements are more closely related. They are likely principally occurring as isomorphic substitutions in pyrite, or as separate Ni-Co-enriched sulfide minerals. This interpretation is consistent with the discovery of discrete, but microscopic, Ni-Co-Fe sulfide minerals vaesite and bravoite in the study area (Figures 10 and 11). Correlations between Ni, Co, and Fe are higher than correlations for Ni and As ($\hat{\rho}$ = 0.437) or Co and As ($\hat{\rho}$ = 0.588). This is consistent with mineralogical observations in which As is typically in separate sulfide mineral phases from Ni and Co (Figure 10). This is an important observation suggesting that water quality evaluations for wells in the study area should probably include analyses for Ni and Co more regularly, instead of only As.

Smaller correlations between Zn and Fe and between Cu and Fe are most likely due to the fact that those metals also precipitate as separate sulfide mineral phases, such as sphalerite and chalcopyrite, and are independent of the presence of pyrite or marcasite in any particular sample. The same would be expected between Pb and Fe, but there is a moderate correlation between these two elements ($\hat{\rho}$ = 0.676 for enriched samples). Because galena is far less commonly observed in the study area than sphalerite, chalcopyrite, pyrite, or marcasite, the correlation between Pb and Fe may represent isomorphic substitution of Pb in pyrite or marcasite rather than the discrete presence of galena.

The correlation between K and B ($\hat{\rho}$ = 0.694 for enriched samples) was unexpected, and is not well understood because boron could not be detected using SEM-EDS techniques. However, it is possible that B is substituting in the structure of authigenic feldspar or illite (e.g., Figure 8E), both of which are present in the region [23]. These minerals could be the source of elevated boron levels reported for the Cambrian-Ordovician aquifer across the study area [58].

Correlations between Ni and As estimated separately by stratigraphic units (Supplementary Materials Table S2D) showed samples from the Maquoketa-Neda, the Ancell Group, and the Cambrian Sandstones were well correlated ($\hat{\rho}$ = 0.762, 0.722, and 0.797, respectively). The plot of Ni *vs.* As (Figure 14C) showed that some samples contained elevated Ni concentrations relative to As. These are best represented by some Ancell Group samples from three Oconto County quarries (Duame Quarry, Chase Quarry, and Montevideo Quarry) and one Sinnipee Group sample from the Vulcan Quarry in Winnebago County. Elevated nickel relative to arsenic is consistent with the existence of Ni-bearing minerals such as vaesite and bravoite that were observed in Oconto County (Figures 10 and 11). Ni and As in the Silurian units appeared moderately correlated ($\hat{\rho}$ = 0.501), while in the remaining units (Sinnipee and Prairie du Chien groups), they did not correlate as strongly ($\hat{\rho}$ = 0.381 and −0.158, respectively).

Relatively strong correlations between Ni and Co persisted even for some finer stratigraphic divisions, such as individual formations within the Sinnipee Group. Specifically, for the Galena and Platteville formations, $\hat{\rho}$ was 0.694 and 0.657, respectively (Figure 14D). As and Co were less strongly correlated for the Galena and Platteville formations, yielding $\hat{\rho}$ values of 0.572 and 0.385, respectively. Again, this is consistent with the observation of Ni and Co-bearing mineral phases as described above.

A moderate correlation ($\hat{\rho}$ = 0.541) existed for V and Cr in all samples over all stratigraphic intervals (Figure 14E), but this correlation improved notably for the enriched sample subset ($\hat{\rho}$ = 0.769) (Table 5). However, for a subset of samples from the mineralized zone near the Ordovician-Silurian contact in central Brown County (17 samples along a small portion of the Niagara Escarpment), a particularly high correlation between V and Cr was observed ($\hat{\rho}$ = 0.940) (Table 5; Figure 14F). In these samples, a slight enrichment of V, Sc, Tl, and La was also observed. The precise cause is unknown, but it might relate to the presence of oolitic hematite of the Neda Formation along this part of the escarpment. Although there is a general affinity of V for iron-bearing rocks, most of the samples with high V concentrations are dolostone samples from near the contact. Another stratigraphic difference noted is that iron sulfide-rich samples from the Maquoketa-Neda contact and the Silurian dolostones just above this contact are depleted in Ni, relative to samples from the Ancell and Sinnipee groups

(Figure 14A). Although depleted in Ni, they are slightly enriched in V, Sc, Tl, and La relative to the Ancell and Sinnipee Group samples (Table S1). These differences are likely the result of diagenesis by hydrothermal groundwater. The Maquoketa Shale (Figures 2 and 4) is a regional confining unit that likely isolated the Silurian dolostone units above from the Ordovician sandstones and carbonates below during mineralization. This local anomaly occurs near the only exposure of the Neda Ironstone, which suggests that mineralizing groundwater may have scavenged certain elements locally from the Neda Ironstone instead of being supplied by groundwater migrating through other strata.

Cu concentrations were highest in Oconto County (Ancell Group) and near the Ordovician-Silurian contact in central Brown County (Maquoketa-Neda units). This is consistent with the identification of chalcopyrite in field specimens from Oconto County Prairie du Chien Group samples.

Tuttle *et al.* [59] demonstrated that redistribution of minor and trace elements can occur in rocks with sulfide mineralization due to weathering processes and groundwater flow. While it is likely that remobilization of trace elements may have occurred in the study area, a systematic assessment of this was not performed. Extensive Late Pleistocene glaciation has removed bedrock-derived soil horizons, and most soils have developed on transported materials. In most cases, bedrock samples were obtained from relatively fresh host rocks in quarries, drill cores/cuttings, and excavated road cuts to keep sample weathering effects to a minimum. The most likely bedrock units to have been affected by weathering are the Silurian dolostones (Figure 2), which show extensive karst development [25] and relatively low trace element concentrations (Table 4).

4. Discussion

The origin of the SCH is not well understood, but the fact that the most prevalent sulfide mineralization in eastern Wisconsin is located at the top of the St. Peter Sandstone is well recognized. Enrichment of this zone might be the result of sulfate reduction due to organic carbon near the contact between the Ancell and Sinnipee groups, but this is absent at many locations in the study area. Alternatively, its location at the top of the St. Peter Sandstone is consistent with the possibility of a sour gas cap during mineralization. The presence of sour (H_2S-rich) natural gas migrating with deep groundwater discharging out of the Michigan basin (e.g., [23]) could explain the observed regional and stratigraphic spatial distribution of sulfides at the top of this unit. Precipitation of sulfide minerals would be expected to occur at the site of gas exsolution from brines migrating updip or from a metals-bearing fluid mixing with a preexisting sour gas cap. Further analysis is beyond the scope of this study, but work on the sulfur-isotopic characteristics of the sulfide mineralization is ongoing and may help to resolve this.

Previous work on whole-rock chemistry in the region was limited to a small number of samples because those studies were mostly focused on detailed water quality research in a few locations (Figure 3). Results of the whole-rock analyses from this study were compared with reported metals concentrations for the Ancell Group of Winnebago and Outagamie Counties and other localities in northeastern Wisconsin [29,38,40,60,61]. This procedure allowed generalized comparisons to be made between rocks in the southern part of the study area to those in the northern portion. Additional unpublished data were obtained from Dave Johnson [45] for 69 selected well cuttings from Cambrian rocks in Brown County. In those samples, nickel, arsenic, and cobalt concentrations were generally low, but values of up to 22.5 ppm for Ni, 105 ppm for As, and 93 ppm for Co were detected in different samples, with six samples containing cobalt above 25 ppm [45]. This likely indicates the presence of As, Ni, or Co-bearing minerals at those locations.

Arsenic concentrations relative to iron in this study were compared to those from the studies mentioned above. In general, whole-rock arsenic concentrations varied between 0 ppm and 500 ppm for all studies. However, for three samples reported in previous studies from Winnebago and Outagamie counties, As concentrations ranged between 500 and 743 ppm. While a few samples reported by

Gotkowitz *et al.* [29,40] had higher maximum Co concentrations than those in this study, a comparison of As *vs.* Co data also shows general overlap between the studies.

There were some differences noted between the studies. First, Cr concentrations in 308 of 310 samples in this study were below 40 ppm. The two exceptions were for cuttings samples in a municipal well in central Brown County with Cr concentrations of 66 and 152 ppm. In contrast, 18 of 21 samples analyzed in previous studies [29,40,61] were reported to have Cr concentrations between 100 and 764 ppm, regardless of location, with most concentrations above 200 ppm. Because the locations of some of these data overlap those in our study, these high Cr values seem anomalous and may be due to sample contamination. One value reported by Gotkowitz *et al.* [29,40] for an unmineralized sample of St. Peter Sandstone had a Cr concentration above 500 ppm, even though the sample had no sulfur and less than 1% Fe. Because of this anomalous behavior of Cr, we did not attempt to draw any conclusions about the difference in Cr between our studies and previous studies as they relate to rock geochemistry. It is possible that samples in the previous studies were submitted to a laboratory that crushed the samples with high Cr-steel, which is an alloy known for its toughness and which would be a suitable material for crushing rocks. In this study, contamination of the two higher Cr cuttings samples from this study by drilling equipment cannot be ruled out.

A comparison of Ni, As, and Fe shows general agreement between most samples analyzed in our study and those of Gotkowitz *et al.* [29,40] and Pelczar [38] (Figure 14A,B). In most samples, As is enriched relative to Ni. However, in some samples, Ni appears elevated relative to arsenic (Figure 14C), which is consistent with the presence of Ni-bearing minerals such as vaesite and bravoite.

It is unknown whether northeastern Wisconsin holds economic concentrations of MVT minerals in Paleozoic bedrock. A lack of significant local enrichment, compared to the former ore district in southwestern Wisconsin, could be due to a number of factors. It is likely that a diffuse hydrothermal fluid flow system was responsible for mineralization in the study area. This is consistent with pervasively dolomitized carbonate rocks in which 100 percent of the host-rock limestone has been replaced, along with a regionally prevalent SCH. However, occasional instances of acidic, metals-rich groundwater in water wells reported in the region suggest alteration of enriched sulfide deposits might occur in local areas. Such instances are observed mainly in areas near the Ancell Group outcrop belt (Figure 3) where oxygenated water interacts with the SCH or other sulfides due to natural conditions or aquifer drawdown [29,30,32,34,40]. Farther east (*i.e.*, down dip) from the outcrop belt (Figure 4), oxidizing conditions are less likely to occur, so limited information about the existence of mineralized zones can be inferred from groundwater chemistry alone. Extensive glacial sedimentary cover, poor knowledge of geologic structures such as folds and faults, and geochemical conditions favoring the stability of sulfide minerals, make detection of larger concentrations of sulfide minerals unfavorable in much of the region. Structural style, as well as hydrothermal fluid composition and intensity may also be factors.

It is useful to consider the potential impact of this mineralization on groundwater quality in the region outside of Winnebago and Outagamie counties where special well casing requirements are established. While the upper Ancell Group is likely to be the most significant source of metals due to the abundance of sulfides and the fact that porous media flow dominates, water quality in all units below the Silurian dolostones should be studied more carefully in the future. Because the distribution of sulfide minerals is highly heterogeneous, their locations and intensities along fractures, faults, bedding planes, and in vugs are difficult to predict locally. Fracture and bedding plane-dominated flow are likely to amplify the interaction between groundwater and sulfide minerals under the right redox conditions. In addition, certain stratigraphic zones of dolostone with high intercrystalline porosity, such as one about 6 m (20 feet) above the base of the Platteville Formation, also contain abundant Fe-sulfides locally (Figure 7A). For these reasons, the average concentrations of metals within the specific units are probably not so important. Rather, the complex distribution of sulfide minerals, redox conditions, and fluid flow pathways likely has a much larger influence on water quality in the carbonate units.

Additional MVT-related groundwater quality issues persist in this region that are relevant to this discussion. High dissolved fluoride (up to 3 mg/L) and exceptionally high strontium concentrations (over 10 mg/L) are present in groundwater throughout parts of the study area, especially in the Cambrian and Ordovician strata [13,56,58]. It is likely that these two ions are related to the presence of fluorite, celestine, and strontianite in the bedrock. Fluorine was not part of the whole-rock chemical analysis package used in this study, but microscopic and macroscopic fluorite was observed in strata from the region. Strontium whole-rock concentrations were generally low (< 200 ppm in 304 of 310 samples), with the highest concentration observed at 731 ppm. However, microscopic and macroscopic celestine and strontianite occur in the study area and are the likely sources of high dissolved strontium [13,51,58]. The fact that high whole-rock Sr concentrations were not observed in this study further emphasizes the important conclusion that many of the minerals having negative impacts on water quality in the region are widespread, but heterogeneously distributed.

5. Conclusions

This article provides an improved understanding of the bedrock chemistry in northeastern Wisconsin, USA and places it in the context of groundwater quality problems facing the region resulting from sulfide mineralization. Field, laboratory, and SEM-EDS observations; regional whole-rock geochemical sampling; and a stratigraphic analysis were conducted on Paleozoic bedrock. This study provides the first detailed description and whole-rock geochemical analysis of MVT-bearing rocks in northeastern Wisconsin.

Four major conclusions can be drawn from the study. First, we document that an expanded region of sulfide mineralization, previously described in Winnebago and Outagamie counties, extends northward into Brown, Shawano, Oconto, and Marinette counties. This includes both the highly enriched sulfide cement horizon (SCH) at the top of the Ancell Group, as well as disseminated metal sulfides in other parts of the section. It is now clear that the SCH stretches throughout most of eastern Wisconsin and into the upper peninsula of Michigan.

Second, the study provides the first qualitative and quantitative assessment of the stratigraphic distribution of sulfide mineralization and metals concentrations in Paleozoic bedrock in the region. On a local scale (meters to kilometers), the distribution of MVT minerals is heterogeneous because they occur in vugs, fractures, and along particular bedding planes. The two units with the highest metals concentrations are the Ordovician Ancell Group and the Maquoketa-Neda formations. Somewhat lower concentrations of metals generally occur in the Cambrian sandstones, the Sinnipee Group dolostones, and the Prairie du Chien dolostones. The lowest metals concentrations are typically found in the Silurian dolostones in the eastern part of the study area.

We also present the first descriptions of discrete Ni and Co-bearing mineral phases in northeastern Wisconsin, along with a complete list of MVT-related minerals known from the region, which is more extensive than previously recognized. Field and SEM-EDS investigations have documented the existence of previously unknown minerals for the region, including vaesite, bravoite, malachite, possibly erythrite, and others.

Finally, the results of this study provide a regional foundation for current and future groundwater studies in the region in order to better understand the sources of dissolved arsenic and other metals in the groundwater of northeastern Wisconsin. Based upon the bedrock geochemistry, the potential for groundwater quality problems from arsenic and other metals is greater than previously recognized for counties in the northern portion of the study area. In addition, the discovery of new minerals (bravoite and vaesite) explains the origin of dissolved nickel and cobalt that has been observed in groundwater above State of Wisconsin health standards for over 25 years. We hope this work will provide a baseline for future economic geologists and groundwater specialists in this region and in others with similar geology.

Supplementary Materials: The following are available online at www.mdpi.com/2076-3263/6/2/29/s1, Table S1: Sample numbers, locations, descriptions, and selected whole-rock geochemistry for 310 samples. Table S2A: Full raw analytical results for the whole-rock ICP-AES analyses of samples from 2007 to 2008. Table S2B: Full raw analytical results for the whole-rock ICP-AES analyses of samples from 2013. Table S2C: Expanded table showing estimated Pearson's r and Spearman's ρ correlations amongst $\log_{10}$ -transformed variables for selected elements in all samples. Table S2D: Table showing estimated Pearson's r and Spearman's ρ correlations amongst $\log_{10}$ -transformed Ni *vs.* As, listed by stratigraphic interval (Precambrian excluded). Figure S3: Box-plots for selected metals from both the full set of samples and the "matrix" subset of samples.

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Author Contributions: John A. Luczaj coordinated field observations and collections, along with SEM investigations, and wrote the majority of the manuscript. Michael J. McIntire assisted with sample preparation and data analysis. Megan J. Olson Hunt performed the statistical analysis and constructed the plots.

Conflicts of Interest: The authors declare no conflict of interest.

Abbreviations

The following abbreviations are used in this manuscript:

MVT	Mississippi Valley-type
ICP-AES	Inductively Coupled Plasma—Atomic Emission Spectroscopy
SEM-EDS	Scanning Electron Microscopy—Energy Dispersive Spectroscopy
SCH	Sulfide Cement Horizon
PDC	Prairie du Chien Group

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April 10, 2024

County Clerk
Elizabeth Otto
571 County Rd A
Green Lake, WI 54941-8630

Re: Conditional Use Permit Hearing Process for County K Quarry

Dear Ms. Otto,

We understand that the Land Use Planning and Zoning Committee (LUPZC) has tentatively scheduled to begin the hearing process on the non-metallic mine application, County K Quarry, at your May 2, 2024 meeting.

In light of past procedural irregularities during the Skunk Hollow Mine application and hearing process in 2022, the Green Lake Association is concerned about the adherence to proper procedures in the current application and hearing process for the proposed County K Quarry. Our concerns are as follows:

1. A Town Board Action Form sent by the LUPZ Department ("Department") to the Town of Brooklyn ("Town") on March 13, 2024 allows the Town to respond with "no action taken." The Green Lake County Code requires the affected Town's recommendation on a pending CUP; the code does not allow for no action by the Town.
2. This same Town Board Action Form lists a return date that does not allow for sufficient time for the Town to undergo its mandatory process to review the CUP and provide a recommendation.
3. The applicant has the burden of proof in establishing compliance with the applicable CUP standards. Pre-hearing opinions by staff in communications to the LUPZC on the applicant's compliance with the applicable CUP standards is improper.

<u>Issue #1: "No Action" Option Inappropriately Included on Town Board Action Form</u>

The current process allows for the Town to bypass a CUP recommendation, which undermines the integrity of the procedure. See the attached "Town Board Action" form sent by the LUPZ Department to the Town of Brooklyn. The Town Action Form provides three options: 1) Town does not object to and approves of request, 2) No action taken, and 3) Objects to and requests denial of request.

The inclusion of "take no action" on the provided Town Action Form is misleading because it allows the Town to avoid its own hearing process. The term "shall" in Section 350-56(B) <u>signifies a mandatory requirement.</u> The LUPZC <u>*shall*</u> consider the recommendation of the affected Town and the LUPZC <u>*shall*</u> find substantial evidence that the standards are satisfied.

Additionally, the Town's recommendation holds significance as they are the most affected by the proposed CUP. Their input provides valuable insights into the potential impacts on residents and the environment. We need to know more about what is being proposed and the possible environmental impacts of the proposal. The initial hearing held by the Town provides an opportunity to gather and assess that information.

Issue #2: Town Board Action Form Deadline Offers Inadequate Time for Mandatory Process

The enclosed Town Board Action Form includes a return date of April 19, 2024. This date does not allow adequate time for the Town to conduct the mandatory public hearing through its Plan Commission. According to the Town of Brooklyn's website, the "function and duty of the Plan Commission [is] to review all…zoning changes and forwarding said recommendation to the Town Board."

The hearing process by the Town of Brooklyn could take 60 days or more for a hearing of this complexity. As we understand the Town's process:

1. The Department **sends the CUP application to the Town's Chair/Clerk** along with the Town Board Action Form requesting the Town's recommendation.
2. The Chair/Clerk **forwards the CUP application to the Town's Plan Commission**.
3. Pursuant to public notice, the **Town Plan Commission conducts a public hearing on the CUP**, allowing the applicant and the public to present their views, including the opportunity to present substantial evidence in opposition to the proposed CUP. After deliberations, the Plan Commission votes on a recommendation to approve, approve with conditions, or deny the CUP, reporting its decision to the Town Board.
4. The Town Board reviews the Plan Commission's recommendation and the CUP application, then **votes on its final recommendation to the LUPZC.**

Considering the technical nature of non-metallic mine proposals, scheduling and preparation are crucial for a fair, impartial and informed decision-making process.

If the LUPZC plans to begin the hearing process on May 2, 2024, we suggest that the LUPZC use that date for scheduling by asking these and other relevant questions:

1. Has the Town given its recommendation? If not, when can we expect it?
2. How long will the applicant's presentation be? Will there be expert testimony? Who are those experts?
3. The public needs to hear the applicant's presentation before responding at a later date.

Issue #3: Pre-hearing Opinions Don't Place the Burden of Proof on the Applicant

We emphasize the importance of impartiality in public hearings. The purpose of the public hearing is to inform both the public and the LUPZC about the proposed CUP, allowing for questions, concerns, and objections, as well as determine whether the CUP applicant has satisfied the applicable standards for issuance of the CUP with substantial evidence.

However, *pre-hearing opinions* from staff regarding compliance with standards is inappropriate, as the burden of proof lies with the applicant. This type of pre-hearing opinion can be seen on pages 12-13, 21-

22, 30-31, 43-44 of the LUPZC's packet for its April 12, 2024 meeting. Only after all parties have had the opportunity to present substantial evidence at the hearing is the LUPZC in a position to determine whether the applicable CUP standards have been satisfied.

Therefore, to ensure clarity and fairness in proceedings, we propose meeting with the LUPZC's legal counsel to establish Rules of Procedure for the upcoming County K Quarry hearing tentatively scheduled for May 2, 2024.

Thank you for your attention to these matters. We look forward to working together to ensure a transparent and equitable process for all involved.

Sincerely,

Stephanie Prellwitz
Chief Executive Officer
Green Lake Association

cc: Green Lake County Board of Supervisors
Matt Kirkman, Land Use Planning & Zoning Director
Cate Wylie, County Administrator
Jeffrey Mann, Corporation Counsel
Mike Wuest, Chair, Town of Brooklyn
Kathleen Morris, Clerk, Town of Brooklyn

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Via Email

May 6, 2024

Jeffrey Mann, Corporation Counsel
Green Lake County
571 County Road A
Green Lake, WI 54941
jmann@greenlakecountywi.gov

Chuck Buss, Chair
Green Lake County Land Use Planning &
Zoning Committee
571 County Road A
Green Lake, WI 54941
cbuss@greenlakecountywi.gov

Re: CUP Hearing for Kopplin & Kinas Mine

Dear Attorney Mann and Chairman Buss:

It was nice to meet you in person last week at the Land Use Planning & Zoning Committee ("Committee") meeting on Thursday, May 2. This letter is to follow up on a process issue I alluded to in my comments, when I was speaking for the Green Lake Association ("GLA") and Green Lake Sanitary District, and to encourage the Committee to re-open the public hearing to allow all those who wished to comment to do so.

The May 2 meeting started at 9:00 AM and adjourned at approximately 9:20 AM. As noticed, a public hearing commenced at approximately 9:30 AM for four items, the fourth of which was a proposed conditional use permit ("CUP") for Kopplin & Kinas mine. When the time came for the hearing on Item 4, it was announced that public comments would be limited to three minutes/person, and a total public hearing of fifteen minutes. I took one of the spots and made an objection to the short amount of overall public comment time allowed at the hearing. When the 15-minute time expired, only six people had had the opportunity to speak, with many other still in line at the podium (including some members of GLA). Even the applicant did not get to speak. We estimate there were approximately ninety people in the room.

Similarly, the Committee would not accept written submissions people attempted to provide the Committee at the hearing, or even (in the case of a document I sent) the day before. Only once the Committee voted to table a decision on the CUP, after the public hearing had been closed, did the Committee indicate it would accept written submissions. I provided our documents—a memo from Dr. Steve Gaffield and a map prepared by GLA—to the Planning Director to distribute to the Committee members after the hearing was over.

As you know, conditional use proceedings are quasi-judicial proceedings to which due process applies. *See, e.g.,* Rebecca Roberts, Center for Land Use Education, UW-Stevens Point, Plan Commission Handbook at 2 (2nd ed. 2012).[1] Because "zoning decisions implicate important private and public interests," due process concerns in zoning proceedings are paramount. *Marris v. City of Cedarburg*, 176 Wis. 2d 14, 25, 498 N.W.2d 842 (1993). "Notice and hearing provisions are invariably intertwined with due process considerations." *Oliveira v. City of Milwaukee*, 2001 WI 27, ¶ 31, 242 Wis. 2d 1, 17, 624 N.W.2d 117, 124. The "ultimate test" to determine whether a lower tribunal afforded due process was afforded "is the presence or absence of fair play, which includes the right to present competent evidence." *Osterhues v. Board of Adjustment for Washburn County*, 2005 WI 92, ¶ 32, 282 Wis. 2d 228, 698 N.W.2d 701 (internal quotations and citations omitted).

In *Roberts v. Manitowoc County Board of Adjustment*, the court considered whether hearing procedures on a conditional use permit for a proposed wind farm violated due process principles. 2006 WI App 169, ¶ 21, 295 Wis. 2d 522, 721 N.W.2d 499. In that case, the board limited speakers at the public hearing to five minutes apiece. Sixteen people spoke against the CUP and only one was cut off at the five-minute mark. The board repeatedly asked, "anyone else want to speak against this" several times, and no one did. As the court found, "all who wished to speak had the opportunity to do so." *Id*. ¶ 26 (affirming board process).

The same cannot be said here, where only a handful of people were able to speak on an issue of significant public interest, and several who wished to speak were not allowed

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[1] Available at https://www3.uwsp.edu/cnr-ap/clue/Documents/PlanCommissions/PCHandbook.pdf

to do so. This not only raises due process concerns, but contravenes the very purpose of a duly noticed public hearing. *See Weber*, 209 Wis. 2d at 234; *see also Step Now Citizens Grp. v. Town of Utica Plan. & Zoning Comm.*, 2003 WI App 109, ¶ 58, 264 Wis. 2d 662, 692–93, 663 N.W.2d 833, 848 (stating that the purpose of the notice is to "provide the public with a right to appear ***and voice objections***") (emphasis added). It was also not clear what the policy purpose of the overall fifteen-minute limit was.

We appreciate the Committee for delaying a decision to take more time to consider the highly technical matters presented by this CUP, and for accepting testimony from Dr. Gaffield outside the hearing and accepting our documents afterwards. However, in order to allow all persons who are interested in addressing the Committee do so, Green Lake Association and the Green Lake Sanitary District respectfully request that the Committee re-notice and re-open the public hearing on this matter. In addition, we suggest that if written comments are only allowed by a certain date ahead of the hearing, that that date is publicized and made known in advance so that members of the public will know when they must provide these submissions.

Thank you for your consideration. I'd ask that this correspondence be distributed to all the Committee members.

Sincerely,

PINES BACH LLP

Christa O. Westerberg

COW:hej

cc: Cate Wylie, County Administrator *via USPS Mail*: 571 County Road A
Green Lake, WI 54941

May 7, 2024

Re: CUP Hearing for Kopplin & Kinas Mine

Pines Bach LLP
c/o Attorney Christa O. Westerberg
122 W. Washington Ave, Ste 900
Madison, WI 53703

Dear Attorney Westerberg,

It was nice meeting you, too, last week in person. Please know that Green Lake County is in receipt of your most recent letter of May 6, 2024. While I appreciate your perspective, as well as the passion exhibited by your clients, I do not share your legal opinion on how our CUP review hearings must be run.

In your letter, you cite to a variety of opinions, all of which revolve around the concept of due process afforded to *parties* in an action. In *Marris v. City of Cedarburg,* 176 Wis. 2d 14, 498 N.W. 2d 842, you refer to the Court's concern for upholding due process in zoning proceedings. However, the due process rights discussed in *Marris* were those belonging to an actual party, namely the property owner who appealed a board of zoning decision. Conversely, your clients, while deeply committed to preserving Green Lake, are not parties at this stage in the proceedings.[1] And while it's true that the review process has a built-in portion dedicated to "public comment," said comments are neither inherent to the process nor without restriction. The exception, however, is in reclamation permit hearings whereat certain residents residing, owning property, or maintaining a principal place of business within 300 feet of a boundary are vested with a right to speak.[2]

Similarly, in *Osterhues v. Board of Adjustment for Washburn County,* 2005 WI 92, 282 Wis. 2d 228, 698 N.W.2d 701, the Court examined the due process afforded to an "aggrieved person." However, the *aggrieved* in *Osterhaus* were surrounding property owners whom the County contacted prior to the hearing. Moreover, the posture of the proceedings in *Osterhues* were markedly different than that of the immediate case. In

[1] Green Lake County Code §350-56.

[2] Green Lake County Code §323-17.

Osterhues, the case had proceeded to that county's Board of Adjustment. Alternatively, the immediate case remains before the Planning and Zoning Committee. This is an important distinction because it isn't until a case reaches the Green Lake County Board of Adjustment that "any person aggrieved" first obtains the right to seek an appeal.[3]

Lastly, you refer to *Step Now Citizen Grp. v. Town of Utica Plan. & Zoning Comm.,* 2003 WI App 109, 264 Wis. 2d 662, 663 N.W.2d 833, emphasizing comments from an earlier case, *Gloudeman v. City of St. Francis,* 143 Wis.2d 780, 784 (1988), wherein that Court stressed that the purpose of notice is to "provide the public with a right to appear and voice objections." However, after taking into account that the *Gloudemans* actually lived adjacent to the property in question, it's clear that the Gloudemans were parties, and therefore, had a much stronger argument for standing than anyone who's thus far publicly spoken regarding the current CUP request. In short, *Step Now Citizen Grp.* does not stand for the proposition that an unlimited number may speak at CUP review hearings in the absence of such a guarantee by our County's ordinances.

Notwithstanding our disagreements, I concur that the applicants, Kopplin & Kinas, did not receive an opportunity to speak at the previous hearing. As such, and because they are a party carrying the burden to demonstrate that the application should be granted, I will be suggesting to the Committee that it offer them the opportunity to speak outside of any further public comment section that might be offered.

Regards,

Jeffrey A. Mann

Jeffrey A. Mann
Corporation Counsel

JAM/*tjt*

[3] Green Lake County Code §350-62.

Hi my name is Ida Mae Barclay Neuenfeldt. I live at N5139 Brooklyn G road, . My extended family has farmed this land for over 100 years .My father bought this farm in the early 40's.

I am a registered nurse who worked in this profession for 35 years. I am concerned about the health and environmental impact of the proposed mine on our family and future generations.

Moving the mine ½ mile does not change the environmental impact on Powell Springs Mitchell Glen Dakin Creek and White Creek,

Is there any contingency plan to evaluate sulfite, arsenic and nitrate levels before the mine is approved? These elements can affect the water , well and air quality in the neighborhood. They all ~~have~~ dangerous and /or deadly cancer causing agents.
are

. I feel we have every right to have these issues addressed before mine approval. These are severe health issues that may not surface until years later and then it will be way too late to resolve them.

AS I sit in my living room and look to the east I see a irrigation system that has been abandoned since 2012 after 106 hours of operation due to extremely high levels of arsenic, nickel and sulfides on the Machovich farm.

My other concern is a selfish one. A real estate property impact evaluation of our property was completed. The conclusion was a decrease of value of 30% or approximately $324,500 before the new evaluation .

With these facts I again say no.

Hi My name is Ernie Neuenfeldt. My wife and I live at N5139 Brooklyn G Road, on the farm that Ida was born on , We purchased the farm from Idas Mom in 1985, Since that time we have built

Diversion dikes ; waterways ; and planted thousands of trees, In 2011 we built our dream retirement home and shop, It is a beautiful peaceful wonderful environment to live in.,

The Couty kk Mine is nothing other than the Skunk Hollow mine moved ½ mile up hill to the east right next to Cole Oil Co The runoff from the Retzlaff property drains through the Steve Machkovich farm fields Tom Pennfield' s farm through the corner of my farm and on its way to Dakin Creek and then Green Lake. The blasting residue,diesl hydrolic oil gasoline or any other pollutants used in the gravel pit will end up in Green Lake through surface runoff or under ground waterways.

Wells farming and Green Lake will be adversely affected

Thank vou ,,,

Laura Lind
Resident of 118 Hall Street, Ripon, WI

But today I am speaking as Executor of the Neuenfeldt Irrevocable Trust which includes 76 acres of pristine, meticulously maintained property, located ½ mile from the proposed mine site. The immediate area is a harmonious mix of farmland, recreational and residential properties. Residents and tourists enjoy the beauty of the woodlands, fresh water springs, and waterways, including Green Lake. My childhood is filled with memories of playing in the woods and enjoying the beautiful landscape of Green Lake County.

After critical review of the tenets of the conditional use permit, I have found strong evidence that the requested permit does **NOT** meet many of the tenets required for approval of conditional use permits.

1. Will not have a negative effect upon the health, safety, and general welfare of the occupants of the surrounding lands
2. Will be designed, constructed, operated and maintained so as to be harmonious and be appropriate in appearance with existing or intended character of the general vicinity and that such a use will not change the essential character of the same area
3. Will not be detrimental to property in the immediate vicinity or to the community as a whole

Denial of the conditional use permit proposed by Koplin & Kinas is essential for protection from both physical and financial harm for current, and future generations of my family and all residents of Green Lake County.

As assessed 2 years ago by Real Estate Dynamics, the minimum financial damage to our family alone is estimated at $200,000 just for the loss in property value for being in the close proximity to an active quarry/mine site. This estimate would grow exponentially with any common complications from mining; including flooding, noise and air pollution, contamination of ground water sources, structure foundation degradation from blasting vibrations and extinction of natural fauna and flora of this unique area. Proximity analysis of properties in the immediate area of the mine would suffer an estimated property value loss of $1,819,000 for the community and these numbers are likely higher today than when assessed 2 years ago.

The impact of a mining facility versus the current, intended use of the area within a Farmland Preservation District, would have a negative impact on the health and well being of the entire neighboring communities due to noise, dust, and air pollution. Attached to my statement, I have included a report that clearly demonstrates that the impact of mining is significantly more noxious than farming, and would clearly impact the existing and intended character of the general vicinity and the mine would change the essential character of the entire area.

Approval of this conditional use permit would have significant, detrimental impacts on all local residents. It would financially devastated land owners with a 25-30% reduction in property values and has the potential to have a devastating economic impact on Green Lake County as a whole. It would significantly impact the health, safety, and general welfare of the occupants of the surrounding land by increasing traffic, noise and pollution. Given these facts, there is no way that Kolpin & Kinas could design, construct, operate, and maintain a mine site at this location that would be harmonious with the existing character of this beautiful, unique community.

Please refer to the attached supporting documentation for Comparison of Ag Use with Mining and the Estimated Property Value Impacts Executive Summary by Real Estate Dynamics (A full report can be made available for review as needed).

Comparing Ag Use with Mining Use

In their document, "Consideration and Response to Applicable Statute, Ordinances and Standards," Kopplin and Kinas make the claim about the proposed Skunk Hollow Mine:

> *"The activities proposed in the mine Application are more highly restricted than the activities expected in the AG-1 district, and unlike agricultural operations, will be subject to the terms and conditions of a special exception permit regulating noise, dust, odors, heavy equipment, use of chemicals, and long hours of operation, activities unregulated by the County when under agricultural use."*

Yet, **mining is a much more noxious land use activity than mining**, as demonstrated by the following.

1. ANNUAL OPERATION TIME ON PARCEL

Time Associated with Ag Use

The 40-acre field at the proposed Skunk Hollow Mine (zoned A1) was most recently **double-cropped with green peas and soybeans.** This cropping system requires the following passes across a field:

Green Peas	***Soybeans***
Tillage: 2 passes	Tillage: 0 passes (no-till fields)
Planting: 1 pass	Planting: 1 pass
Spraying: 1 pass	Spraying: 1 pass
Harvest: 1 pass	Harvest: 1 pass
5 trips/year [1]	3 trips/year [1]

It is reasonable to assume a farmer can plant or harvest about **8 to 10 acres/hour** [1]. A 40-acre field, as proposed, requires **4 hours per pass** using the most conservative estimate.

- Green Peas: 20 hours/year
- Soybeans: 12 hours/year

Therefore, the **total time spent to double-crop 40 acres with green peas and soybeans is 32 hours/year.** This agricultural activity is intermittent and seasonal.

Time Associated with Mining Use

The applicants do not state hours of operation in their application, and rather state that hours will "be specified in the Conditional Use Permit." The CUP approved on July 7, 2022 specified hours of operation from Monday through Friday from 5:30 AM to 6:00 PM and on Saturday from 6:00 AM to 3:00 PM.

This equates to 3,250 hours/year during the weekdays and 468 hours/week on Saturdays, excluding holidays.

Therefore, the **total time spent to operate mining equipment is around <u>3,718 hours/year</u>, which is <u>11,619% more time spent on the parcel mining versus farming</u>.** This mining activity is six days a week, all year long.

[1] J. Hebbe, personal communication, December 20, 2022

2. EQUIPMENT USED ON PARCEL

Equipment to operate the proposed Skunk Hollow Mine would use **five times the equipment** to double crop the same piece of property as an agricultural field. Use of this agricultural equipment is seasonal, so that time is only between roughly April/May through October—and not year-round, as in mining operations.

Agricultural Land Use ***Equipment used to double crop the A1 parcel with green peas and soybeans*** [1]		Mining Land Use ***Equipment to be used for the proposed Skunk Hollow Mine, per the applicant*** [2]
1. Tractor 2. Vertical Tiller 3. Self-Propelled Sprayer 4. Pea Combine 5. Soybean Combine		1. Dozers 2. Scrapers 3. Excavators 4. Haul Trucks 5. Graders 6. Drill Rigs 7. Crushing Units (Primary, Secondary, Tertiary) 8. Screening Units 9. Washing Units 10. Conveyors 11. Wheeled Loaders 12. Skid-Loaders 13. Service Trucks 14. Crane 15. Haul Trucks 16. Generators 17. Pumps 18. Truck Scale 19. Scale House 20. Dump Trucks 21. Forklifts 22. Tractor & Seed Spreader 23. Roller 24. Water Truck 25. Sweeper
5 pieces of equipment to farm (double crop) the parcel [1]	vs.	**25 pieces of equipment, per applicant, to mine the parcel** [2]

[2] Appendix C, Kopplin & Kinas Co., Inc., Aggregate Processing & Construction Equipment

3. NOISE FROM EQUIPMENT

The **equipment required to mine the proposed Skunk Hollow Mine site would be substantially louder than equipment to farm the same parcel.**

There are *28 homes within ½ mile of the site* that would be subjected louder equipment if the parcel is mined instead of farmed. This louder equipment would be used 11,619% more of the time than agricultural equipment—which is only used seasonally, from May/April through October.

A recent study found that: "For all situations, **predicted noise levels exceeded CPCB [Central Pollution Control Board] limits within the... nearby residential area. Residential areas near the crusher plants are vulnerable to increased noise propagation.**" [3]

The same study continues: **"Expansion of mines will result in increase in productivity but might pose a threat to the wellbeing of the people living nearby and also to the mine workers."** [3]

Equipment noise measured in decibels (dB) demonstrates this difference.

Agricultural Use	Mining Land Use	Reference Noises
Tractor: 85-100 dB [7]	Screening tower: 105-107 dB [4] Secondary crusher: 97-99 dB [4] Quarry blast: Up to 140 dB [5 6] Back-up beeper: 97-112 dB [7]	Lowest sound audible: 0 dB [7] Babbling stream: 50 dB [7] Average conversation: 60 dB [7] Busy restaurant: 70 dB [7]

Quarry blasts, at 140 dB, "may actually cause pain the ear," [6] but occur periodically in mining operations. Though less loud, at 97-112 dB, back-up beepers occur daily in mining operations. The National Academy of Engineering cited **"backup beepers as one of the six top noise sources people associated with behavioral and emotional consequences."** [7]

Noise due to seasonal agricultural use is buffered by vegetation, whereas mining occurs even in times when the leaves have dropped and the there is no audial (or visual) buffer.

4. DISRUPTIVE GROUND VIBRATIONS

Agricultural land use does not produce ground vibrations, contrary to mining operations. A recent study used a case study of two residences near subsurface blasting found **direct connects between nearby blasting and damage to homes, even when individuals blasting events were below governmental "safe" limits**:

[3] Manwar VD, Mandal BB, Pal AK. Environmental propagation of noise in mines and nearby villages: A study through noise mapping. Noise Health 2016;18:185-93.
[4] Bauer E.R., and D.R. Babich. Noise assessment of stone/aggregate mines: six case studies. National Institute for Occupational Safety and Health (NIOSH). 2007.
[5] P.K Singh, M. Klemenz, and C. Niemann-Delius, "Air Overpressure Airblast generation, propagation and prediction", QM February 2005
[6] Smith DW. Hearing loss protection for agricultural workers. AgriLIFE Extension, Texas A&M System.
[7] Holzman DC. Vehicle motion alarms: necessity, noise pollution, or both? Environ Health Perspect. 2011 Jan;119(1):A30-3. doi: 10.1289/ehp.119-A30. PMID: 21196143; PMCID: PMC3018517.

- "The houses experienced damage, and it was concluded that **the damage was the result of the structural response to the ground vibrations**." [8]

- "Ground vibrations resulting from subsurface construction blasting are usually monitored to assess their impact on nearby structures. **Currently, there are no unified or widely accepted criteria for the safe limits of ground vibrations** (Svinkin 2004)." [8]

- "Data recorded for the two case studies of houses located nearby subsurface blasting were examined. It is evident form the readings of the seismographs... that the PPVs recorded for all blasting events were well below 51 mm/s; the safe limit required by the MoI [Ministry of Interior] and defined in most of the currently available safe limit criteria [ST-051-8]... **Despite satisfying all these criteria, threshold cracks, and even structural cracks, appeared in these [two] houses after the excavation by blasting**." [8]

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[8] International Forensic & Litigation Appraisal Services. The impact of blasting quarries and the need for adequate setbacks. 2020.

Real Estate Dynamics, Inc.

December 7, 2022

Ernie Neuenfeldt
Neuenfeldt Family Irrevocable Trust
c/o Pines Bach LLP
122 W Washington Ave, Ste 900
Madison, WI 53703

Re: The estimate of the property value impacts from a proposed limestone mine to the market value of the property located at N5139 Brooklyn G Road in the Town of Brooklyn, Green Lake County, Wisconsin

Dear Mr. Neuenfeldt:

At your request, Real Estate Dynamics, Inc. (REDI) has appraised the property impacts to the market value of the above-mentioned property. The property was appraised for the purpose of documenting any change in market value given the proximity of the property to the proposed Skunk Hollow Mine (the Mine).

The date of value is November 25, 2022. We have performed a highest and best use analysis as a prelude to our value estimate in which we address the use issues facing the property, within the constraints of market forces. Craig D. Hungerford inspected the property on November 25, 2022. We estimate the damages to the market value of your property to be $324,500 based on the potential impacts from the proposed Mine.

The report summarizes our methodology, data, analysis and conclusions. If we can be of any additional service, please feel free to contact us.

Sincerely,

REAL ESTATE DYNAMICS, INC.

Craig D. Hungerford

Craig D. Hungerford, CRE
President

Executive Summary

- Real Estate Dynamics, Inc. (REDI) has estimated the impact to market value caused by the proposed and adjacent Skunk Hollow Mine on a property located at N5139 Brooklyn G Road, in the Town of Brooklyn, Green Lake County, Wisconsin. The property is identified as parcel number 004-00780-0000.

- The purpose of the report is to estimate market value and assist the owner, the Neuenfeldt Family Irrevocable Trust, and their agent(s) with concerns over damages that may result from the proposed Skunk Hollow Mine on the adjacent property. The Skunk Hollow Mine is a proposed 80 acre non-metallic limestone mine located near residential homes and environmentally sensitive areas, including Powell Spring, Mitchell Glen, White Creek and Dakin Creek.

- The subject property consists of one parcel, 004-00780-000, which is improved with a single family home and a detached garage.

- The subject property is zoned A-1 Farmland Preservation District. Nonmetallic mining is considered a conditional use and must comply with the requirements in the A-1 district.

- Given the property's location, surrounding uses and zoning we believe that agriculture and residential use would be most appropriate and most probable for the subject property as vacant or improved. Therefore, the highest and best use of the subject site is as agriculture and residential use.

- The Sales Comparison Approach is used to estimate value.

- Given the rural nature of the property and the potential impact of the nonmetallic mine on the subject property, we estimate the damages to the market value of your property to be $324,500.

- We have applied the proximity analysis to other rural residential properties in the immediate area of the mine including the adjacent Skunk Ridge Lane neighborhood. The value estimates are based on 2022 assessed values. The value impact is estimated at $909,500. If damages were based on market value, they could be at least double the assessed value, or approximately $1,819,000.

VALUE SUMMARY	
Value of N5139 Brooklyn G Road	$665,000
Proximity Damages	$199,500
Flooding Damages	$125,000
Total Damages	$324,500
Net Value of N5139 Brooklyn G Road assuming the Mine is developed	$340,500

Speaking Against a Quarry at Cty. K in the Town of Brooklyn
Submitted by Susan McConnell, N4975 Craig Rd., Green Lake
May 1, 2024

What do you see when you open the Green lake County web page?
When I opened the page last week this is what I saw - A series of beautiful photos found in and around Green Lake… A stone wall lining a road inside the American Baptist Assembly grounds scattered with red & yellow fall leaves; clean water flowing swiftly over rocks in a stream; a calm reflective water over the lake shore near a pier; a rustic wooden bridge in the woods; a gorgeous green field that seems to go on forever under a beautiful blue sky; a peaceful stretch of river with reeds & grass & overhanging trees….

This is where we live. This is where YOU live. This is Green Lake County.
This is what we aim to protect, and we've been here before. This is the 3rd time the neighbors from Skunk Hollow have gathered together to protect our sacred water sources & the lake that these waters flow into.

In 2016 Green Lake County adopted its Farmland Preservation plan. The use of land within this designation is considered an Exclusive Agricultural Zone (called A-1), and specifies it as uniquely special for farming. The following information is from 'the plan', page 2: "GL County has a strong history of preserving agricultural land & natural resources in order to maintain a high quality of life & a strong economy. Due to the importance of agriculture within the local & regional economy, it is necessary to encourage farmland preservation, protect natural resources, and minimize conflicts between farm & farmland uses."

Additionally, "This plan was prepared in accordance with the Farmland Preservation Chapter of the Wisconsin Statutes (Chapter 91) - It establishes public policy in support of farmland preservation. "Goals, objectives & recommendations stated in this plan reflect deliberations among GL County Planning & Zoning Staff, the Farmland Preservation Ad-Hoc Steering Committee, UW-Extension, and GL County Land Use Planning & Zoning Committee.

The plan shows a chart of the current 19 operating quarries in GL Cty. 18 are located either in M-1 or unzoned areas. Only 1, the Koplin & Kinas Morris pit on McConnell Road is in an area zoned A-1. Unlike the present situation, this quarry was approved because there was little or no public opposition. Perhaps also as in this CUP proposal little time was allowed in which residents had time to act. In short, all the other mining companies & GL Zoning board have followed the zoning plan which recognizes the need for non-metallic mining, yet at the same time respects the efforts of the GL Planning & Zoning initiatives to preserve prime farmland.

Another major concern to siting the K Quarry in this location will be an industrial use driveway opening onto Hwy. K. This roadway is extremely busy with cars, semi-trucks, school bus travel & daily contractor trucks, as well as farm equipment. Fully loaded dump trucks, leaving & entering at an estimated 2 per hour over the course of a 10 hour work day is a serious danger. On Fridays and Mondays the traffic is heavier as weekend visitors come to the lake hauling boats, four-wheelers, snowmobiles and camper trailers. These vehicles already travel too fast. It will become even more hazardous.

To permit an open pit mining operation within a farmland preservation district so close to 3 protected conservancy areas containing springs & ground water sources, along with a significant residential population goes against the stated goals of Green Lakes own comprehensive land use plan. Today I urge you to slow down this CUP application by denying, or at the very least tabling the request. Give everyone involved time to do what is right for the land, the water, the people who live & work here, and the applicant. Think about what the future holds for everyone in Green Lake County.

technical memo

K QUARRY PERMIT APPLICATION REVIEW

Date |	04/30/2024
To / Contact info |	Lisa Reas, GLSD
From / Contact info |	Steve Gaffield PhD, PE (Wisconsin) & Stu Grubb, PG (Minnesota), EOR
Regarding |	Summary of review & recommendations

Permit Application Review

Proposed Mining Depth and Materials

The proposed K Quarry layout and operation is very similar to the formerly proposed Skunk Hollow mine, with an open pit to be developed in phases to extract dolomite of the Sinnipee Group above the water table. Koplin & Kinas (K&K) have estimated the depth to groundwater and the depth to the base of the Sinnipee dolomite based on information available in Well Construction Reports from the Wisconsin Department of Natural Resources (DNR).

K&K proposed to mine no deeper than 10 ft above the elevation of the water table at the time mining begins. Over several decades, the water table in the region has been measured to fluctuate over more than 10 ft (Figure 1). In addition, the Wisconsin Initiative on Climate Change Impacts predicts that groundwater elevations will rise in the next few decades in response to increased precipitation (Hein and others, 2021). Therefore, there is a possibility that groundwater could rise more than 10 ft after mining begins, so that the proposed 10-ft separation would not ensure that the mine would remain above the water table.

The elevation of groundwater is proposed to be established with 4 monitoring wells to be installed at the property, which is appropriate if they are constructed as water table observation wells. This will provide valuable information for all parties involved to establish the final depth of the pit and the volume of material available for extraction.

The proposal also states that mining will get no closer than 5 ft to the sulfide cement horizon (SCH) that is present throughout the region at the top of the St. Peter Sandstone, which lies immediately below the dolomite unit to be mined. This horizon typically has the highest sulfide mineral content of bedrock units present in the region, and partially dewatering it or otherwise exposing it to aerated water is a known mechanism to mobilize metals such as arsenic and nickel in groundwater. Well Construction Reports indicate that the top of the SCH is at approximately elevation 900 ft and that static water levels are 16 – 37 ft above the SCH. If the pit terminates 10 ft above groundwater, that will leave 26 – 47 ft of rock between the bottom of the pit and the SCH. Test drilling is proposed by K&K to determine the depth to the SCH throughout the mine area.

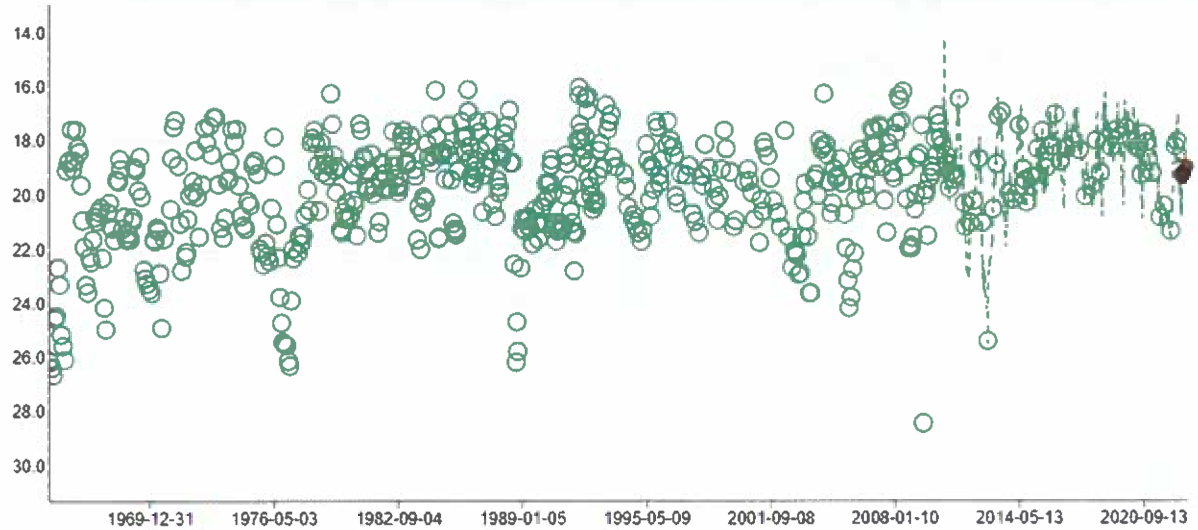


Figure 1. Variations in depth to water (in feet below ground surface) in a Dodge County well completed in the St. Peter Sandstone from 1964 to 2022 (from US Geological Survey)

Groundwater Flow Direction

K&K interprets local Well Construction Reports to indicate groundwater flow from the site to the northwest, toward Dakin Creek and Green Lake. That is likely; however, it is possible that the K Quarry site is located on or across the groundwater divide shown on the USGS water table map (Cotter, 1986). In that case, groundwater flow from the mine could be toward the southeast, away from the lake and creek. The 4 monitoring wells K&K propose to install should be adequate to determine the groundwater flow direction(s) at the site.

Risk of Acid Mine Drainage and Metals Contamination

K&K notes that mining below the water table poses a risk of acid mine drainage and contamination of groundwater by metals such as arsenic and nickel. Their statement that the SCH typically has the highest concentration of sulfide minerals in the area of the K Quarry is supported by literature, including the paper by Lucjaz and others (2016) included with the permit application. However, the Sinnipee Group dolomite that is proposed to be extracted is also known to contain abundant sulfides, especially near its base (Lucjaz and others, 2016). The supporting documentation provided by K&K with the permit application describes acid base accounting testing results on rock samples from the Skunk Hollow mine site, but test results were not included. The test results apparently show low sulfide mineral concentrations and high neutralization potential, which is not surprising for dolomite bedrock with disseminated sulfide mineralization.

We recommend requesting the acid base accounting test results from K&K. However, as Lucjaz and other (2016) point out *"...the average concentrations of metals within the specific units are probably not so important. Rather, the complex distribution of sulfide minerals, redox conditions, and fluid flow pathways likely has a much larger influence on water quality in the carbonate units."* In other words, testing of bulk samples will not necessarily characterize the risk related to groundwater flow through fractures and exposure to sulfide minerals along those flow paths.

Lucjaz and others (2016) also note that oxidation of sulfide minerals has been shown to be a source of arsenic and other metals in eastern WI not only where the water table has been drawn down, but where aquifers are shallow and exposed to oxygenated recharge. The mining will reduce the depth from the ground surface to the SCH, somewhat elevating the risk of recharge-related mobilization.

For these reasons, groundwater monitoring is recommended, as discussed below.

Water Supply Well

The application notes that a new groundwater supply well may be needed for dust suppression, washing aggregates, or portable pavement plants. No details were provided about pumping rates, but EOR's experience is that the average pumping rates for these types of wells is fairly low, and that the well is unlikely to be classified as a high capacity well. Pumping of a well can dewater portions of the aquifer and mobilize metals; we therefore recommend casing a new well to the Cambrian sandstone aquifer (below the SCH) to minimize the risk of groundwater contamination by metals.

Stormwater management

Runoff from other properties upstream of the mine site will be diverted around pit to a stormwater basin, which will provide some removal of sediment and associated pollutants such as total phosphorus. Because the mine pit will be internally drained, this will slightly reduce the area of agricultural land draining to Dakin Creek. In combination with the stormwater basins, this could reduce the quantity of runoff and improve the quality of runoff from agricultural lands.

A potential water quality risk related to the proposed stormwater management system for the mine is the possibility of pumping water from pit if water from heavy rains does not infiltrate into the bottom of the pit quickly enough to allow continued mine operations. If acid mine drainage were to occur and wastewater from the pond were discharged to surface water, this could introduce contaminants into the surface drainage system. The Wisconsin Pollutant Discharge Eliminate System General Permit for nonmetallic mining and/or processing that DNR will require includes requirements for sampling of pumping discharges. Required parameters at Total Suspended Solids and pH, and DNR can require additional parameters, including arsenic, nickel, lead and other metals, if they determine such sampling is warranted. The General Permit also requires annual sampling of wastewater in the mine pit that drains to groundwater, including pH and metals. The DNR can require additional testing and corrective action if necessary to protect water quality. This sampling, along with visual observations of acid mine drainage impacts, provides an opportunity to detect water quality problems early and correct operations as needed.

Reclamation and Duration of Mining

The mine is proposed to be operated for at least 70 years, with reclamation of various stages occurring throughout the active mining period. This will reduce the time that sulfide minerals in the bedrock are exposed to the atmosphere and precipitation, reducing risk of metals mobilization. Stockpiles of crushed rock will be staged within the active mining area, and precipitation on these stockpiles would lead to some risk of acid mine drainage. K&K has an economic interest in selling materials and not having them stockpiled for prolonged periods. Groundwater monitoring will help detect if groundwater is being contaminated and allow for corrective actions to be taken.

A pond will be created in the center of the reclaimed mine site, with overflows discharged through the stormwater pond at the north end of the property that will be constructed during the active mining phase. The plan calls for the pond to be lined with at least 2 ft of clay soils to limit infiltration of surface water into the bedrock. Runoff from upstream of the mine property will be routed through the pond, which will provide some peak discharge attenuation and sediment removal from runoff from agricultural lands upstream of the property.

The mine reclamation plan must be approved by the DNR under NR135, which requires financial assurances to be provided.

Recommended Conditions of Approval

To address the potential risks discussed above, we recommend the following conditions be placed on approval of the proposed K Quarry mine, and that the County regularly reviews details on the mining to confirm that the conditions are being met

Rock Materials Testing

- K&K will provide Green Lake County with the acid base accounting results for rock samples from the formerly proposed Skunk Hollow mine site as a supplement to the permit application. This should include a description of the sampling intervals and geologic units from which composite samples were collected.

Depth of Mining

- The depth to the water table at the site should be determined through the installation of monitoring wells in the 4 locations indicated in the application, and they should be constructed as water table observation wells compliant with Wisc. Admin. Code Chapter NR141 for use for water quality sampling. Drilling progress should be observed closely for evidence of saturated conditions to guide construction of the wells so that the screen intersects the water table, allowing accurate measurement of the depth to groundwater.

- The minimum separation between the bottom of the mine and groundwater (measured at the commencement of mining) should be 15 ft, because (1) groundwater levels have been measured to fluctuate by over 10 ft in a Dodge County bedrock well, (2) climate change is expected to raise groundwater levels in future decades (Hein and others, 2021), and (3) oxidation of sulfide minerals has been shown to be a source of arsenic and other metals where aquifers are shallow and exposed to oxygenated recharge.

- Water levels in the monitoring wells should be measured annually. If the measured groundwater level is above the base of the mine, mining should be paused until the area below the water table has been backfilled above the water table elevation.

Groundwater monitoring

- The 4 groundwater monitoring wells proposed to be installed around the perimeter of the proposed mine should be sampled at least three times before mining begins to establish background water quality. Samples should be collected quarterly, unless that does not leave enough time to collect 3 samples. In that case, monthly sampling will be acceptable. Parameters should include pH, an unfiltered metals screen including arsenic and nickel, and nitrate. A summary of background sampling including water levels, laboratory reports and results tables shall be provided to the County. This data can be used for comparison with samples collected during mining to detect changes in groundwater quality related to the mine.

- During active mining, the monitoring wells should be sampled annually for pH, an unfiltered metals screen that includes arsenic and nickel, and nitrate. A summary including water levels, laboratory reports and results tables shall be provided to the County each year.

- If any parameter is detected in groundwater at concentration at or above its Preventive Action Limit defined in Wisconsin Administrative Code Chapter NR 140, the mine operator shall notify the Wisconsin Department of Natural Resources (DNR) as required by NR 140.24. The DNR will evaluate the information, including background water quality concentrations, to determine if an investigation and report on the cause and significance of the increased concentration, changes in the monitoring program, and/or a response action are required, as described in NR 140.24.

Water Supply Well Construction

- Any water supply well that is constructed at the mine site shall be cased and cement-grouted at least as deep as the top of the Cambrian sandstone, following the DNR casing requirements for other northeast Wisconsin counties with naturally occurring arsenic in groundwater.

Baseline Data Collection Recommendations

The data currently being collected by the Green Lake Association provides useful background surface water quality downstream/downgradient of the proposed mine site. This includes monthly Total Suspended Solids and nutrient samples, plus an annual metals screen. Samples have been collected from two locations: Powell Spring and Glen Creek to the northwest of the K Quarry site.

We recommend having at least 3 samples from each location tested for the metals screen before mining begins, to provide more background data for comparison with conditions during active mining.

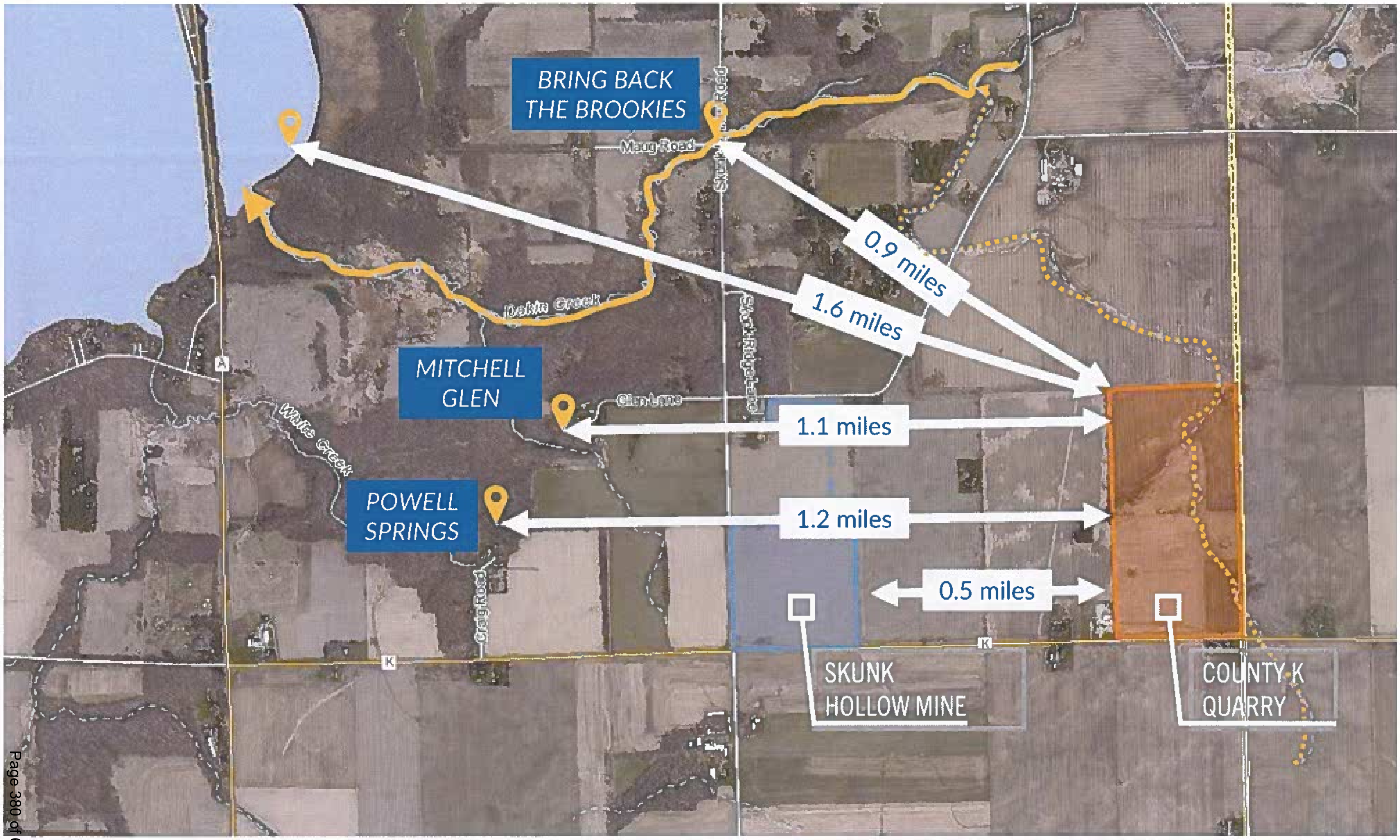
We also recommend adding a third sampling site on the tributary draining northwest from the K Quarry site or Dakin Creek a short distance downstream of the tributary. This would be useful for comparison with the active mining period if water is pumped from the mine to this tributary.

References

Cotter, RD, 1986. Water-Table Map of Wisconsin. United States Geological Survey, Water-Resources Investigations Report 90-4171.

Hein, C, N Turyk, and M Magee, 2021. Impacts of and Adaptation Strategies for Climate Change on Wisconsin's Water Resources. Wisconsin Initiative on Climate Change Impacts. Nelson Institute for Environmental Studies, University of Wisconsin-Madison and the Wisconsin Department of Natural Resources, Madison, Wisconsin.

Luczaj, JA, MJ McIntire, and MJ Olson Hunt, 2016. Geochemical Characterization of trave MVT Mineralization in Paleozoic Sedimentary Rocks of Northeastern Wisconsin, USA. Geosciences, 6(2).


BRING BACK THE BROOKIES
Maug Road
Dakin Creek
0.9 miles
1.6 miles
MITCHELL GLEN
Glen Lane
White Creek
1.1 miles
POWELL SPRINGS
Craig Road
1.2 miles
0.5 miles
SKUNK HOLLOW MINE
COUNTY K QUARRY

Foxhead Regenerative Agriculture Project

foxheadag.org N6498 State Road 49, Green Lake, WI 54941 (920) 212-8952 grow@foxheadag.org

May 15, 2024

Green Lake County
Land Use Planning & Zoning Department
571 County Road A
Green Lake, WI 54941

Re: Proposed County K Quarry

Foxhead Regenerative Agriculture Project (FoxRAP) is a nonprofit serving Green Lake County and the Upper Fox River watershed. Our mission is to cultivate a local agriculture network to benefit our community and ecosystem. To succeed, a main focus of ours is farmland preservation. The proposed quarry is in a certified county-administered A-1 Farmland Preservation District under the Wisconsin Farmland Preservation Program. This program is designed by the Department of Agriculture, Trade and Consumer Protection to help local governments and landowners preserve agricultural land, promote soil and water conservation, and ensure that land use in the district is limited to agriculture and other compatible uses.

Taking into account the county's own land use plans, FoxRAP strongly recommends the rejection of the Conditional Land Use Permit for the County K Quarry in its proposed location due to the permanent degradation of prime agricultural land it will impose on the site itself as well as surrounding land.

Please consider the following from the Green Lake County Farmland Preservation Plan 2016 (GLCFPP), a "foundation" for the Green Lake County Comprehensive Plan 2016:

- "Green Lake County has some of the best and most reliable farming soils in the State. These soils can grow a variety of crops."
- "Almost 4,500 acres have been converted to other uses within the County over the 5 year time span. The greatest losses were experienced by the Towns of Berlin and Brooklyn." We note the proposed quarry is located within the Town of Brooklyn.
- "Once lost, the acreage is hard to revert to its original agricultural use. In some cases, land can be converted from an idle state back into production, but typically those acreages are marginal land for farming." We offer that the reclamation plan will be less suitable for farming after its conversion back to farmland.
- "The best approach to maintaining farmland continues to be minimizing the conversion to other uses. Land use planning and zoning play major roles."
- "A key resource of our county is large, undisturbed tracts of farmland for agricultural production."

While we recognize the importance of quarries to the development of the county and agricultural enterprises, we recommend the county follow its own proposed future land use projections as outlined in Map 3 of the Comprehensive Plan 2016 and approve mining proposals in current and future industrial areas only.

The GLCFPP encourages “growth in areas where it will not conflict with other land uses and is compatible with local comprehensive planning efforts.” We propose that to remove this prime agricultural land from production for a 70-year conditional-use permit is exceptional and will have an extensive negative impact in this Farmland Preservation District.

Creating these land use zones will help us all realize the Vision for Green Lake County:
We will continue to balance economic growth with the conservation of our natural resources. Our communities are thriving, and proper planning allows for commercial and economic growth around our cities and villages, while focusing new residential development in designated areas. A strong economy supports our hard-working citizens with well-paying jobs. Throughout Green Lake County, a visitor can enjoy the open space and landscapes of the past. We have preserved our productive agricultural land and the family farm continues to thrive. Our beautiful lakes have been well-managed and preserved, and the County’s water resources remain healthy and attractive. Our communities remain safe, and maintain that rural, small-town feel and high quality of life.

Thank you for your consideration,

SRothman

Shelly Rothman
Executive Director
FoxRAP

The Green Lake Conservancy's statement in opposition to the proposed K Quarry

The Green Lake Conservancy's mission is to protect Green Lake's special places permanently and proactively through conservation, strategies, and legal tools. In advancing its mission, the Conservancy urges the Committee to deny the Kinas application for the K quarry based on the same five standards that the Skunk Hollow Mine was denied by the Board of Adjustment per advice of the county attorney. These five standards are the law, and the failure of any single one **must** defeat the CUP.

The first standard on which they failed previously, and should be denied again, was the failure of Kinas to prove that locating a mine in a farmland preservation district was appropriate considering there were alternatives, like unzoned areas, they could have explored (Wis. Stat. § 91.46(6)(c); Ordinance 350-27(2)(e)3). But Kinas ignores those unzoned areas that represent about a third of the county [see map]. Allowing quarries in the A-1 zone goes against the county's long-range plan.

The second standard on which they failed previously, and should be denied again, was their failure to provide substantial evidence that the mine will **not** have a negative effect on the health and safety of people nearby (Ordinance 350-56(B)(2)1). Kinas proposes a driveway on County K to propel 2 heavy and slow trucks an hour, 10 hours a day, 6 days a week, into a 55-mile an hour highway. Traffic is currently substantial and even more so during the summer. The school bus uses it twice daily. Additionally, 2 tall liquid propane towers plus 48 residential-sized tanks are stored next door to where the Kinas' will be blasting. Kinas' proposal does not address these hazards and cannot claim they aren't substantial or real.

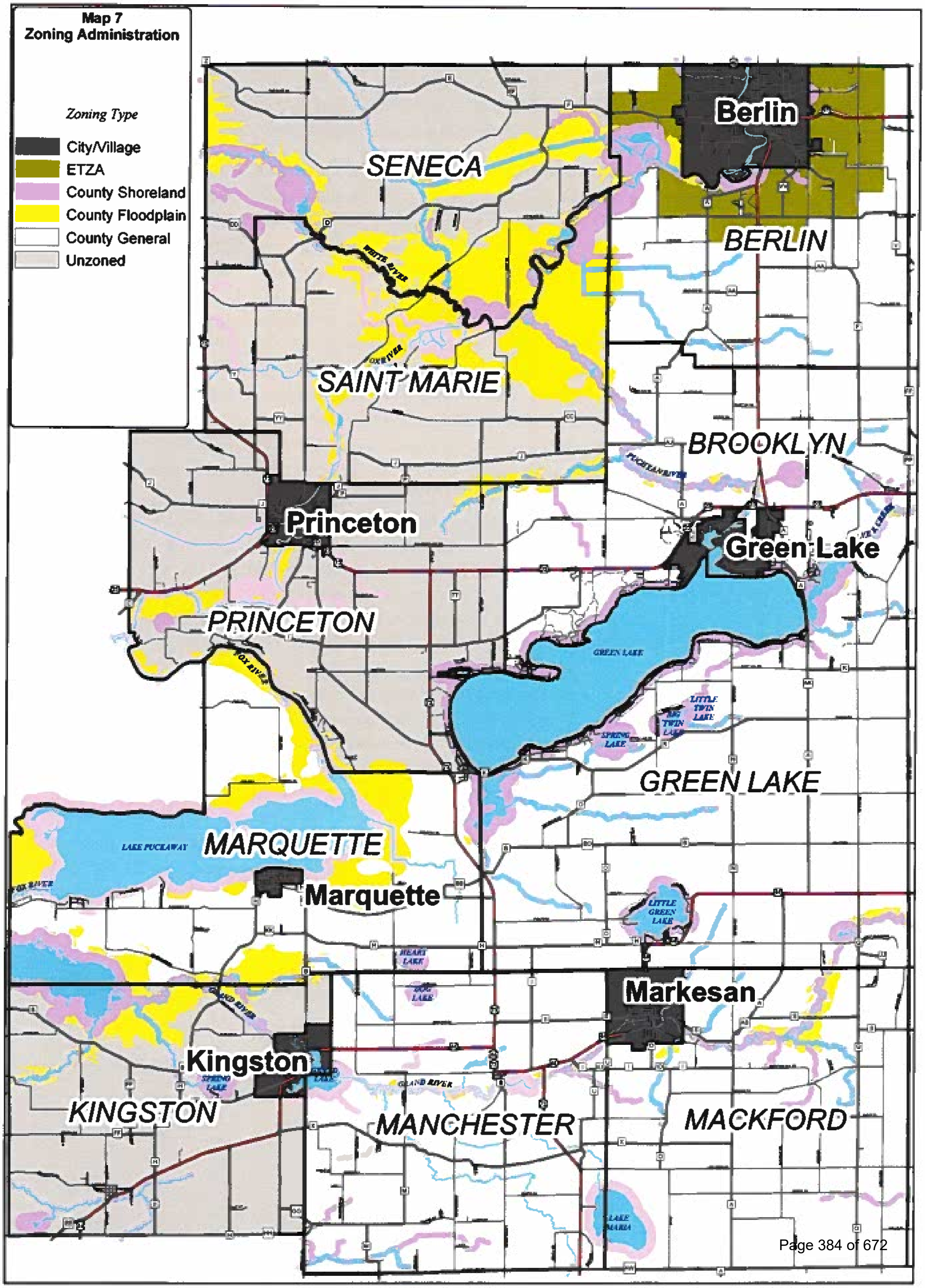
The third standard on which they failed previously, and should be denied again, was not changing the essential character of the area (Ordinance 350-56(B)(2)2). The area is a farming and residential community with several unique and fragile natural wonders whose preservation is part of the Conservancy's mission. Several private homes are located within a few feet of the proposed quarry and a dairy farm is down the street. Nothing in Kinas' materials address the impact an industrial quarry would have on these homes, farms, or natural springs.

The fourth standard on which they failed previously, and should be denied again, was that a mine would not be hazardous or disturbing to existing or future neighboring uses (Ordinance 350-56(B)(2)3). But the presence of 200 times the acceptable level of arsenic in a well next door and the fact that blast vibrations have the potential to change the nature of fractures through which groundwater flows (affecting the quality and/or quantity of water to wells and springs) are valid and substantial concerns.

The fifth standard on which they failed previously, and should be denied again, was that a mine will likely be detrimental to property in the immediate vicinity (Ordinance 350-56(B)(2)4). In addition to the mine's neighbors on County K, also deeply affected are another half dozen homes within a half-mile of the north side of the site, including Ernie & Ida Neuenfeldt's. All Brooklyn properties were just assessed at their full market value—raising many home values by 30 - 50%. But the December 2022 valuation of properties within a half-mile of the Skunk Hollow Mine done by the REDI corporation assessed that these properties would lose between 25 – 30% of their value once mining began—thus taking away in today's dollars most of that increased value.

Being true to its mission, the Green Lake Conservancy strongly opposes the placement of the proposed nonmetallic quarry on County K.

Map 7: the Zoning Administration's map shows unzoned areas in Green Lake County in grey (from the 2016 *Comprehensive Plan of Green Lake County*)



From:	MICHAEL STREIT
To:	Buss, Chuck; Thom, Gene; Boutwell, Bill; ctalma@greenlakecounty.wi; hreabe@greenlakecounty.wi; nhoffman@greenlakecounty.wi; Kirkman, Matt; Wylie, Cate
Subject:	"...we borrow from our children"
Date:	Tuesday, May 14, 2024 11:47:20 AM
Attachments:	We Borrow from our Children.pdf

[CAUTION: EXTERNAL SENDER This email originated from outside Green Lake County. Do not click links or open attachments unless you recognize the sender and know the content is safe.]

PLEASE PRIORITIZE THE PUBLIC GOOD OVER THE REQUEST OF A PRIVATE COMPANY. THANK YOU.

MIKE STREIT
847-910-8570

"We don't inherit the earth from our ancestors, we borrow it from our children"

Oscar Wilde in the 1936 book "Oscar Wilde Discovers America"

From: hilkes2001@yahoo.com <hilkes2001@yahoo.com>
Sent: Thursday, May 16, 2024 3:53:14 PM
To: Clerk <clerk@greenlakecountywi.gov>
Subject: Proposed County K Quarry

[CAUTION: EXTERNAL SENDER This email originated from outside Green Lake County. Do not click links or open attachments unless you recognize the sender and know the content is safe.]
Good afternoon,

I would like to express my concerns regarding the approval process for the proposed County K Quarry.

I urge the Green Lake County administration reopen public comments during the next committee meeting, ensuring all perspectives can be heard, with community input being a critical component of any decisions that are made.

Such quarry will affect our precious resources like Green Lake greatly.

Thank you,

David Hilkes
Princeton, WI

Dear Matt,
Pursuant to the LUPZC's offer at this morning's hearing to submit public comment through your office, please include in the committee's packet my below comment, which I intended to present to the committee this morning.

Thanks, Matt,

Dick Martens

Good morning. I'm Dick Martens, W2965 Hillside Road, Town of Brooklyn, and Secretary of the Green Lake Association, where our sole mission is to safeguard the water quality of Big Green and its watershed.

First, I want to thank you for your service. You have a difficult case in front of you. You must determine whether Kopplin and Kinas has satisfied each of the required thirteen standards set forth in the County Code.

I want to focus on standard number four- which reads and I quote: "No conditional use shall be approved or approved with conditions by the Land Use Planning and Zoning Committee unless it shall find the conditional use will not be detrimental to property in the immediate vicinity or to the community as a whole."

Mitchell Glen, Powell Spring and Dakin Creek are in the immediate vicinity of the proposed quarry, especially when you consider water flowing both above and below ground. These environmentally sensitive areas were evaluated for risk of possible contamination from water flowing from the proposed quarry by our expert, Dr. Steven Gaffield, a hydrogeologist.

In his report, which we forwarded for distribution to the Committee yesterday, Dr. Gaffield sets forth certain conditions required to help minimize the risks to these environmentally sensitive areas.

We ask that you review the substantial evidence contained in Dr. Gaffield's report and that you adopt Dr. Gaffield's conditions when considering whether the proposed quarry will be detrimental to property in the immediate vicinity. The GLA will be submitting additional conditions to mitigate the possible adverse effects of the proposed quarry on nearby resources.

Let's not forget that the applicant plans to operate the proposed quarry for seventy years.

We look to you to protect our natural resources, now and seventy years from now. Seventy years of proposed operation is one reason why the periodic testing called for in Dr. Gaffield's report is so important.

Thank you.

Liz Otto, County Clerk - please print and/or forward as below. Thank you.
==

TO: All Green Lake County LUPZD members and the County Administrator.

The Kopplin & Kinas Co., Inc. has requested a Conditional Use Permit (CUP) for an aggregate quarry ½ mile east from where they requested a CUP for the Skunk Hollow Quarry in 2022. That 2022 CUP was initially approved by the Green Lake County Land Use Planning and Zoning Department (LUPZD) but was subsequently overturned on appeal because the LUPZD had **blatantly** overlooked numerous provisions required for that CUP approval. That appeal was the result of enormous community input opposing the Skunk Hollow Quarry CUP and, even though the LUPZD was well aware of this opposition, they allowed the CUP and it was observed when they approved it that one of the LUPZD members high-fived Mr. Kinas and said ''we did it", which speaks to possibly some sort of collusion or bias by the LUPZD.

With the new K Quarry CUP application a mere ½ mile east of the previous location the local community is once again having to mobilize to oppose it because most, if not all, of the same provisions still apply. At the May 2, 2024 LUPZD meeting there was standing room only and numerous online Zoom participants in attendance to voice their opinions/opposition on the K Quarry CUP. Much to everyone's surprise and outrage the chairperson said he was limiting the time for public comments (3 mins max for each person) to only 15 minutes total. That only allowed a few people to speak in opposition to the CUP and left many, many more people who came to speak unable to do so. Given that, it appears that the LUPZD is once again trying to **ramrod** this Kopplin & Kinas K Quarry CUP through for approval.

All the provisions that were **blatantly** overlooked in the 2022 CUP Quarry still apply. I implore the LUPZD to strictly adhere to those provisions for this K Quarry CUP so as to avoid the previous fiasco that happened with the 2022 CUP.

I am very concerned about the extremely high arsenic and sulfide levels, the acid rock drainage concerns and the effect on private wells and the water table and the 30% impact on nearby property values. Also, the proposed K Quarry would be contrary to the intent of the Green Lake County Farmland Preservation Plan.

A previous site-specific hydrogeology study for the Skunk Hollow Quarry CUP (a mere .5 miles west of the K Quarry CUP) found that Skunk Hollow Mine “cannot be operated as proposed without degradation of aquatic resources including Powell Spring and Creek, White Creek, Mitchell Glen, Glen Creek, and Dakin Creek,” which are all adjacent water resources that flow to Green Lake. Additionally, as mentioned by the Green Lake Association, sulfide minerals have been detected in nearby wells and bedrock and when exposed to oxygen (as in mining), these sulfides, if at this site, can get into the mine drainage water. This acid mine drainage, if not handled properly, will kill fish, especially if it gets into Dakin Creek and then into Green Lake. Green Lake is already 'compromised' and any additional degradation to the lake's water supply would only compound the problems the lake is already facing.

Therefore, I am opposed to the K Quarry CUP and respectfully request that the K Quarry CUP be denied.

Regards,

Edward Ellsworth
W555 Badtke Ln (actually in Green Lake County)
Ripon, WI

From: artsofdaycholah@yahoo.com <artsofdaycholah@yahoo.com>
Sent: Wednesday, May 8, 2024 8:40 AM
To: Clerk <clerk@greenlakecountywi.gov>
Subject: New submission from Contact Us

[CAUTION: EXTERNAL SENDER This email originated from outside Green Lake County. Do not click links or open attachments unless you recognize the sender and know the content is safe.]

Department

County Clerk

Your Email Address

artsofdaycholah@yahoo.com

Name

Margaret York

Email Subject

proposed new mine

Your Message

It is unlikely that anyone who lives in this area has not enjoyed Green Lake in some way---- watersports, beauty, increased property values, etc. Over the years that water has been abused in many ways and today it is in danger of losing all of its benefits to this community. The new mine proposed once again adds abuse to Green Lake and the watershed. I urge the powers to be to not approve the proposed site. Margaret York

From: Wendy Freismuth <wegner28@gmail.com>
Sent: Thursday, May 16, 2024 4:00:51 PM
To: Clerk <clerk@greenlakecountywi.gov>
Subject: I vote No to the Mine!

Please! Do not ruin our beautiful Lake, the air quality, the property values, the roadways, the land and springs in the surrounding areas.
Ted and Wendy Freismuth

From: Nancy Rasmussen <nancydrasmussen@hotmail.com>
Sent: Friday, May 17, 2024 10:45:49 AM
To: Clerk <clerk@greenlakecountywi.gov>
Subject: Public Comment Submission: County K Quarry Application

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To the Land Use Planning and Zoning Committee,

I respectfully submit my comments regarding the proposed County K Quarry application scheduled to be reviewed on June 14, 2024. My view is that the committee should reject this application for the following reasons:

1. I've reviewed and am complimentary of the current Green Lake County Comprehensive Plan (2016) and Green Lake County Farmland Preservation Plan posted on your website. I would presume, given your roles, you are familiar with the plans, the stated goals and objective, the future use maps, and the overriding strategies driving the plan to protect and maintain the natural resources and agricultural nature of the county, and won't belabor how inconsistent those points are with the proposed application. However, if you haven't reviewed the content detail recently, I point you to Future Use, Map3b, p. 40 to remind you that the applicant's proposed use of land as non-metallic mining is an industrial use and on that basis alone, the application should be denied for land that is deemed to be agricultural in use for at least the next 35 years and is integral to the preservation of many nearby water and irreplaceable resources in the comprehensive plan's contemplated future use map. It is difficult to imagine an application rationale for industrial/mining use in this location that would supersede the plan and its clearly stated guidance.
2. Specifically, industrial use, including mining, is anticipated to be approximately 1% of the county's allocated acreage in the future use plan. The applicant was previously rejected for the nearby Skunk Hollow site and I presume agreed to search elsewhere for its mining sites, and while I don't know the rationale for this site specifically, it seems disingenuous that the current application is within a stone's throw of the previously (ultimately) rejected Skunk Hollow site. It is inconceivable that the only alternative site for the mining application is in the same 0.2% of the total area of the county (or 0.3% excluding water covered area). The applicant should be denied this application on the same set of criteria used for the ultimate rejection of the Skunk Hollow site, and while I can't assess all motivations, I would suggest that the county and this committee has limited resources to entertain seemingly specious applications of this sort in the future and the applicant should be directed to more appropriate potential sites by the committee.
3. Your committee is integral to preserving our irreplaceable county resources. Thank you for your hard work to do so.
4. Finally, I provide below a copy of my public comment provided during the Skunk Hollow Conditional Use Application which ultimately rejected the applicants nearby site. All these comments apply to the new applicant site.

   To all who are evaluating the Skunk Hollow Mine Conditional Use Application, *As a Green Lake county homeowner of 28 years, I respectfully submit my assessment and recommendation to the committee to deny the permit for the proposed Skunk Hollow mine. Why?*

1. The mine is not viable in the location and depth as proposed per the well thought out hydrogeology report.

2. The mine application does not meet (most, or in my reading, any of) the conditions of the Conditional use statutes as the position paper provided by the Green Lake Association, Green Lake Conservancy, Green Lake Sanitary District and neighboring owner have so well supported.

3. The Board of Adjustment needs to recognize and accept that the inherent risks of the conditional use exception application clearly outweigh any theoretical benefits (noting these are not publicly available) and deny the application, to perform their duty to protect 1) the public, 2) the county, 3) the sensitive environment, 4) the water resources of the county, 5) the value of neighboring farmland and owners interests, and 5) importantly to ensure a financially viable investment by the applicant as well.

4. In any event, the applicant and the county need to reassess the application for fair consideration given the findings of the aforementioned reports. The financial viability for the application given the ongoing costs and inherent risks of a yet-to be-defined, statutory-required compliance plan, and with yet unknown expanded remediation requirements should damages be incurred, needs to be completed. A mine that is initiated, and then prematurely abandoned due to environmental damage and/or financial considerations of the applicant is very possible result and would be a terrible outcome for all interests.

5. The costs of monitoring and abatement must fall on the applicant, not the affected parties or the community. The exposure for any remediation requirements must fall on the applicant. The potential damages to the sensitive environment are incalculable and this alone should encourage the applicant to look for a viable and better place for their mine. My assessment is that the applicant should withdraw and discontinue their pursuit of this site.

6. Lastly, I can attest to potential impact of noise and windborne particulates on neighbors and environments as my home is approximately a half mile of another operating mine. While the impact of the significant noise, vibrations, and truck traffic and wind drive particulates generated by the mine is not well studied for sensitive flora and fauna, what is known is not positive. Please do not underestimate these impacts on neighbors and the community. I believe this will be the first and loudest complaint, and a proactive compliance plan for significant, never ending noise and particulates needs to be defined.

Thank you for the opportunity to comment and I encourage the members of the committee to deny the application.

Nancy Rasmussen
W3079 Orchard Ave.
Green Lake, WI 54941
Nancydrasmussen@hotmail.com

Sent from Mail for Windows

From: Jan Saecker <jansaecker@gmail.com>
Sent: Friday, May 17, 2024 11:49:14 AM
To: Clerk <clerk@greenlakecountywi.gov>
Subject: County K Quarry

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What can happen in the course of mining rock for the next 70 years? From now until 2094.

Today, we are dealing with smoke caused by fires in British Columbia, Canada, an idea that was foreign--doubly--a decade ago. British Columbia is home to a rain forest. Its western red cedars are among the oldest trees extant on earth, with trunks over 16' wide at the base. Who would believe their rain forest habitat would burn? Will a 2000 year old tree trunk survive this fire?

Our habitat, surrounding the spring-fed water of Green Lake, is also fragile. It's easier to ignore the rising temperatures in all parts of this planet, and the effects global warming will cause on this lake.

Now, there is no proof that prolonged mining near Green Lake will interfere with its springs, or cause air pollution with dust, or increase temperature with machinery used in mining and moving rock, or that more rock will not increase community welfare.

And there is no proof that prolonged mining near Green Lake will improve water purity and air quality, reduce carbon emissions, and support public welfare. But we would do well to protect the lake from large and long alterations of the surrounding environment.

--
Jan Saecker
Pronouns: she, her, hers
920 398 0123

From: Nathan Gray <nathan@graymontmedical.com>
Sent: Friday, May 17, 2024 1:17:58 PM
To: Clerk <clerk@greenlakecountywi.gov>
Subject: Strongly Against County K Quarry

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Good Afternoon

My name is Nathan Gray and I live at W2209 Hickory Road. I am strongly against the proposed County K Quarry.

Green Lake is a special place and should be protected. I am shocked that Kinas Mining continues on it's quest of mining within close proximity to Green Lake and it's watershed. Please protect the Lake and make sure this beauty of nature is healthy for future generations.

Thank you

Nathan Gray
Graymont Medical Brands
C: 847-312-6416
www.graymontmedical.com | www.tln.care | www.graymontx.com | www.modicine.com | www.ashlandhealth.pharmacy

From: Nathan Slinde <slindene@gmail.com>
Sent: Friday, May 17, 2024 5:08:15 PM
To: Clerk <clerk@greenlakecountywi.gov>
Subject: Proposed County K Quarry

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TO: All Green Lake County officials involved in consideration of the proposed County K Quarry

FROM: Nathan and Jenni Slinde, 1924 Tuleta Hill Road, Town of Green Lake

We are deeply dismayed by recent events in regards to the proposed County K Quarry. To begin with, public input in regard to the quarry has been severely limited. Officials and the proposed quarry owner know there is significant opposition to the proposed quarry site along Highway K. Limiting public input to the process solidifies the perception of back door dealing and corruption. Shame on you.

We understand the need for nonmetallic mining in the county. We are not opposed to this. We oppose, like so many others in the area, the suggested site for mining. The effect on water quality, not only on the lake and its watersheds, but also underground aquifers, would be detrimental. The science confirms this fact. Additionally, issues like road safety, noise pollution, air quality as well as effects on area property values will be a significant problem. The reasons not to site the quarry are long. The reason to site the quarry at that location can be no other than profit as our environment, neighborhood and health would be compromised.

Please consider that your neighbors and residents of Green Lake County oppose the location of this quarry for the above reasons. Voting NO for the Conditional Use Permit is the only RESPONSIBLE decision that can be made.

Sincerely,
Nathan and Jenni Slinde

Sent from my iPhone

From: jeff.beischel@yahoo.com <jeff.beischel@yahoo.com>
Sent: Monday, May 20, 2024 12:17:17 PM
To: Clerk <clerk@greenlakecountywi.gov>
Cc: gretchen zirbel <gretchenzirbel@gmail.com>
Subject: County K Quarry

To whom it may concern,

As homeowners in Green Lake County, we are adamantly against the consideration to approve a mining operation at the County K Quarry. The Green Lake Association and Green Lake Sanitary District cannot be more clear as to why this would be an ill-fated and poor decision for the area and the public at large.

--
Jeff Beischel
Gretchen Zirbel
1656 Sandstone Ave.
Green Lake, WI 54941

From: Donna Gasbarro <gasbard14@gmail.com>
Sent: Tuesday, May 21, 2024 3:49 PM
To: Clerk <clerk@greenlakecountywi.gov>
Subject: County K Quarry

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Hello,

I've recently toured Mitchell Glen & Powel Springs this past April 2024 & was amazed at these gems you have that the rest of Wisconsinites have yet to discover.
I believe everything needs to be done to safeguard Big Green Lake & surrounding waterways for future generations.

Donna Gasbarro
1205 S Douglas St
Appleton Wi 54914

Ryan,
Please add this to the K Quarry packet. His property is located in Fond du lac County and he is 2,365 feet from the proposed K Quarry site.
Matt

-----Original Message-----
From: Otto, Liz <lotto@greenlakecountywi.gov>
Sent: Thursday, May 23, 2024 7:59 AM
To: Kirkman, Matt <mkirkman@greenlakecountywi.gov>
Subject: FW: County k quarry
-----Original Message-----
From: Justen Niemuth <JustenNiemuth@hotmail.com>
Sent: Thursday, May 23, 2024 6:07 AM
To: Clerk <clerk@greenlakecountywi.gov>
Subject: County k quarry

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Hi. I am a neighboring resident east of the site. I vote no on the quarry.   There is enough traffic on this stretch of road already. I already see a lot of people pass on the hill to get somewhere faster. I don't think any wider road would help.   The concern about disturbing the water shed to green lake is not worth it. That has to be one of the cleanest lakes around.   I would hate to see the put in for a few people to make more money. Not worth it.
Sent from my iPhone

I forgot my contact info if needed. Justen Niemuth w14301 county road kk Ripon wi 54971.   Phone is 7152816188

Sent from my iPhone

> On May 23, 2024, at 6:07 AM, Justen Niemuth <justenniemuth@hotmail.com> wrote:
>
>
> Hi. I am a neighboring resident east of the site. I vote no on the quarry.   There is enough traffic on this stretch of road already. I already see a lot of people pass on the hill to get somewhere faster. I don't think any wider road would help.   The concern about disturbing the water shed to green lake is not worth it. That has to be one of the cleanest lakes around.   I would hate to see the put in for a few people to make more money. Not worth it.
> Sent from my iPhone

From: Susan Harr <s.brushharr@gmail.com>
Sent: Thursday, May 23, 2024 8:59 PM
To: Clerk <clerk@greenlakecountywi.gov>
Subject: We oppose the County K Quarry Project

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After reviewing Hydrogeologist, Dr. Steve Garfield of EOR Consulting's report and his assessment of the potential water quality impact and the risks it poses to nearby ecologically sensitive areas of the county, we agree with his recommendations that would mitigate the impact of the proposed Quarry Project on the surrounding water resources.

In addition, as a members of a family that have summered in Green Lake for over 6 generations (in the same cottage) we can't imagine the impact of this proposed quarry project on the surrounding area. **Issues like road safety, noise pollution, property values, air quality, and private well water access would certainly become grave concerns. We oppose the development of the County K Quarry Project.**

Susan Brush Harr
Mary-Katherine Harr
595 Illinois Ave
Green Lake, WI

Sent from my iPhone

DATE: May 24th, 2024 FILE REF: County K Quarry, Green Lake County

TO: Green Lake County Clerk

FROM: David Bolha, Wisconsin DNR Water Quality Biologist

SUBJECT: County K Quarry Conditional Use Permit

To Whom It May Concern:

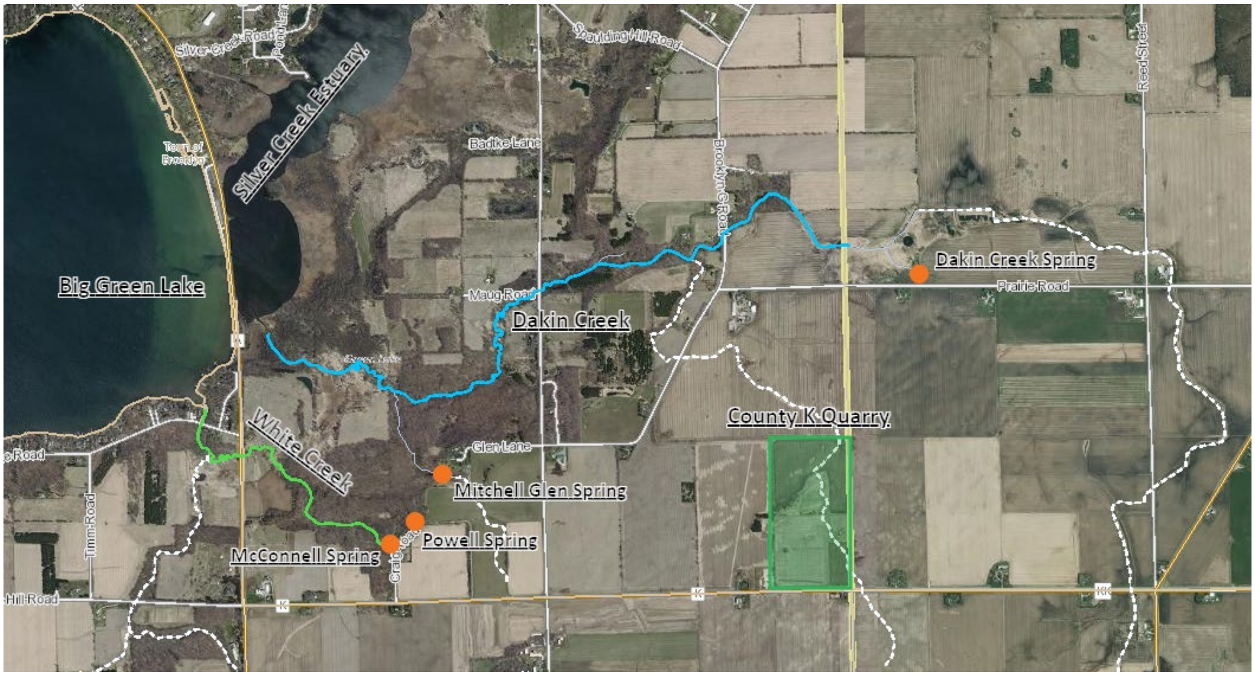
On May 2nd, 2024, the Green Lake County Land Use Planning and Zoning Department held a public hearing regarding a Conditional Use permit for a limestone quarry (a.k.a. County K Quarry) on Donald Kinas property at the intersection of CTH K and the Green Lake/Fond du Lac County line.

The location of the proposed County K Quarry is within 1.3 miles of multiple sensitive water resources and unique landscape features that have the potential to be significantly impacted. The water resources near the proposed quarry rely on healthy, cold groundwater to provide the necessary environment for sensitive fish and aquatic life to thrive (Table 1, Map 1).

Streams	**Springs**
Dakin Creek	Dakin Creek Spring
White Creek	Powell Spring
	McConnell Spring
	Mitchell Glen Spring

Table 1: Water Resources near the County K Quarry Site

Dakin Creek is a cold, groundwater-fed stream that originates from a spring 0.7 miles Northeast of the proposed County K Quarry site and flows generally west from the Fond du Lac-Green Lake County line and discharges into the Silver Creek Estuary (Map 1). It is classified by the Wisconsin DNR as a Class 2 Trout Water. Streams in this classification may have some natural reproduction, but not enough to utilize available food and space. Therefore, stocking is required to maintain a desirable sport fishery. These streams have good survival and carryover of adult trout, often producing some fish larger than the typical average-sized fish. Starting in 2019, Dakin Creek has been stocked each year with Brook Trout. Standard field surveys indicate that the stocked fish have responded well to their new environment, showing good growth and survival through the winter. Natural reproduction was documented in 2022. Habitat restoration and migration barrier removal has made a dramatic impact on the ability of these fish and other aquatic life to thrive within the stream (Photo 1-6), with surveys indicating a healthy, well-balanced aquatic life community. Brook Trout have been documented below Maug Road and as far upstream as above Brooklyn G Road. Cooperative efforts, including State grants and local fundraising, between a strong group of partners have improved the in-stream habitat and reduced water quality impacts from runoff and bank erosion throughout the watershed. These efforts include many volunteer/work hours, from local high schoolers, residents of every age, and partners like Green Lake Sanitary District, Green Lake County Land and Water Department, Green Lake Association, Green Lake Conservancy, and multiple Wisconsin DNR Departments (Photo 2-6).



Map 1: Water Resources Near Proposed County K Quarry Site

Photo 1: Brook Trout collected during fish survey conducted by Wisconsin DNR in 2021.

Photo 2: Streambank and habitat restoration upstream of Skunk Hollow Road in Dakin Creek in 2022


Photo 3: Stream channel restoration in Dakin Creek upstream Skunk Hollow Road in 2019


Photo 4: New culvert placed under Skunk Hollow Road removing fish migration barrier in 2020.

Photo 5: Volunteers restoring habitat within Dakin Creek upstream of Skunk Hollow Road in 2019. Photo taken by Green Lake Association.

Photo 6: Plaque placed at the intersection of Skunk Hollow and Maug Roads to commemorate the restoration efforts of partners in Dakin Creek in 2020

White Creek is a cold, groundwater-fed stream that originates at the Powell and McConnell Springs and flows Northwest until it empties into Big Green Lake (Map 1, Photo 7). White Creek is designated by the Wisconsin DNR as a Class 1 Trout Water, with naturally reproducing Brown Trout present. Streams designated as Class 1 are high quality trout waters that have sufficient natural reproduction to sustain populations of wild trout, at or near carry capacity. Consequently, streams in this category require no stocking of hatchery trout. This creek is designated in Wisconsin Administrative Code NR 102 as an Exceptional Resource Water (ERW). ERW are surface waters that provide outstanding recreational opportunities, support valuable fisheries and wildlife habitat, have good water quality and are not significantly impacted by human activities. ERW status identifies water that the State of Wisconsin has determined warrant additional protection from the effects of pollution. Watershed restoration efforts from partners have reduced runoff carrying pollutants into the stream. Based upon Wisconsin DNR standard surveys, White Creek has excellent habitat and a healthy fish and aquatic life community. The cold water from Powell and McConnell Springs provides the majority of baseflow and the cool temperatures and high oxygen concentrations that sensitive fish, such as Brown Trout and Mottled Sculpin, need to thrive.

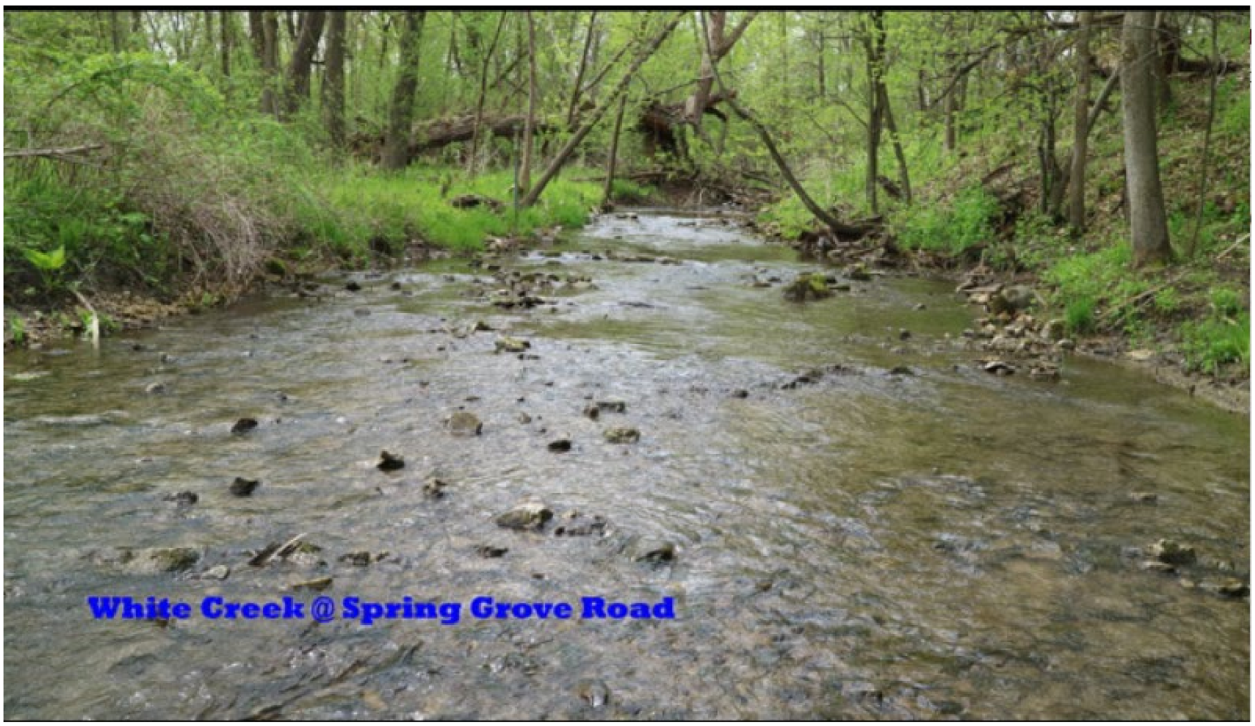


Photo 7: White Creek upstream of Spring Grove Road. Photo taken by Green Lake Watershed Warriors volunteer monitoring program.

Powell Spring is located ~1.2 miles due West of the proposed County K Quarry site (Map 1, Photo 8-9). This spring provides the majority of baseflow (~80%) in White Creek. The groundwater that feeds the spring comes from the Dolomite Limestone to the East in the direction of the mine site. The cold groundwater of this spring is critically important to the integrity of White Creek and the sensitive aquatic life that inhabit it. To preserve and further protect the integrity of the Spring, the Green Lake Conservancy, together with a Wisconsin DNR Land Acquisition Grant, purchased the property immediately surrounding the Spring in 2021.


Photo 8: Powell Spring Orifice


Photo 9: Flowing water downstream of Powell Spring facing East. Photo taken by Green Lake Conservancy.

McConnell Spring is located ~1.3 miles due West of the proposed County K Quarry site (Map 1, Photo 10-11), and ~200 yards Southwest of Powell Spring. This spring, along with Powell, provides nearly 100% of baseflow in White Creek. The groundwater that feeds the spring comes from the Dolomite Limestone to the East in the direction of the mine site. The cold groundwater of this spring and Powell is critically important to the integrity of White Creek and the sensitive aquatic life that inhabit it. The area around the Powell, McConnell and Mitchell Glen Springs have also been documented as a historically important trade route, used by Native Americans and settlers alike.

Photo 10-11: McConnell Spring Orifice (Left) and flow downstream (Right)

Mitchell Glen Spring is located ~1.1 miles due Northwest of the proposed quarry site (Map 1, Photo 12-13). This spring provides significant baseflow to Dakin Creek. The groundwater that feeds the spring comes from the Dolomite Limestone to the East in the direction of the mine site. The cold groundwater of this spring is critically important to the integrity of Dakin Creek and the sensitive aquatic life that inhabit it. Mitchell Glen is also a unique geological feature that provides habitat to rare fauna and is owned the Green Lake Sanitary District for preservation and further protection.

Photo 12: Mitchell Glen facing toward the origin spring orifice

Photo 13: Mitchell Glen Corridor facing West

Potential Water Quality Impacts to Local Water Resources

If recharge to the groundwater or groundwater flow in and around the quarry is disrupted due to the mining activities, flow within Mitchell Glen, Powell, Dakin Creek, and/or McConnell Springs would likely be disrupted and reduced. If groundwater or precipitation that would have recharged the groundwater are pumped out of the mine and discharged as surface runoff, the quantity of water reaching the springs could be reduced. In addition, the discharged surface runoff may carry increased loading of suspended solids and nutrients to the receiving water. Due to the nature of the limestone bedrock and shallow groundwater, mining could increase the likelihood that pollutants, such as Ammonia, may leach into the groundwater and reach the springs at levels toxic to fish and aquatic life. Reducing the quantity of groundwater reaching the headwater springs of White Creek and Dakin Creek could have a significant impact on White and Dakin Creeks. Reducing the flow within White and Dakin Creeks could increase water temperatures, increase the sedimentation of riffle and pool habitats, and reduce the reproductive success and habitats necessary for fish and aquatic life to thrive.

HERE WE GO AGAIN!

Big Green Lake is the heart of this community and we are fighting for it's life. The lake was put on the impaired list 10 years ago. Everything that happens to this lake efects us all, tourism, hotels, restaurants, retail, and small busineses such as fishing guides etc. Every single person around the lake and in this community has a responsiblity to keep it safe.

Zebra muscles have invaided the lake and are consuming the competiors of Blue Algi which is a bacteria that makes all animals sick and forces beaches to be closed. Boat cleaning stations have been set up in an attempt to slow the invasion.

Phosphates and nitrates are increasing weed growth and we are now harvesting the weeds to keep them somewhat controled. Many farmers and residential folks are taking measures to prevent these chemicals from entering the lake.

We recently prevented the development of a mine that had the potential to contaminate three sources that feed the lake. Another attempt to open a mine 1/2 mile from the previous spot in the Green Lake Water Shed and still efecting all 3 streams.

As I stated previously, we are fighting for the life of this lake which is the life of this community and aproval of this mine could be like putting another nail in it's coffin. Help us stop this mine.

Connie Willett

From: bruce kersting <cpd4837@hotmail.com>
Sent: Friday, May 24, 2024 2:12 PM
To: Kirkman, Matt <mkirkman@greenlakecountywi.gov>
Subject: K quarry

[CAUTION: EXTERNAL SENDER This email originated from outside Green Lake County. Do not click links or open attachments unless you recognize the sender and know the content is safe.]

My name is Bruce Kersting my farm is located at 4117 Cty T Princeton, we have been there since 1976. The Kopplin-Kinas business has operated since 1923, during this time they were a great asset to the county and it's residents. I am in support of letting them put the pit at this site. I understand that the vetting of this site has been very thorough and that it has been found that it would cause no harm to Green Lake. I also understand that the Kinas's have agreed to any and all restraints placed on them, regarding surrounding wells etc.etc.. I have a pit on property that adjoins mine for alot of years now and have no complaints. Come on folks, if there were was no gravel there would be no cement for houses, no gravel for roads and sidewalks. Let's not let this turn into a political grudge match because then nobody wins!!

Sent from my U.S.Cellular© Smartphone

From: Donn R. Wright <domhnall_4@hotmail.com>
Sent: Monday, May 27, 2024 8:57 AM
To: Buss, Chuck <cbuss@greenlakecountywi.gov>; Thom, Gene <gthom@greenlakecountywi.gov>; nhoffman@greenlakecountywi.gov; Boutwell, Bill <bboutwell@greenlakecountywi.gov>; Talma, Curtis <ctalma@greenlakecountywi.gov>; Reabe, Harley <hreabe@greenlakecountywi.gov>; Kirkman, Matt <mkirkman@greenlakecountywi.gov>; Clerk <clerk@greenlakecountywi.gov>
Cc: office@riponpress.com; Berlin Journal Company <news@theberlinjournal.com>; info@greenlakeconservancy.org; info@greenlakeassociation.org
Subject: K & K Quarry

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K&K Quarry
Acknowledgments

Limestone is a valuable natural resource. Doubtless, there is not one person in Green Lake County who does not benefit from at least one limestone product.

Limestone may become even more valuable in the future, and here is one reason why. Forests are being destroyed by logging, fires, diseases, and insects. Some surviving forests are being protected from logging. Destruction and preservation both result in depleting supplies of wood products for construction projects. These will need to be replaced by stone products such as concrete.

Stone is heavy and therefore costly to transport. Mining stone in locations close to processing facilities, manufactories, and construction sites makes economic sense.

In some cases (too many perhaps), limestone and other subsurface minerals may be more profitable for a farmer than crops and livestock.

The state of Wisconsin does allow mining limestone from underneath land that has been designated for Farmland Preservation and Exclusive Agriculture … as long as certain conditions pervade. See Chapter 91 of the State Statutes, with particular attention to 91.46 sub (6). Plans for reclamation must be made in advance and enforced ever after. Transfer of quarry ownership, lack of ongoing profitability, and bankruptcy must not negate reclamation. Money should be regularly deposited in a thoroughly protected fund from the outset of mining.

Nevertheless

Farming is the most important job in the world. If it were not for farmers, what would people do for most of our food (as well as most of our fiber)?

People cannot eat rocks.

It may seem apparent that Green Lake County, the state of Wisconsin, and the United States can afford to continue losing farmland. Taking the entire planet into view, however, reveals this is not true. Consider soil erosion, desertification, weather weirdness, warfare, and municipal sprawl. The farmland of the United States, and especially that of the Midwest, is therefore the most valuable in the world. Second comes that of Canada. If North American farmers are more and more to continue providing food and fiber to the world, they must have the land—with the topsoil—to do it.

Farmland preservation is not on optional fad. With a seven-generation outlook, it is a nonstop necessity.

Mining is a necessary enterprise. Whenever possible, however, do it in locations that do not destroy agriculture.

Donn R. Wright,
Farmers’ grandson and great-grandson
Christine A. Wright,
Farmers’ daughter, granddaughter, and great-granddaughter
W1913 South Lawson Drive
Green Lake, Wisconsin

From: David and Kate Mickle <kdmickle@gmail.com>
Sent: Monday, May 27, 2024 10:53 AM
To: Clerk <clerk@greenlakecountywi.gov>
Subject: Proposed County K quarry

[CAUTION: EXTERNAL SENDER This email originated from outside Green Lake County. Do not click links or open attachments unless you recognize the sender and know the content is safe.]

I am writing to ask that there be more time for public comment and research regarding the proposed quarry. It would have dramatic effects on precious springs like Michell Glen and Powell springs that are fragile and key to ground water and could impact Green Lake. None of this should be taken lightly. Time is needed and careful consideration should be given.
We are stewards of this land for future generations to come.
Sincerely
Kate Mickle

Sent from my iPhone

From: Chris Casebolt <chris.casebolt@mac.com>
Sent: Monday, May 27, 2024 4:47:35 PM
To: Clerk <clerk@greenlakecountywi.gov>
Cc: Buss, Chuck <cbuss@greenlakecountywi.gov>; Thom, Gene <gthom@greenlakecountywi.gov>; nhoffman@greenlakecountywi.gov <nhoffman@greenlakecountywi.gov>; Boutwell, Bill <bboutwell@greenlakecountywi.gov>; Talma, Curtis <ctalma@greenlakecountywi.gov>; Reabe, Harley <hreabe@greenlakecountywi.gov>
Subject: Couty K Quarry concerns / comments

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May 27, 2024

Liz Otto
County Clerk
517 County Road A
Green Lake, WI 54941

Dear Ms. Otto:

Please include my comments below in the board members' packets for the June 14, 2024 LUP@ZC meeting.

I have concerns about the zoning/permitting for the proposed Couty K Quarry located within the Dakin Creek Watershed. Dr. Dale Robertson of the USGS presented the annual "State of the Lake" presentation to the GLSD Board of Commissioners on April 14, 2024. Dr. Robertson reported recent water quality improvements to the lake, though the improvements are heavily related to the ongoing drought.

The Couty K Quarry has the potential to contribute to sulfide and arsenic levels running into the Dakin Creek Watershed and into Green Lake. While preferable to maintain the farmland preservation within the County Zoning Plan and forbid construction of the quarry, I do respect the needs of our economy. Should the quarry be permitted, I ask that it be permitted with significant watershed protection to prevent quarry site runoff into Dakin Creek.

The NOAA has outlook a wetter than average Summer with the arrival of La Nina conditions in the Pacific Ocean. That means we could have more run off, further endangering the water quality of the lake with any quarry construction activity.

Many mining and oil & gas operations around the country are able to operate while protecting surrounding watersheds, please ensure we do, too.

Thank you,

Chris Casebolt
Princeton, Wisconsin

From: Bill Jene <billjene1955@gmail.com>
Sent: Tuesday, May 28, 2024 6:12:39 AM
To: Clerk <clerk@greenlakecountywi.gov>
Cc: Buss, Chuck <cbuss@greenlakecountywi.gov>; gthom@greenlakecounty.gov <gthom@greenlakecounty.gov>; nhoffman@greenlakecounty.gov <nhoffman@greenlakecounty.gov>; Boutwell, Bill <bboutwell@greenlakecountywi.gov>; Talma, Curtis <ctalma@greenlakecountywi.gov>; Reabe, Harley <hreabe@greenlakecountywi.gov>
Subject: Proposed County K Quarry - Please include in the board members packet for the June 14th LUP&ZC meeting

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I have been reading about the new quarry application and cannot fathom why something like this would be approved when it is so close to the lake. Do we really want to take the chance of adding more sulfide and possibly arsenic into the lake and nearby creeks?

Why would you risk damaging the lake when the surrounding area brings in the bulk of the county's revenue. I am sure that there will be tax revenue from the new quarry, but is it worth the risk of damage to your main source of revenue? As a businessman, I weigh these decisions daily. I would hope the board would do the same.

Please think through your decisions prudently. The lifeblood of the area is in your hands.

Thanks for listening.

Bill Jene'
N4246 S. Lake Shore Drive
Markesan, WI

May 28, 2024

To Green Lake County, Wisconsin LUP&ZC Committee:
Charles Buss, Chairman
Curt Talma
William Boutwell
Harley Reabe
Glen Thom
Nancy Hoffman

What is the direct **economic impact** of the County K Quarry to a sustained **healthy Green Lake water shed**????

The two are **directly** related. **Do not separate them.**

PREFECE my thoughts first:

The water quality of Green Lake is **IMPAIRED**.

The Wisconsin DNR has listed Green Lake as an impaired LAKE.
Cause "non-point pollution".

It's evident: A. By the frequent toxic algae warnings issued in 2023.
B. Acres of floating duck weed. C. Stories of grandparents prohibiting their grandchildren from swimming in the lake as they did.

It's also evident, by the three agencies Green Lake Association, Green Lake Sanitary District and Green Lake Conservancy that are concerned about the "**degradation**" of the GL water shed.

Is this proposed quarry going to help the Green Lake water shed?

The quarry water is planned to flow directly into Dakin Creek thus into Green Lake and will most likely disrupt the many underground stream that make up this massive aquifer.

Now to **DIRECT ECONOMIC IMPACT.**

What is direct economic impact one might ask? It is a transaction between someone **outside** the host economy and someone **inside** the host economy (Green Lake County). For example, a visitor to a local restaurant, boat dealership or home contractor's office.

Restaurants sell food, boat business sell boats and contractors build homes.

Those are tangible transactions by someone outside the host economy and someone inside the host economy.

Now what does the Green Lake County sell?

You see Green Lake County is in the **BUSINESS** of selling **"quality of life"** and that includes a **healthy-healthy water shed.**

A healthy GREEN LAKE water shed is significant to the **economic foundation** of (1) Green Lake County and (2) the governmental units that border the shores of Green Lake.

Or phrased another way

The Green Lake water shed is the **economic foundation** or **engine** to a sustained economic **future for GREEN LAKE County** and the **governmental units** that border the shores of Green Lake.

Approximately 1400 homes directly and indirectly border Green Lake. The development and maintenance of those properties have **created** and **sustained** many-many-many businesses.

Do you know what else this healthy **water shed** has **created** and **sustained? TAX REVENUES** Think about that "**TAX REVENUES**".

Over **50%** of the tax revenues for the Green Lake County, Town of Brooklyn, Town of Green Lake, City of Princeton, City of Markesan and the City of Green Lake. Comes from those 1400 homes.

Over **50%** of the tax revenue for the School District of Green Lake, School District of Princeton and School District of Markesan. Comes from those 1400 homes generated by a healthy water shed.

90% of those 1400 homes are owned by someone **outside** the host economy and

90% of the owners of those 1400 homes **do not use** our government services or our schools.

Now let's compare the direct economic impact of this proposed quarry to Green Lake County over its life time.

Tax revenue. Insignificant as compared to 90% of those **1400 tax bills** that are mailed out of the **Green Lake County Treasures** office each year.

In fact, this proposed quarry will cost the county money just to maintain the roads.

This planned quarry located upgradient of springs in this area and the quarry water planned to flow directly into Dakin Creek (thus into the Green Lake water shed) or into the **economic foundation** of **GREEN LAKE County** and the **governmental units** that border the shores of Green Lake.

DO NOT BE **DECIVED** THIS PROPOSED QUARRY WILL BE DEVASTAING AND FOREVER.

Respectfully,

Keith Wadell
N 5254 County Road A
Ripon, Wi. 54971

28 May 2024

To: Green Lake Land Use Planning and Zoning Committee

My name is Eric Ratering. I live in the Mitchell's Glen house, W611 Glen Lane, Ripon, Wisconsin 54971. I moved to Green Lake in the fall of 1976 for one reason; the clear, cold water of Big Green Lake. All that we have in excellence in Green Lake County is mostly because of Big Green Lake.

The lake is the driver of the businesses, schools, tourism, real estate and tax dollars for the community of Green Lake and the surrounding county. Any decision that undermines this driver adversely impacts the quality of the lake and all aspects of what it means to want to live here.

Your committee is charged with the awesome responsibility of protecting the lake within your purview from all threats in the Green Lake watershed. If you make a decision that incrementally degrades the lake, the condition of the lake will never recover from that increment. If this committee makes decisions that jeopardize the watershed it will be easier to continue to make decisions that jeopardize the watershed until the damage to the lake is irreversible and "beyond the point of too far".

I recommend that the Conditional Use Permit to allow a new Non-metallic Mine in the Green Lake watershed be denied for the reason above and for all the other reasons that citizens have brought before the Committee.

Thank you for your service.

E Ratering

Eric Ratering

From: Ellen Penfield-Schneider and Charlie Schneider <celpschneider@gmail.com>
Sent: Tuesday, May 28, 2024 10:18 PM
To: Clerk <clerk@greenlakecountywi.gov>
Subject: comments to be included in board member packets

My name is Ellen Penfield-Schneider. I am sending this email as I feel it is important to voice my opposition to the proposed Cty K quarry. The property located at N5267 Brooklyn G has been in my family for generations. My grandparents, Carl and Esther Barclay farmed this property, which was then handed down to my mother, Katherine Penield, and her brother, James Barclay. Upon their passing, the property is now owned by my brother Tom Penfield, and his wife, Vicki Nelson. The Dakin Creek runs through this property.

My opposition to his project is based on many factors. The first is the potential ecological damage that could occur. With the new location, more damage could be done to Dakin Creek. This creek drains into Green Lake. Arsenic, a notoriously toxic heavy metal, is present in this area. This metal would likely be exposed and released into the watershed, most likely making its way into Green Lake. The proximity of this quarry to other unique ecological treasures is also of concern. With Green Lake the economic "lifeblood" of this community, a vibrant and thriving body of water is critical to the ongoing economic success of this area.

The second reason is safety. As a recently retired institutional clinical pharmacist at SSM/St Agnes Hospital, I was called to various "code" situations that were brought into the emergency room. Trauma was one of the codes. I witnessed the results of a number of dump truck versus vehicle accidents during my career. NONE of these ended well for the occupant(s) of the vehicle. Allowing trucks to enter and exit a major county road is a recipe for disaster. Cty K is the road many travel to and from Green Lake. It is truly heartbreaking to watch the reactions of loved ones of accident victims when they are told that their loved ones did not survive. The proximity of the proposed quarry to Cole Fuel Co is also a reason for great concern for the safety of nearby residents and employees.

The third reason is the "quality of life" issues that arise from this location. These include decreased milk production from cows on a nearby farm due to the increased noise (cows do NOT like noise), decreased property values, loud noises (constant beep beep beep) , poorer air quality, and increased truck traffic in a pastoral area.

The proposed property is also a farmland preservation area. These areas are essential to maintain the agricultural integrity of the county. There are a number of unzoned areas in the county, as well as zones designated as M-1 zone, that would be more appropriate for a quarry.

On a personal note, Donald Kinas was the best man at our parents' wedding in 1956. The Kinas name was associated with integrity and good will. The continued push to locate this quarry on Cty K , where it is vehemently opposed by neighbors, greatly threatens their reputation.

Thank you for your time.

Ellen Penfield-Schneider

JOHN S. CRAIG
509 N. Rosa Rd., Madison, WI 53705
Tel (608) 628-3375
Johnsr547-special@yahoo.com
Owner – Craig Farm – About 1 ½ miles West of the Proposed Mine
Parcel Numbers: 004007680000, 004007670000, 004007660000, 004007540000, 004007520000

28-May-2024

Green Lake LUP&Z Board Members, County Board Members
Liz Otto, Green Lake County Clerk
clerk@greenlakecountywi.gov
571 County Road A, Green Lake, WI 54941

Re: County K Quarry Application

AT THIS TIME I OPPOSE GRANTING A CONDITIONAL USE PERMIT FOR DEVELOPMENT OF THE COUNTY K QUARRY

Based on my past personal observations I believe, if development of the mine is allowed to proceed, there is a high probability of detrimental effects to water wells, streams, and springs in the area. Before a CUP for a quarry is approved: additional information on the area's hydrogeology should be obtained, a plan should be in place to assure compliance with the conditions of any CUP and a plan should be in place to assure the resources will be available to restore the land to the production of biological agricultural products when the quarry is at the end of its usefulness.

I remember that, around the early to mid-1960's, a pea viner was located around a mile east of my farm and close to Hwy K. Recent discussions I have had with persons more closely involved with agricultural production than I was at the time have indicated that the viner was located slightly south of the southeast corner of the proposed "County K Quarry." I do remember that what appeared to be greenish "pea juice" and leachate, assumed to be from that viner, traveled underground and ended up resurfacing in the Powell Spring. The rocks in the Powell Creek became covered with a slimy, green substance. I was also told that, because of water quality degradation at that time, at least two water wells in the area had to be redrilled. One well was slightly west of the southwest corner of the proposed quarry and the other was about 2 miles west. Because of the issue with the Powell Spring, it was assumed the issues with the wells were caused by the viner. In 1995, when a quarry at Brooklyn G and County Hwy K was being proposed, I contacted the DNR Southern District water manager, Dell Maug. Mr. Maug stated that changes in ground water often accompany development of fractured limestone mines. He further suggested that people in the area should have their wells tested for water quality and that the static water levels should also be recorded. I do not know if flow levels and water quality studies of the springs and creeks which are in danger of damage from this mine have been done, if not, that should be done as well. This information should be obtained in case changes are noticed if a quarry operation starts. I would hope that persons experiencing changes in underground and or surface water availability would be eligible for significant compensation for their losses.

I am not opposed to limestone surface mines. More than most people in this area I appreciate the great roads the materials from the mines make possible. As a much younger person, I spent my summers growing up in the small Central Alberta Town of Sylvan Lake. (It is no longer a small town.) With a few exceptions, paved, and even well graveled roads were many years in the future. Back then, if heavy rain was expected, there were simply places you did not go. (Now the roads in that area are generally great.) However, I also witnessed 2 Alberta trout streams destroyed because of materials exploitation and poor development of agricultural lands. While we must have products from surface mines, resource development needs to be done responsibly. It seems to me that allowing a mine at the site of the proposed County K Quarry before: 1) additional hydrogeologic testing showing a low probability of damage to the area's ground and surface waters is done, 2) a plan is in place to assure compliance with all conditions of the CUP approval and 3) an enforceable plan is in place for post mining restoration of the quarry; would not be responsible resource development.

John S. Craig

May 27, 2024

Liz Otto, County Clerk
517 County Rd. A
Green Lake, WI 54941

Crystal Jarvis
206 Center St.
Port Barrington, IL 60010

Subj.: Quarry

Dear Ms. Otto,

As a former longtime resident at the Tichora Boy Scout Camp I feel compelled to speak up on the issue of the unwelcome quarry threatening damage to the watershed and pollution to Green Lake itself.

My parents went to Tichora in 1931 for a summer chef job and fell in love with the place. They stayed on until the camp was sold to the Baptists. Dad filled the roles of cook, caretaker and camp ranger over the years. I was born in 1937 and was lucky to be a child of the woods and waters until 1955.

2.

Graduation was something that called for me to go out and make a living for which opportunities were not to be found locally.

But I had my memories and life went on. About four years ago I wisely gave up driving and was invited to live here with my son and daughter in law.

My cat and I share a pleasant room with a huge framed map of Green Lake on the wall opposite my bed. It gives me comfort and makes me sleep well.

I view the northern lights. I watch snowflakes fall and the spring thaw. I find tiny rare flowers in secret places. I hear the first returning blackbirds sing. I gather berries, pick up nuts. In the winter the frozen lake will boom at night as pressure ridges form.

It's all there in that map of Green Lake 1974 by Jean Plout.

3. I've learned there have been changes. A sewer system, Amazing! And wonderful! And no road will ever be put through the old Tichora and that's good. The Indian spirits agree.

So let's assure that this precious place can keep its natural beauty and be a healthy place to live for all the species that live in this magnificent setting.

No quarry please. No poisons. No polution. No sick lake, no dying wildlife.

Our earth satellites have exposed the damage and destruction of huge lakes around the world. All the result of mans greed. Mining, mining, mining. The poisons make the lakes toxic to all life. Even the miners on the shore are at risk. The folks in the valley had to move out.

Don't let a gravel quarry threaten the health of Green Lake!

Sincerely
Crystal Jarvis

Preserving the Land that Protects the Lake

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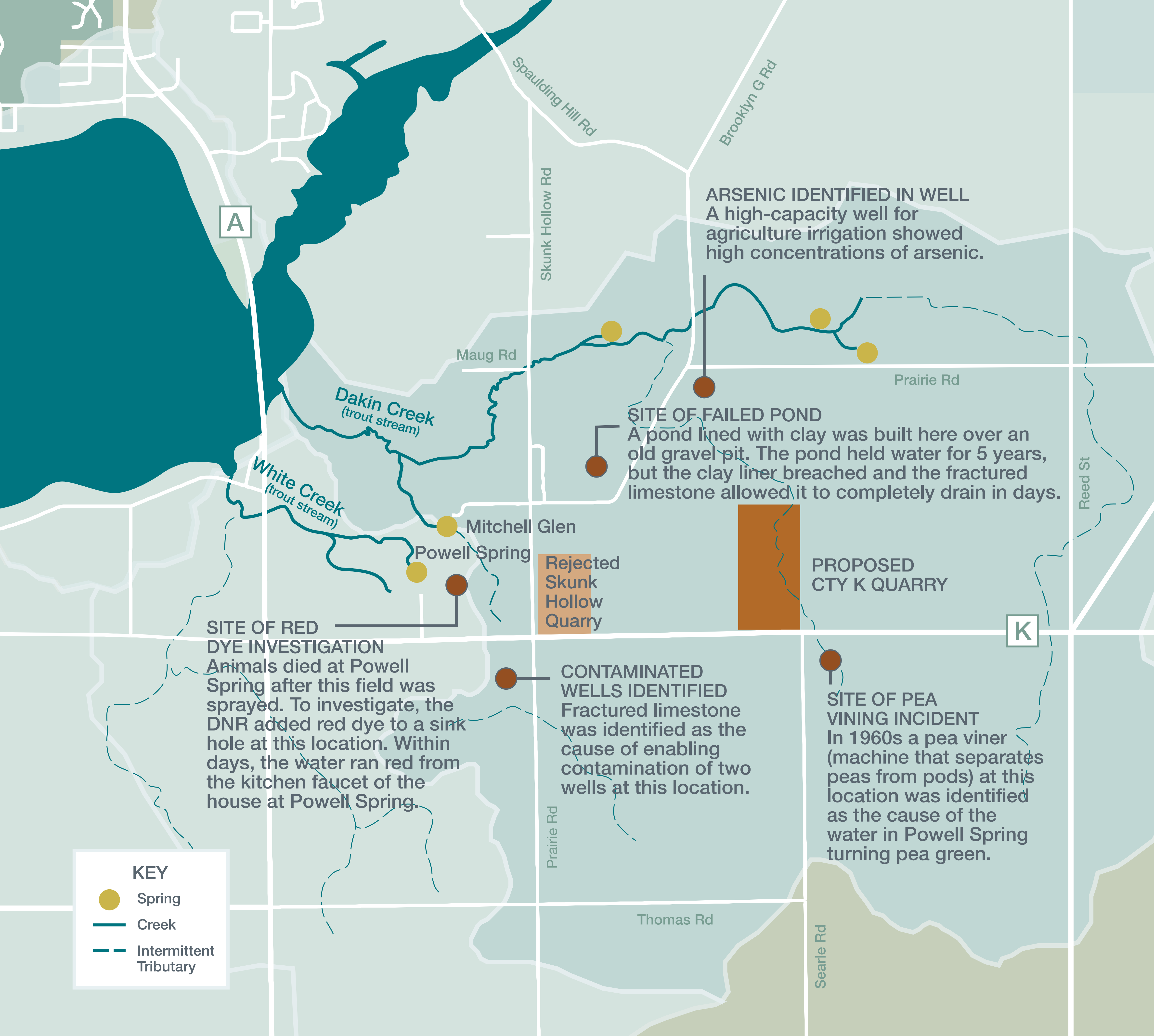

PROPOSED CTY K QUARRY

What happens here, doesn't stay here.

The area surrounding the proposed Cty K Quarry is comprised of fractured limestone. The horizontal fractures in the limestone allow water to move laterally. Within the watershed this means contaminated water could flow quickly and easily from the Cty K Quarry site.

Fractured limestone at the surface level.

The map on the left details historical events that illustrate the quick water movement within the fractured limestone beneath the surface. A quarry in the Dakin Creek Environmental Corridor threatens potential harm to this unique and fragile area surrounded by natural freshwater springs and DNR designated trout streams.

GREEN LAKE CONSERVANCY

Preserving the Land that Protects the Lake

May 28, 2024

Attention: Green Lake County
Land Use Planning & Zoning Department
571 County Road A
Green Lake, WI 54941

Reference: Proposed County K Quarry

The Green Lake Conservancy is an all-volunteer, non-profit land trust with a mission to preserve and protect special places throughout Green Lake County and the surrounding region. Since 1995, we have been a strategic partner, protecting special places though acquisition, gift, and conservation easement, with the goal of preserving and protecting water quality, wildlife habitat, scenic views, recreational opportunities and cultural resources.

With the support of grants from the Wisconsin Department of Natural Resources (WDNR), plus donations from partner organizations and engaged citizens, we have protected over twenty properties including two scenic and high value properties located very close to the proposed K Quarry—**Mitchell Glen** and **Powell Spring**. Both properties protect cold water springs, which flow to **White Creek** and **Dakin Creek**, which are designated by the WDNR as Areas of Special Natural Resource Interest and Class I and II Trout Streams. Both springs, along with the many other springs in the area, are maintained by a groundwater aquifer that the DNR has designated as the **Dakin Creek Watershed**. That watershed is an important element of the greater Green Lake Watershed, which is an important supplier of cold, clean water to Big Green Lake.

As such, protection of the surface water and groundwater quality and quantity is important to maintain stream base flow, aquatic biodiversity, fisheries, wildlife habitat, recreational opportunities, and overall health of downstream Green Lake. **Our concern is that a disturbance to the watershed in the form of a pit quarry located in the middle of the Dakin Creek Watershed would threaten the delicate balance of the existing quality and quantity of water that supplies Big Green Lake.**

The Conservancy appreciates the opportunity to provide comments on Kopplin & Kinas' (K&K) proposed 80-acre nonmetallic mine, called the K Quarry, to be located north of County K just west of the Fond du Lac County line. The proposal estimates that the quarry **will be in use for over 70 years—until around the year 2100**—when the great-grandchildren of our current younger generation will be making decisions about Green Lake County. We urge you to take the welfare of these future generations very seriously as you consider the implications of this proposal.

In advancing its mission, the Conservancy urges the Committee **to deny the Kopplin & Kinas application for the K Quarry** based on the same five standards that the Skunk Hollow Mine was

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denied by the Board of Adjustment in 2022 per advice of the county attorney. These five standards are the law, and the failure of **any single one must defeat the CUP**. In the following pages we will delineate those standards and highlight with evidence how Kopplin & Kinas fail to meet those standards.

The CUP standards that Kopplin & Kinas' proposal fail to meet:

CUP standard # 1: *The Proposal LACKS substantial evidence that it will not have a negative effect upon the health, safety, and general welfare of occupants of surrounding lands.* AND **CUP standard #3:** *The Proposal LACKS substantial evidence that it will not be hazardous or disturbing to existing or future neighboring uses.*

1. **To the west, north, and south of the proposed site, the limestone and bedrock are porous and fractured.** Arsenic is present in sulfide minerals in the dolomite and sandstone bedrock, and activities like mining can introduce oxygen into the aquifer causing chemical reactions that release arsenic and sulfuric acid into the groundwater[i]**. Please examine the "Dakin Watershed Story Map" and read the accompanying affidavits by Wetzel, Neuenfeldt, and Nehm, as well as the DNR lab report on Machkovich's well which prove that fractured limestone and bedrock led to the contamination of groundwater on their properties:**
    a. Animals died at Powell Spring after a field to the west of the proposed quarry was sprayed with insecticide. Through a red dye test, the DNR established that the poison leaked from the field through a sinkhole into the groundwater. **Duane Wetzel** witnessed the water running red from the kitchen faucet at Powell Spring.
    b. **Duane Wetzel** also witnessed how a pea viner operating on Searl Rd/County KK resulted in Powell Spring turning pea green.
    c. **Ernie Neuenfeldt** built a pond over a gravel pit, and despite being lined with 100 loads of blue clay, it developed a leak and drained in 5 days.
    d. **Carl Nehm,** a dairy farmer, attests to how the fractured nature of the bedrock on his property resulted in bacteria in two of his wells, preventing him from producing Grade A milk until he found another source of water on his farm.
    e. **Steve Machkovich** dug a deep irrigation well that the DNR shut down due to having 200 times the level of acceptable arsenic. See DNR lab report and photo.
2. **Acid rock drainage (ARD)**: Contamination of groundwater by metals is possible even if the mining is above the water table as K&K proposes. ARD can occur where sulfide minerals are exposed to air and water as **aggregate material from mining is stored on site**. ARD can infiltrate downward to the water table and into private wells, springs, streams, and Green Lake.[ii] This will likely happen on a site which will be active for 70 years.
3. **The site would be located next to a liquid propane facility**: Cole Propane currently stores 2 tall towers of propane and 48 residential-sized tanks of propane. K&K will be **blasting** next door to this facility. Can we say with certainty that nothing could possibly go wrong

in the next 70 years to make this a risk worth taking regarding the safety of the occupants of the surrounding lands?

4. **K&K needs a new water supply well** on site for aggregate processing, dust suppression, and portable pavement plants. K&K gives no information as to its capacity, expected pumping rates, or the frequency of use. Pumping water supply wells can trigger chemical reactions, and they can also deplete private wells in the vicinity.
5. **Blasting is a potential source of nitrates and petroleum compounds**. The DNR has documented **contamination of groundwater with nitrates** after blasting at a Wisconsin sand mine. The DNR reports that they commonly receive **complaints about sediment and metal staining in well water near blasting sites**.[iii] The treatment of chemicals used in blasting is also not adequately addressed in K&K's proposal.
6. **Stormwater runoff will run north** going through Machkovich, Neuenfeldt, Polzin, and Penfield properties, ending up in Dakin Creek. The proposed discharges to surface water and groundwater are not adequately described in K&K's Erosion Control and Storm Water Management Plan. "A potential water quality risk related to the proposed stormwater management system for the mine is the possibility of pumping water from pit if water from heavy rains does not infiltrate into the bottom of the pit quickly enough to allow continued mine operations. **If acid mine drainage were to occur and wastewater from the pond were discharged to surface water, this could introduce contaminants into the surface drainage system** [ending up in Dakin Creek]".[iv]
7. **Noise and dust pollution** will be a nuisance to the households in the immediate vicinity and to travelers on County K, Brooklyn G Road and Skunk Hollow.

CUP Standard #5: *The Proposal LACKS substantial evidence that it will be served adequately by essential public facilities and services, such as highways, streets, police and fire protection, drainage, structures, and schools, and that the persons or agencies responsible for the establishment of the proposed use shall be able to provide adequately any such service;* **CUP Standard #6:** *The Proposal LACKS substantial evidence that it will have vehicular approaches to the property which shall be so designed as not to create an interference with traffic on surrounding public or private streets or roads.*

1. **Truck traffic and safety issues on County K:** According to K&K's proposal, there will be 2 heavy trucks an hour, 10 hours a day, slowly entering a 55-mile an hour highway six days of the week. Average traffic is currently 2,400 cars per day.[v] School buses use this route. Gravel from the quarry could also cause potential problems. Other than discussing regular sweeping of the gravel, K&K's proposal **lacks any discussion of the real safety issues involved with the location of the quarry and its driveway.**

Farmland Preservation District Standard #3: *The Proposal LACKS substantial evidence that its operation and its location in the farmland preservation zoning district are reasonable and appropriate and that they considered alternative locations outside the farmland preservation zoning district or are specifically approved under state or federal law.*

Preserving the Land that Protects the Lake

1. **Failure to explore alternative sites:** Farmland Preservation Districts are meant to preserve farmland, protect soil and water, and minimize land use conflicts. Mines can be placed in unzoned areas which comprise about one-third of county land—**see the attached Map 7 of the 2016 Green Lake Comprehensive Plan**. The proposed K Quarry is inconsistent with the intent of the Farmland Preservation District.
2. **Putting a mine in A-1 Farmland Preservation District is a violation of the Green Lake County Comprehensive Plan**: The first paragraph in Chapter 1 of the Green Lake County Comprehensive Plan states: "Throughout Green Lake County, a visitor can enjoy the open space and landscapes of the past. We have preserved our productive agricultural land, and the family farm continues to thrive. Our beautiful lakes have been well managed and preserved, and the County's water resources remain healthy and attractive."[vi]
3. **K&K failed to prove that locating a mine in a farmland preservation district is appropriate.** According to the Zoning Office, there are 19 active quarries in the County. Six quarries, or 32% of all active quarries in the County are operated by K&K. Thus, they currently operate twice the number of quarries of their largest competitor. 18 of the 19 operating quarries are appropriately located in zone M-1 or unzoned areas. **Only one of the 19 active quarries is in a Farmland Preservation area zoned A-1, the Kopplin & Kinas Morris Pit** on McConnell Road (**see attached GL County's Mining Public Fact Sheet**).
4. **Eight other mining companies have followed the County zoning plan** to preserve prime farmland by mining within M-1 or unzoned areas. With this application, K&K continues to ignore County planning. Their application is to expand their dominant position by **mining another 80 acres specifically identified as having the "best agricultural soils" in the Green Lake Farmland Preservation Plan.**

Reclamation standards, section § **323-13A (4)**: **Habitat restoration**: *When the land use required by the reclamation plan approved pursuant to this chapter requires plant, fish or wildlife habitat, it shall be restored, to the extent practicable, to a condition at least as suitable as that which existed before the lands were affected by nonmetallic mining operations.* And **Reclamation standards, section** § **323-13G: Revegetation and site stabilization**: *Except for permanent roads or similar surfaces identified in the reclamation plan, all surfaces affected by nonmetallic mining shall be reclaimed and stabilized by revegetation or other means. Revegetation and site stabilization shall be in accordance with the approved reclamation plan and shall be performed as soon as practicable after mining activity has permanently ceased in any part of the mine site.*

1. **K&K proposes to build a giant pond on the land instead of restoring it to agricultural uses.** The reclamation plan for A-1, Farmland Preservation Districts, indicates that the land must be put **back to its original use—agriculture**. How does a giant pond fulfill this standard? K&K's approach to fulfilling the restoration requirements in their reclamation plan is incorrect. **They need to fill the pit with topsoil and fulfill the financial assurance requirements for Reclamation.**
2. **Given its fractured limestone and bedrock, it is unlikely that a pond built over a gravel pit will survive without its surface water draining into the groundwater**. Please read

PO Box 52 | Green Lake, WI 54941 |. greenlakeconservancy.org

the previously mentioned affidavit by Ernie Neuenfeldt on how his large clay-lined pond, built over a gravel pit, developed a hole and drained within 5 days.

3. **Given its fractured limestone and bedrock, acid rock drainage is likely to occur and leak from the pond into the groundwater.**

Farmland Preservation District Standard #5: *The operation DOES substantially impair or limit the current or future agricultural use of surrounding parcels of land that are zoned for or legally restricted to agriculture.*

1. The proposed site is surrounded by properties which are zoned A-1: the **Nehm dairy farm**, **Neuenfeldt**, **Polzin**, **Penfield, Goyette, Machkovich. All these property owners USE their lands for a variety of agricultural purposes.** Should the quarry contaminate or reduce the water supply or the quality of the water in their wells, they could no longer use it for agricultural purposes.

CUP Standard #2: *The Proposal LACKS substantial evidence that it will be designed, constructed, operated, and maintained so as to be harmonious and be appropriate in appearance with the existing or intended character of the general vicinity and that such a use will not change the essential character of the same area.* AND **Farmland Preservation District Standard #2**: *The operation and its location in the farmland preservation zoning district are NOT consistent with the purposes of the farmland preservation zoning district.*

1. The area is a **farming and residential community** with several unique and fragile natural wonders whose protection is part of the Conservancy's mission. **The Conservancy has spent over $700,000 in creating land trusts and conservation easements in the immediate vicinity (Mitchell Glen, Powell Spring, and the Mildebrandt farm) to maintain the area's essential character and protect its unique features.** If we want to preserve the natural beauty of the lake and its watershed, we must be vigilant in keeping the essential character intact.
2. **K&K's proposal turns what is a Farmland preservation zone into an industrial mining and manufacturing site**. An exception was already made in allowing Cole Propane to set up a commercial business. If the K&K proposal goes through, the County is in essence setting up a small industrial area. If that precedent becomes established, the idea of a Farmland Preservation District becomes meaningless. Nothing about the quarry promotes the area for uses of a generally exclusive agricultural nature to protect farmland and participation in the farmland preservation program.
3. **Potential damage to the economic driver of the area:** Think of the area around Green Lake (its land and watershed) as the "Golden Goose." The value comes from its property, recreational use and tourism, development, etc. and it is the driving economic force in the county. In very practical terms, we need to protect our investment in the quality of the lake and the streams and creeks that feed it. The proposed mine endangers the Dakin Watershed, which flows directly into Green Lake.

CUP Standard #4: *The Proposal LACKS substantial evidence that it will not be detrimental to property in the immediate vicinity or to the community as a whole.*

1. **The mine will be detrimental to property in the immediate vicinity.** The quarry will have immediate and significant detrimental effects on the surrounding properties, diminishing their market value and severely reducing the landowners' use and enjoyment of their property. **With the recent reassessment in the Town of Brooklyn, the potential loss of value is nearly $2,000,000 for nearby properties.**
    a. **The homes within a half mile** of the edge of the proposed mine property are likely to decrease in value by an average of 25-30%.[vii]
    b. **The Skunk Hollow neighborhood, including Skunk Ridge Lane, Glen Lane, the southern part of Skunk Hollow Road, and Maug Road, are all less than a mile away** and those households will also see a substantial decrease in their value.
    c. **Two nearby family dairy farms** will not only experience a loss in terms of property value, but also a potential end to these farmers' livelihoods. Should the quarry reduce water supply or quality in wells at these farms, dairy farming will become impossible, as trucking in an alternative source of water for the herds will be economically infeasible. Cows also need a calm environment for a stress-free life to produce milk. Nehm's cows are stressed every time the Egbert quarry (about a mile from his farm) does blasting.

Sincerely,

Melissa Curran

Melissa Curran
President
Green Lake Conservancy
PO Box 52
Green Lake, WI 54941

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[i] Steve Gaffield, *Hydrologic Evaluation of Proposed Skunk Hollow Mine*, pp. 6 & 8
[ii] Steve Gaffield, *Hydrologic Evaluation of Proposed Skunk Hollow Mine*, pp. 8 & 10
[iii] Steve Gaffield, *Hydrologic Evaluation of Proposed Skunk Hollow Mine*, p. 11
[iv] Steve Gaffield, *K Quarry Permit Application Review*, p. 3
[v] WisDOT, Traffic Count Map, County K Road
[vi] *Green Lake County Comprehensive Plan of 2016*, Chapter 1, p. 1
[vii] Real Estate Dynamics, Inc., *Estimating Property Value Impacts from the Proposed Skunk Hollow Mine on a Property Located at N5139 Brooklyn G Road in the Town of Brooklyn, Green Lake County, Wisconsin,* p. 29

The following pages include affidavits by Duane Wetzel, Ernie Neuenfeldt, and Carl Nehm about the fractured nature of the limestone and bedrock in this area. These legal documents attest to the dangers posed by a quarry which will disturb the bedrock causing both chemical changes underground and potential disruptions in groundwater.

Also included in this section is the documentation of Steve Machkovich's drilling of his irrigation well in 2004, plus the DNR lab report from 2012 which documents extremely high arsenic and nickel levels in his well. Also included is a photo of his corroded irrigation equipment after only 106 hours of use.

Before the

Green Lake County Board
Committee on Land Use Planning and Zoning

In the Matter Involving the
Application by Koplin & Kinas Co, Inc.
for a Conditional Use Permit
to Operate a Quarry On
Green Lake County K

Affidavit of Duane Wetzel

I, Duane Wetzel, having been duly sworn, state as follows:

1. My name is Duane Wetzel, and I live at N5145 Skunk Ridge Lane, Green Lake, WI; Town of Brooklyn (parcels # 004007810500 and 004007811200). I also own 9.5 acres immediately west of Powell Spring (parcel # 004007520000) and White Creek runs through my property.
2. In the 1970s I acquired these properties in the Skunk Hollow neighborhood. I knew all the people mentioned below: the Kasubowski family—the then-current owner of the farmland adjacent to Powell Spring on its east side (parcel # 004007630100); Ms. Eileen Storzer who owned the property next to mine at Powell Spring and lived in a log cabin above it; and Carl Nehm, the current owner of the farmland east of Powell Spring. I grew up spending significant time in the woods at Powell Spring, Mitchell Glen, White Creek, and Dakin Creek. I also grew up observing the various harvests on these local farmlands.
3. When I was a teenager around 1964, I observed two "pea viners" harvesting sweet peas, one in the area of Spaulding Hill and the other on County Road KK and Searl Road. A pea viner is a machine that separates the peas from their pods, and discards the green leaves, vines, pods which leave large amounts of wet debris in the field. The process takes about a month and the piles of very wet sludge really build up. Tractors were used on top of the piles to level them off to allow for more debris to accumulate since the pea viner machine itself did not move. Thus, the wet sludge was packed into the ground. I recall seeing a large "four row" pea viner working on the property on the south-east corner of Searl Road and County K, which is to the east and uphill from Powell Spring. At that time, I personally saw the water at Powell Spring turn the color of pea green. I recall that the green color was so strong that while standing in Powell Creek at the time, I was not able to see my feet. Because of this effect on the spring water, the farmer stopped harvesting. In two or three days, the spring started to turn clear again. This experience meant that the ground contained very porous and fractured bedrock that allowed surface water to freely move beneath the surface as groundwater toward open springs.
4. In a separate incident around 1978, my neighbor, Ms. Elieen Storzer, was living in the Powell Spring cabin. At that time, the canning company that contracted for the harvesting of peas had a crop duster airplane spray insecticide on the farmland east of the Powell Spring. Shortly after that, Ms. Storzer's two pet cats and her dog died of poisoning caused by the insecticide in the well water. To my knowledge, no similar pesticides have since been applied in that area.
5. After this incident, Ms. Storzer contacted the DNR to find out how her well could have been contaminated by these insecticides that resulted in her pets' deaths. It was well-known that

there was a sinkhole in the neighboring farmland to the east (owned at the time by the Kasubowski family) that was sprayed with that insecticide. [That farm is currently owned by Carl Nehm, parcel # 004007630100.] I knew where it was because I saw that the Kasubowskis had put a fence post out in the middle of that field and I asked him why the fence post was there. Mr. Kasubowski told me that it marked a sinkhole, and he placed it there so they would avoid having the back tire of his tractor getting stuck in the hole. If it did, they would have to walk home to get another tractor to pull that one out. Significantly, when the DNR came out to investigate the incident, they poured red dye into that sinkhole and two or three days later when I was at Eileen Storzer's house, she turned her kitchen faucet on and I saw the well water running out of her kitchen faucet was red from the red dye. It was obvious that the red dye that had started as surface water had infiltrated the groundwater, which moved down the grade toward Ms. Storzer's cabin and well. Again, the sinkhole was in the field between Ms. Storzer's cabin and the proposed K Quarry area.

6. These experiences tell me that the groundwater from the farmlands east of Powell Spring to at least Searl Road and both north and immediately south of Highway K moves underground north and west toward Powell Spring and Dakin Creek. This can only be due to cracks and fissures in the underground mineral formations, which I believe to be limestone. I also believe that groundwater further east would also move north and west toward Dakin Creek for the same reasons.
7. I have read the hydrological report dated December 8, 2022, of Dr. Gaffield confirming the presence of contaminants, including sulfides and arsenic, beneath the surface of the farmlands to the east of Powell Spring and north of County K and believe that excavating those lands would disturb dormant contaminants and cause them to move underground to the north and west in the Dakin Creek watershed.
8. Based on these personal experiences, I know that the entire elevated area west of Powell Creek and both north and immediately south of County K allows the free flow of groundwater toward the north and west as confirmed by the Wisconsin Department of Natural Resources. That area is full of porous rock material that, if disturbed, would allow the release of contaminants into the groundwater.
9. I am opposed to the proposed K Quarry because it would have a negative effect on the groundwater in the area and very likely result in contaminating groundwater on my land.

Duane Wetzel

Duane Wetzel

Subscribed to and Sworn Before Me
This 27 day of May, 2024

Robert E. Burke

Robert E. Burke, Attorney at Law
Wisconsin Bar Number 1071425
Notary; My commission is permanent:

Before the

Green Lake County Board
Committee on Land Use Planning and Zoning

In the Matter Involving the
Application by Koplin & Kinas Co, Inc.
for a Conditional Use Permit
to Operate a Quarry On
Green Lake County K

AFFIDAVIT of Ernie Neuenfeldt

I, Ernie Neuenfeldt, having been duly sworn, confirm as follows:

1. I live at N5139 Brooklyn G Road, town of Brooklyn where my wife and I built our home in 2012. I have a private pure water well there that supplies my household.
2. The Wisconsin Department of Natural Resources has mapped the area of my home, along with the proposed K Quarry site, as part of the Dakin Creek watershed, which supplies Big Green Lake. The DNR also confirmed that the water in the area south and east of my property flows north and west toward my property and toward Dakin Creek.
3. The location of my property is two farms away from the northwest corner of the parcel that is now being considered for a quarry. According to the County GIS map, my property has a low elevation of 914 feet above sea level. The proposed quarry site has high elevations of 994 to 1015 feet above sea level. Therefore, water related mining and industrial activity in the proposed area, including blasting, opening rock and washing material would result in excess surface water and groundwater soaked into the limestone to flow north and west onto my land.
4. Around 2012, I attempted to establish a 1.5-acre private pond on my property. I had over 100 loads of blue clay delivered and spread over the abandoned gravel pit there hoping to contain the water. The pond filled and lasted for about five years. However, for whatever reason, a small hole developed in the pond. Within five days, the pond water washed away underground taking the clay with it forming a large drain hole and the pond disappeared. It is evident that the pond water moved through porous rock material and eventually must have flowed underground into the Dakin Creek area.
5. That experience confirms my belief that the underground area of my property has substantial porous and fractured limestone or rock material that permits the flow of very large quantities of groundwater to the north and west toward Dakin Creek. For that reason, and logically given the relative elevations of the above paragraph 3, any water holding in the proposed quarry site would eventually proceed underground following the same course as my pond.
6. My concern is that reports of possible exposure and releasing of contaminants, even in small quantities, would be absorbed in the quarry water and transported underground to my well. This is described fully in the report by Steve Gaffield, PhD, in the Skunk Hollow Board of Adjustment case on December 22, 2022, which is hereby fully included by reference in this statement. I have attached pages 6 and 7 of that report to this statement. I believe this to be a valid concern and I have seen no evidence that would indicate that, if a quarry and crushing works that include large quantities of washing water are established, that such water containing contaminants would not flow in the

groundwater toward my well. I have seen no evidence that this could be avoided and, based on my personal experience, I believe it is very likely to occur.

7. There are nine or more homes immediately adjacent to my property that would appear to be affected by the location of the proposed quarry as well.
8. I have read the materials provided by the Koplin & Kinas company in support of their application, and they do not attempt to address the prospect of deteriorating surface or groundwater quality on my land and home.
9. I also am concerned about the use of water quantities in the proposed manufacturing of aggregate. One estimate I saw is that such an operation may require as much as 1800 gallons per minute. The Koplin & Kinas materials do not adequately address water consumption, so there is no way to predict the effect of such use on my well and others in the area.
10. For reasons relating to the health and safety of my wife and me, as well as the devaluation of the value of my property in the event of the flow of contaminated surface and ground water into my property, I strongly oppose the granting of a Conditional Use Permit for the K quarry.

Ernst R. Neuenfeldt

Ernie Neuenfeldt

Subscribed to and Sworn Before Me

This 28th day of May, 2024

Robert E. Burke

Robert E. Burke, Attorney at Law
Wisconsin Bar Number 1071425
Notary; My commission is permanent:

Before the
Green Lake County Board
Committee on Land Use Planning and Zoning

In the Matter Involving the
Application by Koplin & Kinas Co, Inc.
for a Conditional Use Permit
to Operate a Quarry On
Green Lake County K

Affidavit of Carl Nehm

1. Since 1990, I have lived at N4805 Prairie Rd, Brooklyn Township, Green Lake County where I operate a dairy farm. I also grow feed for my herd on several adjoining parcels. Our farm includes parcel 006-00006-0000, which is one farm lot away from the proposed K Quarry.
2. Some years ago, there were two active wells on the property. Both of those wells failed tests for producing Grade A milk because of the presence of bacteria in the water. Apparently, bacteria had been entering the wells through openings and fissures in the limestone under the topsoil. There were attempts to rehabilitate the well, however the wellhead was located too close to the home so a new much deeper well was dug which resulted in acceptable well water for household and dairy use.
3. Because of the contaminated water, the original two wells were closed and professionally sealed with bentonite and abandoned. The professionals who advised me of the situation said that the fractured rock under those wells allowed contamination of the groundwater at the original well depths.
4. I am concerned about the effects of removal of topsoil and limestone in the general area of my farm because of the apparent free flow of groundwater through and under the limestone and the real possibility of releasing contaminants such as sulfides in the groundwater. If contaminants become present in the groundwater due to a quarry, as reported, it could lead to abandoning my dairy farming. I regard the situation as most serious and therefore oppose the proposed quarry on County K.

Carl Nehm

Carl Nehm

Subscribed to and Sworn Before Me

This 27 day of May, 2024

Robert E. Burke

Robert E. Burke, Attorney at Law
Wisconsin Bar Number 1071425
Notary; My commission is permanent:

Well Construction Report For
WISCONSIN UNIQUE WELL NUMBER **SQ446**

State of WI - Private Water Systems - DG/2
Department of Natural Resources, Box 7921
Madison, WI 53707
Please type or Print using a black Pen
Please Use Decimals Instead of Fractions

Form 3300-77A
(R 8/00)

Property Owner: MACHKOVICH, STEVE
Telephone Number: –
Mailing Address: W235 PRAIRIE RD
City: RIPON State: WI Zip Code: 54971
County of Well Location: Green Lake
County Well Permit No.: W
Well Completion Date: 08/20/2004

1. Well Location: [X] Town [ ] City [ ] Village of BROOKLYN
Fire # (if available)
Grid or Street Address or Road Name and Number
Subdivision Name Lot # Block #

Well Constructor (Business Name): DANIEL J STEFFES
License #: 6109
Facility ID Number (Public Wells)
Address: BADGER WELL DRLG
Public Well Plan Approval #: W-24131
City: FOND DU LAC State: WI Zip Code: 54935
Date of Approval (mm/dd/yyyy): 07/07/2004
Hicap Permanent well #: 67459
Common Well #: 2
Specific Capacity: 2.7 gpm/ft

Gov't Lot # or NE 1/4 of NE 1/4 of
Section 36 T 16 N R13 [X] E [ ] W
Latitude Deg. Min.
Longitude Deg. Min.
Lat/Long Method: GPS008

2. Well Type: [X] New [ ] Replacement [ ] Reconstruction
of previous unique well # constructed in
Reason for replaced or Reconstructed Well?

1. Well serves # of homes and or IRRIGATION
(e.g. barn, restaurant, church, school, industry, etc.)
High capacity Well? [X] Yes [ ] No
Property? [X] Yes [ ] No

[X] Drilled [ ] Driven Point [ ] Jetted [ ] Other

4. Is the well located upslope or sideslope and not downslope from any contamination source, including those on neighboring properties? [X] Yes [ ] No
Well located within 1,200 feet of a quarry? [ ] Yes [ ] No If yes, distance in feet from quarry:
Well located in floodplain? [ ] Yes [X] No
Distance in Feet from Well to Nearest:

1. Landfill
2. Building Overhang
3. Septic [ ] Holding Tank [ ]
4. Sewage Absorption Unit
5. Nonconforming Pit
6. Buried Home Heating Oil Tank
7. Buried Petroleum Tank
8. Shoreline [ ] Swimming Pool [ ]
9. Downspout/Yard Hydrant
10. Privy
11. Foundation Drain to Clearwater
12. Foundation Drain to Sewer
13. Building Drain [ ] Cast Iron or Plastic [ ] Other
14. Building Sewer [ ] Gravity [ ] Pressure [ ] Cast Iron or Plastic [ ] Other
15. Collector or Street Sewer: [ ] Sanitary units in. diam. [ ] Storm
16. Clearwater Sump [ ] <= 6 [ ] > 6
17. Wastewater Sump
18. Paved Animal Barn Pen
19. Animal Yard or Shelter
20. Silo
21. Barn Gutter
22. Manure Pipe [ ] Gravity [ ] Pressure [ ] Cast Iron or Plastic [ ] Other
23. Other Manure Storage
24. Ditch
25. Other NR 812 Waste Storage

6. Drillhole Dimensions and Construction Method

Dia (in.)	From (ft.)	To (ft.)
16	0	62
12	62	465

Upper Enlarged Drillhole / Lower Open Bedrock:
[X] 1. Rotary - Mud Circulation [ ]
[ ] 2. Rotary - Air [ ]
[ ] 3. Rotary - Air and Foam [ ]
[ ] 4. Drill-Through Casing Hammer
[ ] 5. Reverse Rotary
[ ] 6. Cable-tool Bit in. dia. [ ]
[ ] 7. Dual Rotary [ ]
[ ] 8. Temp. Outer Casing in. dia. depth (ft.)
Removed? [ ] Yes [ ] No
If no, why not?

8. Geology

	Type, Caving/Noncaving, Color, Hardness, etc.	From (ft.)	To (ft.)
K-I-	BLACK DIRT	0	3
-YP	HARDPAN STONES SAND	3	34
-L-	LIMESTONE	34	87
-N-	SANDSTONE	87	115
-NL	SANDSTONE LIMESTONE	115	197
-N-	SANDSTONE	197	465

5. Casing, Liner, Screen

Dia. (in.)	Material, Weight, Specification	From (ft.)	To (ft.)
12	ASTM A53B IPSCO PARAGON 12.750 X .375 EL 21 PLAIN END	0	62

Dia. (in.) Screen type, material & slot size

7. Grout or Other Sealing Material Method
Method: TREMIE PIPE PUMPED

Kind of Sealing Material	From (ft.)	To (ft.)	# Sacks Cement
NEAT CEMENT GROUT	0	62	45

9. Static Water Level
ft. above ground surface
38 ft. below ground surface

10. Pump Test
Pumping Level 225 ft. below surface
Pumping at 500 GPM for 1 hours

11. Well is: [X] Above Grade 24 in. [ ] Below Grade
Developed? [X] Yes [ ] No
Disinfected? [X] Yes [ ] No
Capped? [X] Yes [ ] No

12. Did you notify the owner of the need to permanently abandon and fill all unused wells on this property?
[ ] Yes [ ] No If no, explain:

13. Signature of the Well Constructor or Supervisory Driller: DJS Date signed: 08/20/2004
Signature of Drill Rig Operator (Mandatory unless same as above) Date signed

Make additional comments on reverse side about geology, additional screens, water quality, etc.
Variance issued [ ] Yes [X] No

Wisconsin Department of Natural Resources
Laboratory Report

09/24/2012 | Lab: 113133790 | Sample: IX007160 | Page 1 of 2

Laboratory: Wisconsin State Laboratory of Hygiene
2601 Agriculture Dr
Madison WI 53718
Phone: 800-442-4618 Fax Phone: 608-224-6213

DNR ID: 113133790

Sample:

Field #:		Sample #:	IX007160
Collection Start:	09/12/2012 12:00 am	Collection End:	
Collected by:	PATRICK GORSKI	Waterbody/Outfall Id:	
ID #:	SQ446	ID Point #:	
County:	Green Lake	Account #:	PP010
Sample Location:	TOWN OF BROOKLYN (SEC 36 NE:1/4 NE:1/4 T16N R13E)		
Sample Description:	IRRIGATION WELL # SQ446		
Sample Source:	Private (other)	Sample Depth:	
Date Reported:		Sample Status:	PARTIAL
Project No:		Sample Reason:	Investigation

Analyses and Results:

Analysis Method		Analysis Date	Lab Comment				
DIG, ICP, PRIVATE (SW846 3005A)		09/17/2012					
Code	Description	Result	Units	LOD	Report Limit	LOQ
99404	DIG TOTAL REC SW846 3005A	COMPLETE				

Analysis Method		Analysis Date	Lab Comment			
METALS PANEL, TOTAL REC, ICP (EPA 200.7)		09/18/2012	NO CHARGE			
Code	Description	Result	Units	LOD	Report Limit	LOQ
1104	ALUMINUM,TOTAL RECOVERABLE	16700.	UG/L	3		10
978	ARSENIC TOTAL RECOVERABLE	2310.	UG/L	5		16
1113	CADMIUM TOTAL RECOVERABLE	64.	UG/L	0.5		1.6
918	CALCIUM TOTAL RECOVERABLE	142.	MG/L	0.1		0.3
1118	CHROMIUM TOTAL RECOVERABLE	197.	UG/L	1		3
979	COBALT TOTAL RECOVERABLE	2160.	UG/L	1		3
1119	COPPER TOT REC	9830.	UG/L	2		6
899	HARDNESS TOTAL RECOVERABLE CALCULATION	534.	MG/L	1.4		4.6
980	IRON TOTAL RECOVERABLE	426.	MG/L	0.1		0.3
1114	LEAD TOTAL REC	82.	UG/L	3		10
921	MAGNESIUM TOTAL RECOVERABLE	43.7	MG/L	0.1		0.3
1123	MANGANESE ICP TOTAL RECOVERABLE	1720.	UG/L	1.0		3.0
1074	NICKEL ICP TOTAL RECOVERABLE	4310.	UG/L	1		3

With only 106 hours of pumping the water stripped all the galvanizing off the brand-new center pivot irrigation equipment. This was caused by sulfide s in the Platteville and St Peter being oxidized as acid mine drainage reaction.

GREEN LAKE CONSERVANCY

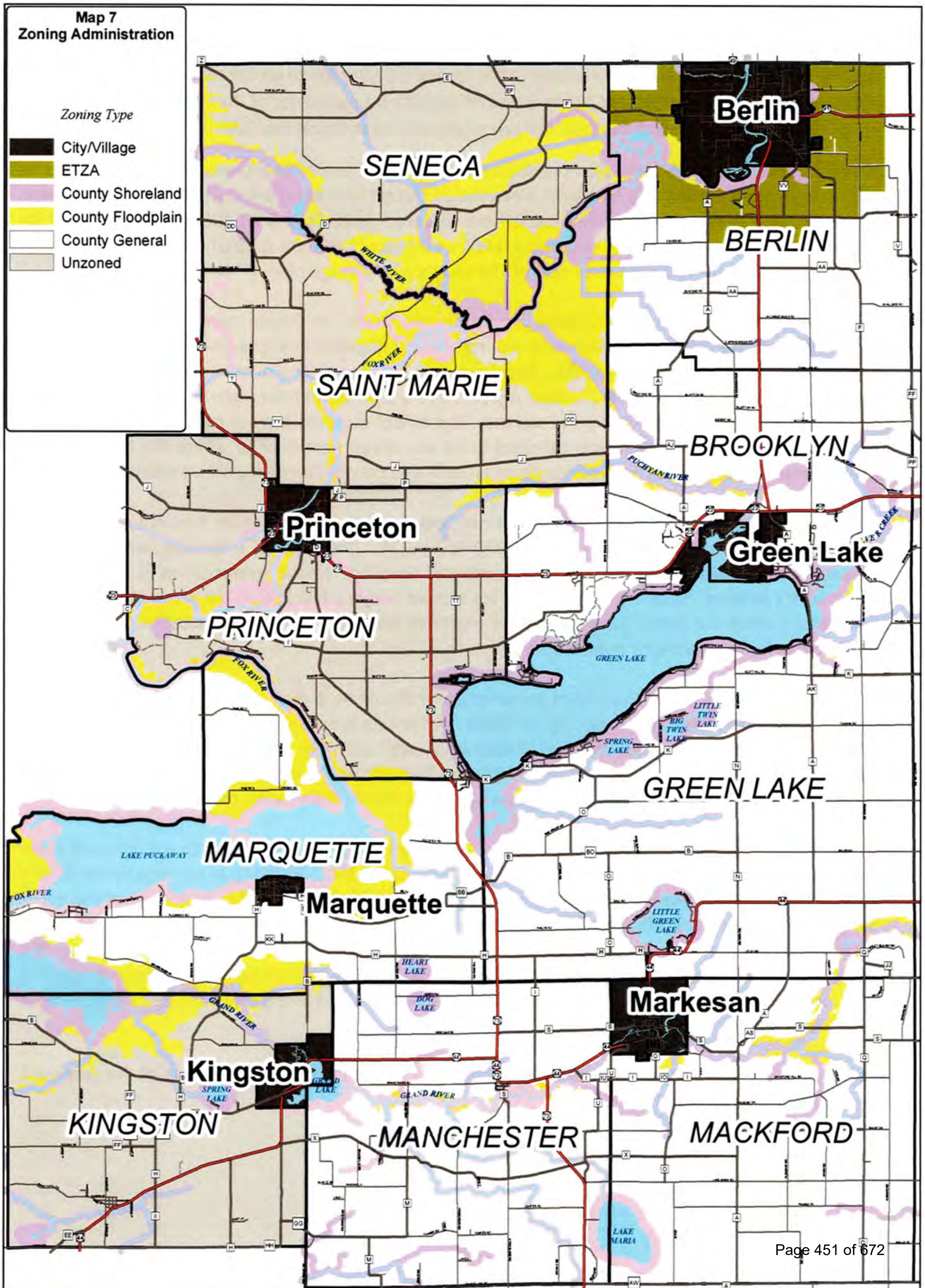
Preserving the Land that Protects the Lake

The following pages include Map 7 of the *2016 Green Lake Comprehensive Plan*. In our county, mining companies can apply to have nonmetallic mines in unzoned areas, which, as you can see from this map, comprise about one-third of county land. Kopplin & Kinas violated the Farmland Preservation District Standard #3, by failing to look at alternative sites, like unzoned areas, for their mine.

Also included here is Green Lake County's "Mining Public Fact Sheet". This gives a chart which demonstrates that Kopplin & Kinas failed to prove that locating a mine in a farmland preservation district was appropriate. According to the Zoning Office, there are 19 active quarries in the County. Six quarries, or 32% of all active quarries in the County are operated by K&K. Thus, they currently operate twice the number of quarries of their largest competitor. 18 of the 19 operating quarries are appropriately located in zone M-1 or unzoned areas. Only one of the 19 active quarries is in a Farmland Preservation area zoned A-1, **the Kopplin & Kinas Morris Pit on McConnell Road**.

PO Box 52 | Green Lake, WI 54941 |. greenlakeconservancy.org

Map 7: the Zoning Administration's map shows unzoned areas in Green Lake County in grey (from the 2016 *Comprehensive Plan of Green Lake County*)



Green Lake Id No.	DNR ID	Site name	Operator	Site Address	Legal Desc	Township	Zoning	Tax ID	Permit Status	Active County Regulated Acres	Permited Minable Acres in Green Lake County
1	55-047-0001	Markesan Quarry	Michels Road and Stone	W1722 County Road I	S1/2, SE1/4, Sec. 8 and S1/4, SW1/4, Sec. 9, Town of Mackford (T14N-R13E), Green Lake County	Mackford	M-1	010-00170-0100, 010-00171-0200, 010-00131-0100	Active	25.6	40.5
2	55-047-0002	Mackford Pit	A F Gelhar	N2402 County Road A	SW1/4, SE1/4, Sec. 34, Town of Green Lake (T15N-R13E) and NE1/4, Sec. 3, Town of Mackford (T14N-R13E)	Green Lake & Mackford	M-1	010-00046-0000,010-00047-0000, 010-00048-0000, 006-00679-0100	Active	28.5	100
3	55-047-0003	Willet Pit	Kopplin & Kinas	Spaulding Hill Rd	S1/2, NW1/4, Sec. 25, Town of Brooklyn (T16N-R13E)	Brooklyn	A-1	004-00505-0000	Reclaimed	0	0
4	55-047-0004	Verch Pit	Kopplin & Kinas	W3384 County Road T	NE1/4, SE1/4 Sec 34, Town of Brooklyn (T16N-R12E)	Brooklyn	Not zoned	016-00327-0000, 016-00314-0000	Active	0	56
5	55-047-0005	Fude Pit	Kopplin & Kinas	W5698 Bend Rd	SE1/4, SE1/4, Sec. 34, Town of Princeton (T16N-R11E)	Princeton	Not zoned	016-00792-0000	Active	16.1	53.5
6	55-047-0006	Kiepe Pit	Kopplin & Kinas	W3207 County Road T	S1/2, NW1/4, Sec. 35, Town of Brooklyn (T16N-R12E)	Brooklyn	M-1, A-2	004-00921-0000, 004-00919-0000, 004-00922-0000, 004-00923-0000 (reclaimed)	Active	31.4	106
7	55-047-0007	Morris Pit	Kopplin & Kinas	W1180 McConnell Rd.	S1/2, SW1/4, Sec. 3, Town of Brooklyn (T16N-R13E)	Brooklyn	A-1	004-00062-0000,004-00063-0000, 004-00064-0000, 004-00065-0000	Active	22.6	70
8	55-047-0008	Kinas Materials Quarry	Kinas Materials	N2401 Cty hwy Q	Sec. 2, Town of Mackford (T14N-R13E)	Mackford	M-1	010-00022-0000, 010-00023-0000	Active	25	45
9	55-047-0009	Princeton Verch Pit	Kopplin & Kinas	CTH T	NW1/4, Sec. 35 Town of Brooklyn (T16N-R12E)	Brooklyn	M-1	004-00920-0000	Reclaimed	0	0
10	55-047-00010	Darnick Quarry	Ridge Stone Products	N8591 Forest Ridge Dr.	S1/2, SE1/4, Sec. 15, Town of Berlin (T17N-R13E)	Berlin	M-1	002-00284-0000, 002-00283-0000, 002-00284-0100	Active	41	65
11	55-047-00011	Manchester Pit	Michels Road and Stone	W3794 South Gate Rd.	N1/2, SW1/4 and SE1/4, Sec. 16, Town of Manchester (T14N-R21E)	Manchester	M-1	012-00302-0000, 012-00301-0000, 012-00306-0000, 012-00307-0000, 012-00308-0000	Active	36.79	100
12	55-047-00012	Mackford Quarry	Gaastra & Sons	N1713 COUNTY ROAD A	SW1/4, Sec 9, Town of Mackford (T14N-R13E)	Mackford	M-1	010-00171-0000	Active	9.22	18
13	55-047-00013	St. Marie Quarry	Badger Mining Co.	N6451 SAINT MARIE RD	Sec. 13, Town of Brooklyn and St. Marie (T16N-R12E)	Brooklyn & St. Marie	A-1	018-00245-0000,018-00242-0000, 018-00243-0000, 004-00796-0000, 004-00793-0000	Reclaimed	0	0
14	55-047-00014	Mashuda Lower Quarry	Kopplin & Kinas	N5681 State Road 73	NE1/4, NW1/4, Sec. 28, Town of Princeton (T16N-R12E)	Princeton	Not zoned	016-00194-0000	Active	15	31
15	55-047-00015	Mashuda Upper Quarry	Kopplin & Kinas	N5449 State Road 73	SW1/4, Sec. 28, Town of Princeton (T16N-R12E)	Princeton	Not zoned	016-00201-0000, 016-00202-0000, 016-00203-0000, 016-00204-0000	Active	27.5	81
16	55-047-00016	Fairwater Quarry	Badger Mining Co.	W300 Utley Quarry Rd	Sec. 36, Town of Green Lake(T15N-R13E) and Sec. 1, Town of Mackford (T14N-R13E) Sec. 31, Town of Metomen (T15N-R14E) FDL Co	Green Lake, Mackford, (Metomen, FDL Co.)	M-1	010-00008-0000, 006-00708-0200, 006-00705-0000, 006-00726-0000, 006-00729-0000, 006-00720-0100	Active	49.7	278.6
17	55-047-00017	Noshkoro Pit	R & R Wash Materials	N8210 Wedde Rd	NW1/4, SW1/4, and SW1/4, SW1/4, Sec. 23, Town of Seneca (T17N-R11E)	Seneca	Not zoned	020-00636-0000	Active	10	24.5
18	55-047-00018	Princeton Pit	R & R Wash Materials	Hwy 23 across from Manthey LN	Sec. 27, Town of Princeton (T16N-R11E)	Princeton	Not zoned	016-00736-0100	Active	9.14	25
19	55-047-00019	Pahl Quarry	Egbert Excavating, Inc.	W7848 Thomas Rd	SW1/4, Sec. 2, Town of Green Lake (T15N-R13E)	Green Lake	M-1	006-00032-0000, 006-00033-0000	Active	14	26
20	55-047-00020	Wick Pit	Egbert Excavating, Inc.	N5746 CT Rd T	SE1/4, Sec. 25, Town of Princeton (T16N-R11E)	Princeton	Not zoned	016-00690-0000	Active	21	21.51
21	55-047-0021	Utley Quarry	Michels Road and Stone	W334 Utley Quarry Rd	N½, Sec 36, Town of Green Lake (T15N-R13E)	Green Lake	M-1	006-00717-0000, 006-00709-0000	Active	12.2	37.82
22	55-047-00022	Lime Ridge Farm Quarry	A.F. Gelhar Co. Inc	W998 Mackford Hil Road	SE ¼, SE 1/4 , SEC 10, T14N, R13E	Mackford	M-1	010-00204-0000, 010-00205-0000	Active	15.87	50
								Total Acreage		410.62	1229.43

Company	# Active Mines
Koplin and Kinas	6
Micheals Road and Stone	3
A.F.Gelhar Co. Inc	2
Egbert Excavating	2
R & R Wash Materials	2
Badger Mining Corp	1
Kinas Materials	1
Ridge Stone Products	1
Gaastra and Sons	1
Total	19

Mine/ Name	A-1 Zoning	GIS Parcel Acres	Parcels	
Morris PIT (7)	A-1	35.61	004-00064-0000	Parcels 004-00063-0000 & 004-00062-0000 are reclaimed portions of the Morris Pit. They are not counted in A-1 mining numbers. A-1 zoning allows mineral extraction.
		40.18	004-00065-0000	

Total Mining Associated Parcel GIS Acres in A-1 Zoning 75.79

Mine/ Name	A-2 Zoning	GIS Parcel Acres	Parcels	
Kiepe Pit (6)	A-2	27.51	004-00919-0000	A-2 zoning allows all uses allowed in A-1 zoning. Mineral extraction is allowed.
		39.99	004-00922-0000	

Total Mining Associated Parcel GIS Acres in A-2 Zoning 67.5

Mine/ Name	I Zoning	GIS Parcel Acres	Parcels	
Manchester Pit (11)	I	40	012-00308-0000	Industrial zoning is not for direct mineral extraction. I zoning is utilized for uses listed in GLC code chapter 350-34
Markesan Quarry (1)	I	10.04	010-00131-0100	

Total Mining Associated Parcel GIS Acres in I Zoning 50.04

Associated Mine/Site Name	M-1 Zoning	GIS Parcel Acres	Parcels	Part of Active Mine	Notes
Markesan Quarry (1)	M-1	27.72	010-00170-0100	Yes	
		2.76	010-00171-0200		
Mackford Pit (2)	M-1	8.6	006-00679-0100	Yes	
		14.46	010-00047-0000		
		49.78	010-00046-0000		
		40.38	010-00048-0000		
Kiepe Pit (6)	M-1	43.01	004-00921-0000	Yes	
Kinas Materials Pit (8)	M-1	37.69	010-00023-0000	Yes	
		36.02	010-00022-0000		
Darnick Quarry (10)	M-1	4.34	002-00284-0100	Yes	
		36.45	002-00284-0000		
		30.23	002-00283-0000		
Manchester Pit (11)	M-1	39.93	012-00302-0000	Yes	
		40.25	012-00301-0000		
		40.32	012-00307-0000		
		40.33	012-00306-0000		
Mackford Quarry (12)	M-1	22.21	010-00171-0000	Yes	
Saint Marie Quarry (13)	M-1	85.38	004-00793-0000	No	Part of a Reclaimed Mine. This parcel has been purposly undistrurbed.
Fairwater Quarry (16)	M-1	63.19	006-00708-0200	Yes	Reclamation plan purposly has areas that will be undisturbed during the mines lifetime. Portions of the Mine are in Fond Du Lac County
		73.61	006-00705-0000		
		1.27	006-00720-0100		
		113.94	006-00726-0000		
		27.67	006-00729-0000		
		77.68	006-00719-0000		
		5.57	006-00699-0101		
		43.07	006-00724-0000		
		263.23	010-00008-0000		
Pahl Quarry (19)	M-1	20.03	006-00032-0000	Yes	
		20.03	006-00033-0000		
Utley Quarry (21)	M-1	12.85	006-00709-0000	Yes	
		24.97	006-00717-0000		
Lime Ridge Farms Quarry (22)	M-1	25.32	010-00204-0000	Yes	
		40.39	010-00205-0000		
Lang Property	M-1	40.38	012-00278-0000	No	Rezoned in 1992 Mine reclaimed in 1994/95. Most of the parcel is split up/covered by DNR mapped wetlands.
Schulz Property	M-1	10	012-00467-0000	No	Rezoned in 1985. 10 acre section of a 40 Acre A-1 Parcel. Special consideration for proximity to surface waters needed.

Total M-1 zoned GIS Acres in Green Lake County 1463.06

M-1 Zoning does not allow for mining the entire M-1 zoned parcel. Mining may only occur within the areas permited by the reclamation permit. Not all areas zoned M-1 are suitable for future mining operations.

Loss of $2 Million in Property Value Due to Quarry Impact

This chart reflects loss of property values within one mile of the proposed County K Quarry site. It is updated for 2024 and for the new location, as a companion to the excerpted Real Estate Dynamics report dated December 7, 2022, which follows.

The impacts listed below are conservative and don't take into account the recent re-valuations performed in the Town of Brooklyn, which saw many properties increased by at least 50%.

Green Lake Conservancy, May 2024

Homes affected	Name	Estimate FMV*		Zillow	25% reduction =	Value **LOSS**
N5158 BROOKLYN G RD	Schoolhouse	$198,500		$236,000	$177,000	
N5195 BROOKLYN G RD	Polcyn	$226,300		$369,000	$276,750	
W244 COUNTY ROAD K	Leahy	$181,400		$232,000	$174,000	
W241 COUNTY ROAD K	Gohlke	$197,700		$360,000	$270,000	
W103 County ROAD K	Retzlaff	$177,000		$281,000	$210,750	
N5267 BROOKLYN G RD	Penfield	$188,600		$348,000	$261,000	
N5307 BROOKLYN G RD	Goyette	$251,800		$397,000	$297,750	
N5139 BROOKLYN G RD	Neuenfeldt	$369,900		$477,000	$357,750	
N5126 SKUNK RIDGE LN	Sarauer	$408,500		$471,000	$353,250	
N5111 Skunk Ridge	Lindquist-Mockridge	$308,200		$354,000	$265,500	
N5145 Skunk Ridge	Wetzel	$273,200		$326,000	$244,500	
N5136 Skunk Ridge	Cook	$214,200		$294,000	$220,500	
N5156 Skunk Ridge	Carpenter	$243,900		$294,000	$220,500	
N5150 Skunk Ridge	Schouten	$190,000		$259,000	$194,250	
N5160 Skunk Ridge	Renker	$141,300		$241,000	$180,750	
N5190 Skunk Ridge	Timm	$176,000		$203,000	$152,250	
N5247 Skunk Hollow	Benson	$227,600		$341,000	$255,750	
N5250 Skunk Hollow	York	$196,000		$222,000	$166,500	
W594 Maug Road	Holtan (recent sale)	$284,000		$619,000	$464,250	
W610 Maug Road	Skunk Hollow Farm	$211,000		$350,000	$262,500	
W598 Glen Lane	McDonald	$181,500		$258,000	$193,500	
W608 Glen Lane	McCarthy	$403,000		$441,000	$330,750	
W611 Glen Lane	McCarthy	$210,000		$265,000	$198,750	
N4805 Prairie Road	Nehm	$293,800		$303,000	$227,250	
		$5,753,400		**$7,941,000**	$5,955,750	**$1,985,250**

ESTIMATING PROPERTY VALUE IMPACTS FROM THE PROPOSED SKUNK HOLLOW MINE ON A PROPERTY LOCATED AT N5139 BROOKLYN G ROAD IN THE TOWN OF BROOKLYN, GREEN LAKE COUNTY, WISCONSIN

Prepared for: Neuenfeldt Family Irrevocable Trust,
c/o Pines Bach LLP

December 7, 2022

Real Estate Dynamics, Inc.

448 West Washington Avenue
Madison, WI 53703

Valuation of the Subject Property

The Cost, Sales Comparison, and Income Approaches to valuation have been considered for this appraisal. All three approaches were considered to directly value the subject property.

The Cost Approach simulates the build versus buy alternative available to some buyers. The Sales Comparison Approach is an analysis of comparable transactions which simulates buyer and seller behavior. In applying the Income Approach, the appraiser simulates the investment analysis of the most probable buyer group to derive an estimate of the price that they would be willing to pay.

The Sales Comparison Approach simulates buyer and seller behavior. The assumption that buyers and sellers will make a reasonable effort to educate themselves about current market behavior is implicit in this approach. Well informed purchasers are less likely to bid a sale price that significantly exceeds prices they would have to pay for property of equivalent utility in the same marketplace. Likewise, sellers who are informed will know the minimum price they may reasonably expect to receive upon sale of the property. The Sales Comparison Approach reflects the spectrum of information available to and the decision process used by these parties to act prudently.

As previously stated, we have prepared this report after considering all three approaches to value. We have applied one approach to value; the Sales Comparison Approach, to value the property. Consideration was given primarily to overall investment similarity, property type and location. The Cost Approach was used, in part, to estimate a component of damages. The Cost Approach and Income Approach to value are typically not considered by buyers and sellers of vacant land or rural residential properties similar to the subject property.

COMPARABLE SALES APPROACH

We have valued the land as though vacant and available according to its highest and best use, which is for residential and agriculture use to support the existing single family home, the surrounding woodlands and agriculture uses. We focused our search on sales in areas of Green Lake and Fond du Lac Counties for the agricultural and single family properties. Six relevant agricultural land sales and four single family sales were found and they are presented in the tables below.

AGRICULTURAL LAND

There has been modest sales activity in the past five years. The sales represent suitable alternative rural land sites that are not exclusively tillable acreage. We have considered the site size differences in pricing per square foot between the sales and the subject site as smaller sites tend to sell for higher unit prices than larger properties and concluded there was no consistent quantifiable adjustment. Further, we considered an adjustment for market conditions and concluded that based on data from the Wisconsin Policy Forum 2022 Property Values and Taxes for all properties in Green Lake County, the 5 year average price adjustment was 5.78% or 6.00% rounded, which corresponds with the dates of sale of the comparables.

COMPARABLE AGRICULTURAL LAND SALES					
Location	Acres	Sale Date	Sale Price	Time Adj Price	$/Acre
1. Irving Park Rd Brooklyn, WI	37.20	9/5/20	$93,000	$106,262	$2,857
2. Brooklyn J Rd Brooklyn, WI	26.66	2/14/20	$130,000	$153,603	$5,762
3. Dakin Brook Rd Brooklyn, WI	17.66	8/14/18	$85,000	$109,917	$6,224
4. Brooklyn J Rd Brooklyn, WI	20.00	10/30/19	$110,000	$132,278	$6,614
5. Brooklyn J Rd Brooklyn, WI	27.30	10/30/19	$152,763	$183,701	$6,729
6. Sunnyside Rd Brooklyn, WI	28.00	3/9/18	$225,000	$298,612	$10,665

COMPARABLE SALE 1

Comparable Sale 1, a 37.2 acre site located on Irving Park Road in the Town of Brooklyn in Green Lake County, sold for $93,000 on October 5, 2020, or $2,857 adjusted per acre.

COMPARABLE SALE 2

Comparable Sale 2, a 26.66 acre site located on Brooklyn J Road in the Town of Brooklyn in Green Lake County, sold for $130,000 on February 14, 2020, or $5,762 adjusted per acre.

COMPARABLE SALE 3

Comparable Sale 3, a 17.66 acre site located on Dakin Brook Road in the Town of Brooklyn in Green Lake County, sold for $85,000 on August 14, 2018, or $6,224 adjusted per acre.

COMPARABLE SALE 4

Comparable Sale 4, a 20 acre site located on Brooklyn J Road in the Town of Brooklyn in Green Lake County, sold for $110,000 on October 30, 2019, or $6,614 adjusted per acre.

COMPARABLE SALE 5

Comparable Sale 5, a 27.3 acre site located on Brooklyn J Road in the Town of Brooklyn in Green Lake County, sold for $152,763 on October 30, 2019, or $6,729 adjusted per acre.

COMPARABLE SALE 6

Comparable Sale 6, a 28 acre site located on Sunnyside Road in the Town of Brooklyn in Green Lake County, sold for $225,000 on March 9, 2018, or $10,665 adjusted per acre.

RECONCILIATION OF COMPARABLE SALES

All comparables suggest a price range for the subject property as an agricultural use. The range of data is from $2,857 to $10,665 per acre with a mean of $6,475 and a midpoint of $6,761 per acre. There appeared to be no difference between parcels with tillable acreage, pasture or wooded areas. Sizes are similar to the subject and there is not a price/size adjustment that is warranted. All properties reflect agricultural zoning. The size and location of the residential subject property land suggests a price between the midpoint and the mean of the range data or $6,600 per acre rounded. The data is used to make adjustment to the single family comparables below.

SINGLE FAMILY

All the following sales reflect sales for residential single family use. Four comparable sales were found to value the residential property and the results are presented in the table below.

There has been significant sales activity in the past three years. The single family sales represent suitable alternative sites for residential use. We have considered the size differences in pricing per square foot between the sales and the subject site as smaller properties tend to sell for higher unit prices than larger properties. We concluded that there is no general size and price relationship adjustment required. Further, we considered an adjustment for market conditions and concluded based on data from the Wisconsin Policy Forum 2022 Property Values and Taxes for all properties in Green Lake County, and the fact that the sales all occurred in the past three years, that the three year average price adjustment was 8.03%, or 8.00% rounded, which corresponds with the dates of sale of the comparables. These adjusted sales were then adjusted for the $6,600 per acre land adjustment estimated above, and for variations in garage/storage buildings in the amount of $15,000 per stall.

SINGLE FAMILY COMPARABLE SALES											
Location	Year Built	Lot Size	Fin SF	# Stalls	Sale Date	Sale Price	Time Adj	Land Adj	Garage Adj	Adj Price	Price /SF
1. W1388 Cty Rd K Green Lake, WI	2005	8.00	3,048	4.5	12/28/20	$360,000	$419,412	$125,400	$22,500	$567,312	$186
2. W1315 Scott Hill Rd Green Lake, WI	2004	42.12	3,590	6.0	3/31/21	$692,000	$789,938	($99,792)	$0	$690,146	$192
3. W121978 Sunny Knoll Rd Metomen, WI	2006	5.00	2,867	6.0	5/7/21	$433,250	$490,574	$145,200	$0	$635,774	$222
4. W13864 Karau Ave Ripon, WI	2006	0.74	2,598	3.0	8/12/22	$365,000	$373,496	$173,316	$45,000	$591,812	$228

COMPARABLE SALE 1

Comparable Sale 1, an 8 acre parcel with 3,048 square feet of finished space constructed in 2005 and located at W1388 County Road K in Green Lake, Wisconsin, sold for $360,000 on December 28, 2020, or $186 adjusted per square foot. Comparable 1 has a 3-car attached garage and a detached garage that is approximately 1.5 stalls. There is approximately 2,048 square feet of main floor finished space and 1,000 square feet of lower level finished space. This is the oldest comparable selling in December of 2020.

COMPARABLE SALE 2

Comparable Sale 2, a 42.12 acre parcel with 3,590 square feet of finished space constructed in 2004 and located at W1315 Scott Hill Road in Green Lake, Wisconsin, sold for $692,000 on March 31, 2021, or $192 adjusted per square foot. Comparable 2 has a 3-car attached garage and a detached garage that is approximately 3 stalls. There is approximately 2,274 square feet of main floor finished space and 1,316 square feet of lower level finished space.

COMPARABLE SALE 3

Comparable Sale 3, a 5 acre parcel with 2,867 square feet of finished space constructed in 2006 and located at W121978 Sunny Knoll Road in Metomen, Wisconsin, sold for $433,250 on May 7, 2021, or $222 adjusted per square foot. Comparable 3 has a 2-car attached garage and a large (60' x100') detached pole building with multiple doors that we determined is the equivalent of a 4-car detached garage. There is approximately 1,648 square feet of main floor finished space and 1,219 square feet of lower level finished space.

COMPARABLE SALE 4

Comparable Sale 4, a .74 acre parcel with 2,598 square feet of finished space constructed in 2006 and located at W13864 Karau Avenue in Ripon, Wisconsin, sold for $365,000 on August 12, 2022, or $228 adjusted per square foot. Comparable 4 has a 3-car attached garage and no additional detached garage space. There is approximately

1,600 square feet of main floor finished space and 998 square feet of lower level finished space.

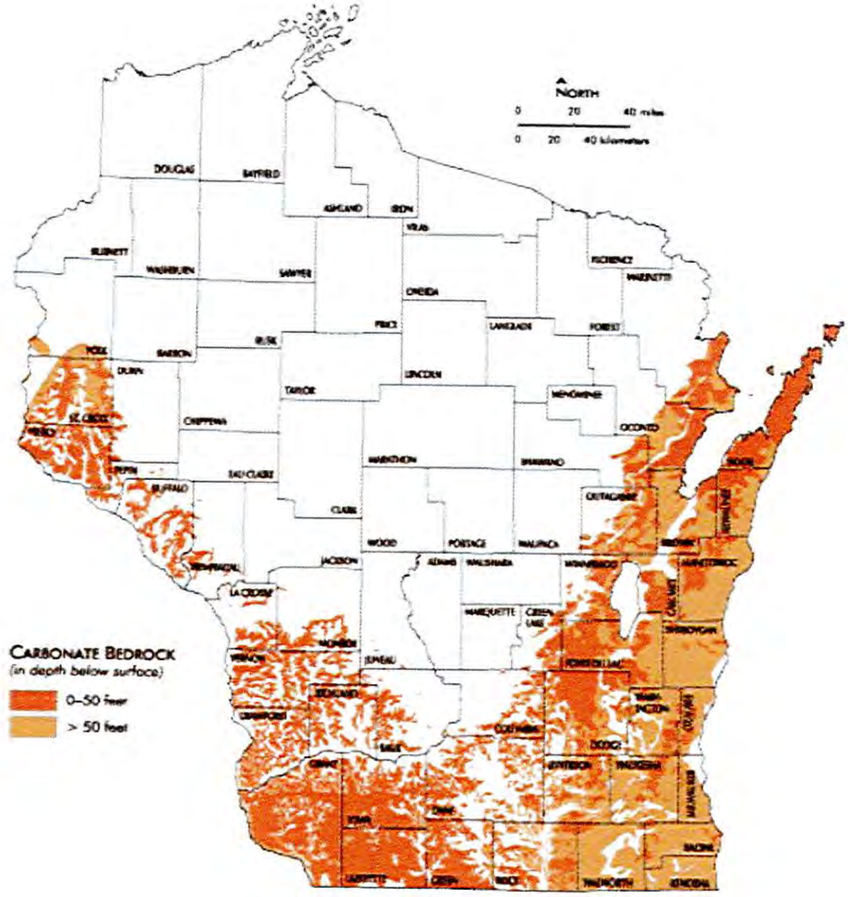
RECONCILIATION OF COMPARABLE SALES

All comparables suggest a price range for the subject property as residential use. The range of adjusted data is from $186.13 to $227.80 per square foot with a mean of $206.98 and a midpoint of $206.96 per square foot. All the properties have similar features with lower level finished space and access. Comparable 4 is the only property without a detached garage. Given the size of the subject property at 3,222 square feet, which is slightly greater than the average of the comparables at 3,026 square feet, a price between the midpoint and the mean of $206.97 or $207 rounded per square foot is appropriate. Therefore, applying $207 per square foot to the 3,222 finished square feet of subject property, yields a value of $666,954 or $665,000 rounded for the single family property including a lot area of 27 acres and a detached garage before considering any impact from the proposed mine operation.

IMPACTS OF NONMETALLIC MINES

Quarrying or nonmetallic mining is obviously harmful where and when it destroys karst landforms and negatively impacts karst ecosystems. "Karst" is a landscape created when water dissolves rocks. In Wisconsin, dolomite and some limestone are typical soluble rocks. The rocks are dissolved mostly along fractures and create caves and other conduits that act as underground streams. Water moves readily through these openings, carrying sediment (and pollutants) directly into our groundwater.

Karst landscapes may have deep bedrock fractures, caves, disappearing streams, springs, or sinkholes. These features can be isolated or occur in clusters, and may be open, covered, buried, or partially filled with soil, field stones, vegetation, water or other miscellaneous debris. Green Lake County is on the edge of the karst region in Wisconsin.



Quarrying is obviously harmful where and when it destroys karst landforms and negatively impacts karst ecosystems. One major potential environmental impact is that quarrying may change groundwater flow patterns, potentially dewater aquifers and/or cause degradation of groundwater quality, particularly if quarries are extensive and deep. Similarly, quarrying may influence surface drainage systems and/or affect the quality of surface water, and cases of this are well documented in the karst of southeast Minnesota. One notable example of this occurred in Vernon County, Wisconsin in 2004 and 2005, when pumping from a high capacity well for gravel washing at the Kraemer Company's Mollett quarry resulted in temporary cessation of flow in nearby Coon Creek.

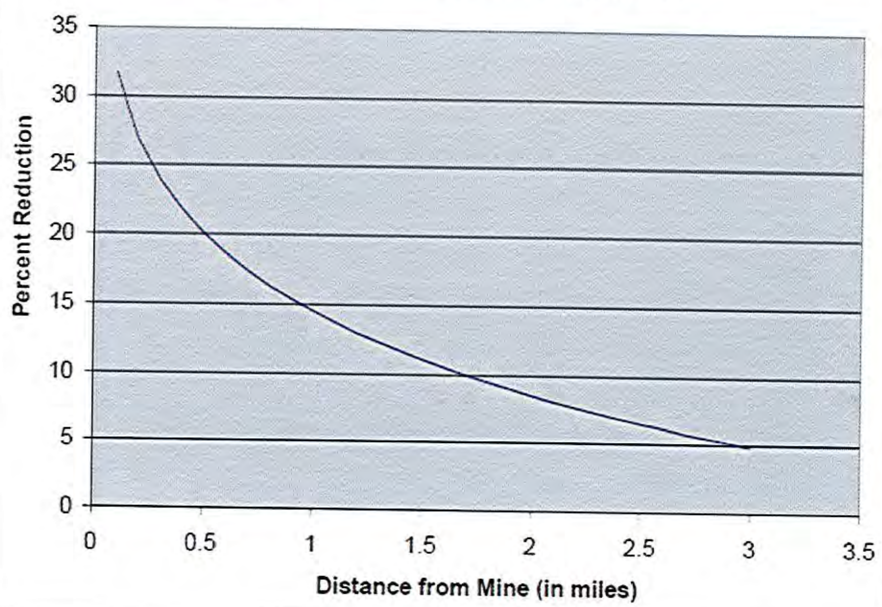
More specifically, nonmetallic mining can impact the adjacent properties as follows:

1. Interrupt natural water recharge which can lead to drops in the water table.
2. This can lead to a reduction of drinking water available to those living near the quarry.
3. Residential wells can run dry and the base flow of regional streams can be reduced.
4. A disruption in the movement of surface water.
5. Contaminated or polluted wells.
6. Silt carried by surface drainage can affect the quality of ground water.
7. Increased road traffic and roadway wear from hauling activities.
8. Increased noise from blasting, crushing and hauling of material.
9. Impact on the natural environment including wildlife from the mining activity.
10. Negative impact on property values.

Our analysis focuses on this last item, negative impact on property values. As with other nuisance uses introduced to the physical landscape of everyday life, the effect of industrial activities such as power lines, waste disposal sites, and here nonmetallic mining, are considered minimal or no impact on property values if the industry is supporting the analysis. While it boggles the mind that no negative impact on property values could be the immediate result of the activities of a large industrial user, it is reasonable to assume that over time, typically years, there is some acceptance to the market place to the activity and the initial shock to the market gets baked into the market pricing over time. Simply put, there is a shock to the market from the initial industrial activity that will lower prices and/or make the sale of the property more difficult. While markets adapt over time, the market is never the same as is if the shock had never occurred. That is why real estate prices can go up over time after the market place resets to a lower price point as a result of the initial introduction of the negative activity.

The studies that most analysts point to when estimating damages from nonmetallic mining is contained in the article "An Assessment of the Economic Impact of the Proposed Stoneco Gravel Mine Operation on Richland Township." Report prepared for the Richland Township Planning Commission by George A. Erickcek, Senior Regional Analyst W.E. Upjohn Institute for Employment Research 2006. Further, this report cites a study by Diane Hite, 2006. "Summary Analysis: Impact of Operational Gravel Pit on House Values, Delaware County, Ohio," Auburn University. This study contains a summary figure below that reflect prices changes with proximity to a Mine. See Appendix G.

Figure 1: Impact of Gravel Pit on Residential Property Values:
(Percent Reduction by Distance from Mine)



Specifically, Hite examines the effects of distance from a 250-acre gravel mine on the sale price of 2,552 residential properties from 1996 to 1998. Her model controls for a large set of other factors that estimate a house's sale price, including number of rooms, number of bathrooms, square footage, lot size, age of home, sale date, and other factors specific to the locality, so that she can focus solely on the effect of proximity to the gravel mine on house values. The data reveals a large, statistically significant effect of distance from a mine on home sale price when controlling for other determinants of residential value, as the proximity to a gravel mine reduces sale price.

APPLICATION TO THE SUBJECT PROPERTY

The chart indicates that properties in close proximity to the Mine experience more than a 30 percent reduction in property values. Given that the Neuenfeldt property is across Brooklyn G Road from the proposed mine and directly adjacent to the proposed detention pond, we conservatively estimate a 30% reduction in the value of their property. Applying 30% to the $665,000 value results in a damage estimate for proximity of $199,500 or a reduction in market value to $465,500.

APPLICATION TO AREA RESIDENTIAL PROPERTIES

In addition, we have applied this analysis to other rural residential properties in the immediate area of the mine including the adjacent Skunk Ridge Lane neighborhood. A non exhaustive list is presented below. The value estimates are based on 2022 assessed values. We assume the average property value impact is 25%, as most properties are within ½ mile of the Mine. The value impact is estimated at $909,500. Based on our analysis of the N5139 Brooklyn G Road, property assessments appear to be less than 50% of market value. Each property would need to be appraised to have an accurate estimate of its market value. Nevertheless, if market values were at least double the assessed value, the damages from proximity would total $1,819,000. This estimate does not include any damages that may result from flooding discussed in the next section.

Address/Parcel #	Assessed Value	Property Impact at 25%
N5126 Skunk Ridge Ln	$290,100	$72,525
004007811300	$19,800	$4,950
N5111 Skunk Ridge Ln	$199,100	$49,775
N5136 Skunk Ridge Ln	$152,100	$38,025
004007810500	$19,800	$4,950
004007811500	$17,100	$4,275
N5145 Skunk Ridge Ln	$174,200	$43,550
N5150 Skunk Ridge Ln	$132,000	$33,000
N5156 Skunk Ridge Ln	$173,200	$43,300
N5160 Skunk Ridge Ln	$100,400	$25,100
004007810200	$169,700	$42,425
004007810700	$19,100	$4,775
N5185 Skunk Ridge Ln	$114,400	$28,600
N5190 Skunk Ridge Ln	$140,500	$35,125
N5158 Brooklyn G Rd	$141,000	$35,250
N5195 Brooklyn G Rd	$160,700	$40,175
W598 Glen Ln	$128,900	$32,225
W598 Glen Ln	$286,500	$71,625
W611 Glen Ln	$149,500	$37,375
N4975 Craig Rd	$149,000	$37,250
N4967 Craig Rd	$25,200	$6,300
N4939 Craig Rd	$118,100	$29,525
N4913 Craig Rd	$129,500	$32,375
N4901 Craig Rd	$54,200	$13,550
W687 Cty Rd K	$120,300	$30,075
N 4805 Prairie Rd	$188,500	$47,125
W244 Cty Rd K	$128,800	$32,200
W241 Cty Rd K	$136,300	$34,075
Total	$3,638,000	$909,500

POTENTIAL FOR FLOODING

The "Erosion Control and Storm Water Management Plan" analysis provided by the applicant from Badger Engineering & Construction, LLC indicates that the detention pond or sediment basin that will be across the road from the subject property, is designed to accommodate a 10-year storm event. In light of changing weather patterns in recent years this capacity would seem woefully inadequate to handle a 50, 100 or 500 year storm event which are happening more frequently than 50,100 or 500 years. Additionally, the property owner notes that they have already had flooding in front of his property that covered the roadway. Given that the subject property is down slope from the sediment basin and the western edge of the subject property has significant down slope topography, an overtopping of the basin could have significant detrimental effects.

A solution to this risk of potential flooding is to create a berm on the property at the road edge to act as a barrier against potential flooding. This was an engineering solution proposed by EOR Inc., of Cottage Grove WI, for a flooding issue in Fitchburg, WI, to protect rural properties including a single family residence from flood waters.

While the following analysis should be reviewed by a qualified third party, we have estimated, based on topography, that a 3-4 foot high berm from the western boundary of the property along Brooklyn G Road east approximately 850 feet may suffice. Properties to the west would no doubt have similar issues, and this solution may impact their surface drainage, however that impact is not within the scope of our analysis. The topography climbs as one move east from the current driveway. Also the existing driveway entrance would need to be relocated the east edge of the property and a new drive will need to be constructed that runs parallel with the berm running west to the existing drive or approximately 625 feet. Based on previous work in our files we estimate the cost of the berm to be $90 per linear foot and the gravel drive to be $65 per linear foot. The estimated cost of the berm is $76,500 and the estimated cost of the gravel drive is $40,625. The total estimated cost-to-cure for the potential flooding condition is

$117,125. There will be some engineering cost to design both projects, therefore we estimate the total cost at $125,000.

GROUND WATER CONTAMINATION

Detrimental effects to the ground water remain a concern and we have detailed the potential hazards facing the subject properties. Until a detrimental event occurs, whether it be water contamination, well draw down or some other harm to the property, and until a corresponding remediation plan is established and priced, it is difficult to assess the financial ramifications to the property, That said, if the water at the residential property was contaminated and unusable the property would essentially be valueless. Cures may be possible, however, until a proposal is developed the property would not be habitable. Therefore, our damage estimate does not include any detrimental ground water conditions.

RECONCILIATION AND SUMMARY

The following table summarizes the results of our valuation analysis and shows the total estimated market value and damages. We have considered all approaches and conclude that the value derived by the sales comparison approach is the most reliable estimate.

Given the rural nature of the properties and the potential impact of the nonmetallic mine on the subject properties, we estimate the damages to the market value of your property to be $324,500.

VALUE SUMMARY	
Value of N5139 Brooklyn G Road	$665,000
Proximity Damages	$199,500
Flooding Damages	$125,000
Total Damages	$324,500
Net Value of N5139 Brooklyn G Road assuming the Mine is developed	$340,500

Prepared by: EOR

For the Green Lake Association, Green Lake Conservancy, and Green Lake Sanitary District

Hydrologic Evaluation of the Proposed Skunk Hollow Mine, Green Lake County, Wisconsin

December 8. 2022

Cover Images

Mitchell Glen

TABLE OF CONTENTS

1. PURPOSE AND SCOPE

Emmons and Olivier Resources, Inc. (EOR) conducted this review of the proposed Skunk Hollow Mine under contract with the Green Lake Association. We were asked to address concerns about potential water resource impacts of the proposed mine. These include acid mine drainage and related metals contamination, sediment impacts on surface water and groundwater, and the supply of groundwater to springs and streams.

EOR's lead investigator for this report was Water Resources Engineer Steve Gaffield, PE, PhD (resume included in Attachment A). This report has been peer reviewed within EOR, and its conclusions and recommendations represent the collective experience of the firm.

Steve Gaffield of EOR visited the area on November 18, 2022 to observe conditions. In addition, we reviewed the Conditional Use Permit (CUP) application materials, information on the mine site provided by the Wisconsin Department of Natural Resources (DNR; Attachment B), and literature on the area including the mine site, nearby natural resources including Powell Spring and Mitchell Glen, the local bedrock geology, and risks related to mining. Many of these references are cited in footnotes throughout this report.

2. GROUNDWATER QUANTITY

2.1. Depth to water table

The proposed mining plan described in the CUP application materials is to terminate the pit above the water table, which is important to avoid aerating the aquifer and potentially mobilizing arsenic and other metals, as described in more detail later in this report. Kopplin & Kinas' Drawing 8 shows a proposed quarry floor elevation of 928.43 ft and a static water level of 918 ft. The source of the 918 ft static water level estimate appears to be from an observation in the on-site water supply well, as discussed in more detail below.

It is unlikely that the water table at the proposed mine site is as deep as estimated in the CUP application. An elevation of 918 ft is lower than Powell Spring. Available information indicates that groundwater flows from the area including the mine site toward Powell Spring, White Creek, Mitchell Glen, and Dakin Creek, which means that the water table at the mine site would be higher than the spring. Figure 1 illustrates a typical groundwater flow system, with the water table sloping downward toward streams and lakes. A statewide water table map from the US Geological Survey[1] (Figure 2) shows that the mine site is near a groundwater divide, with a water table slope to the northwest driving groundwater flow toward Green Lake. The water table elevation at the mine site therefore must be higher than the Powell Spring elevation of 923.4 ft, listed in the spring survey report by the WGNHS.

[1] Kammerer, PA, 1995. Ground-Water Flow and Quality in Wisconsin's Shallow Aquifer System. US Geological Survey, Water-Resources Investigations Report 90-4171.

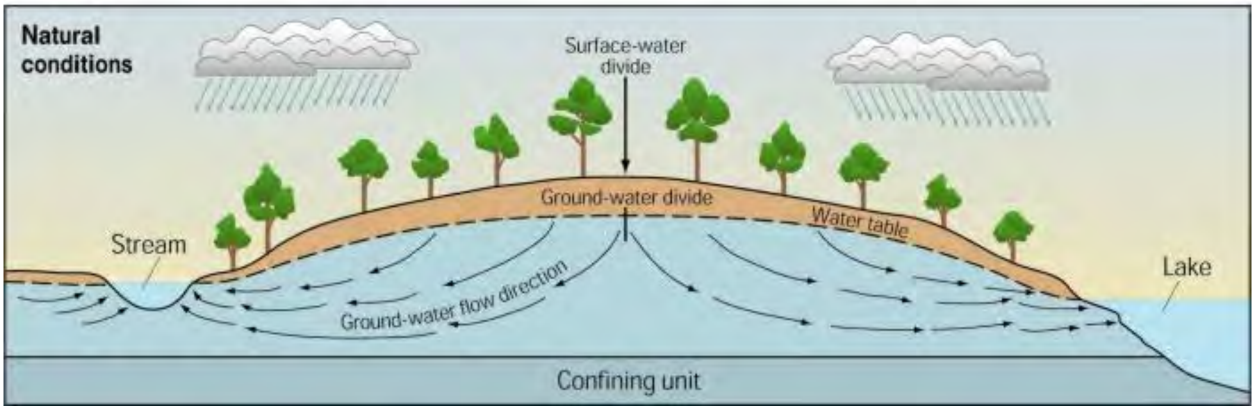


Figure 1. [USGS Ground water in the Great Lakes Basin: the case of southeastern Wisconsin]

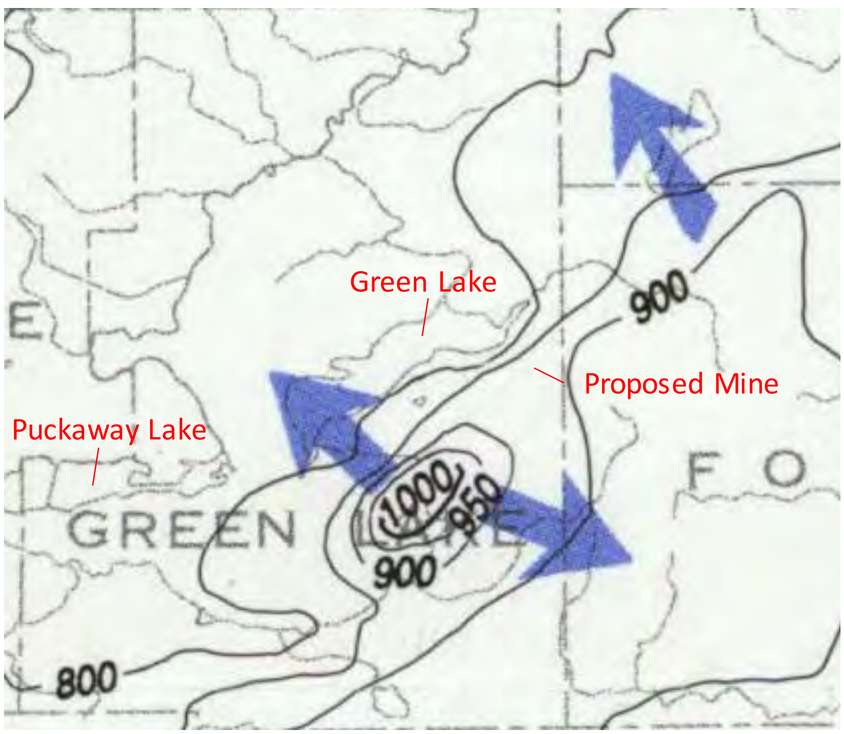


Figure 2. Water table elevation contours and generalized groundwater flow direction. From USGS, 1995. Location notation added by EOR. Note drop in water table from mine site toward Green Lake.

Additional information on groundwater levels in the area can be obtained from Well Construction Reports available on the DNR website. These reports include well drillers' measurement of the depth to the static water level at the time of drilling. EOR estimated the static water level elevation by locating the house associated with each well record, where possible, and determining the ground surface elevation from topographic maps. Estimated water levels near the mine site (Figure 3) show that groundwater drops from the mine site to the north and west, toward Dakin Creek, White Creek, and Green Lake. Static water elevations estimated for the three WCRs closest to the mine site, south and east of Brooklyn G Rd. and north of CTH K, are 935 ft, 942 ft, and 954 ft. The latter well is on the Kinas property, and the CUP application reports an observed depth to water of 60 ft in January 2022, without describing measurement methods. The static depth to water reported on the WCR in 1976 was only 26 ft. The difference in water levels between this reported water level and the deeper measurement reported by Kinas may be related to errors in either or both measurements and/or groundwater level fluctuations over time.

It is important to note that water levels in water supply wells are commonly lower than the water table. The water level in a well represents an average hydraulic head across the depth interval to which it is open to the aquifer. In upland areas, such as the proposed mine site, the groundwater gradient is commonly downward, and lower heads at depth cause the water level in the well to be below the water table. This is well known by researchers that use these wells for water table mapping and groundwater model calibration, and it is why groundwater monitoring wells are constructed with short open intervals. A local example of this effect is the WCR for well 8DI608 near Powell Spring. The reported depth to water of 50 ft in this well corresponds to an elevation of approximately 900 ft, which is 23 ft below Powell Spring where the water table intersects the ground surface.

Water table elevations naturally fluctuate in response to wet and dry periods. This can be seen in groundwater monitoring data from the U.S. Geological Survey for a well in Dodge County completed in the St. Peter Sandstone to a depth of 125 ft (Figure 4). Between 1964 and 2022, water levels in that well varied more than 12 ft. Therefore, groundwater levels in the future are likely to range above and below levels that are measured today.

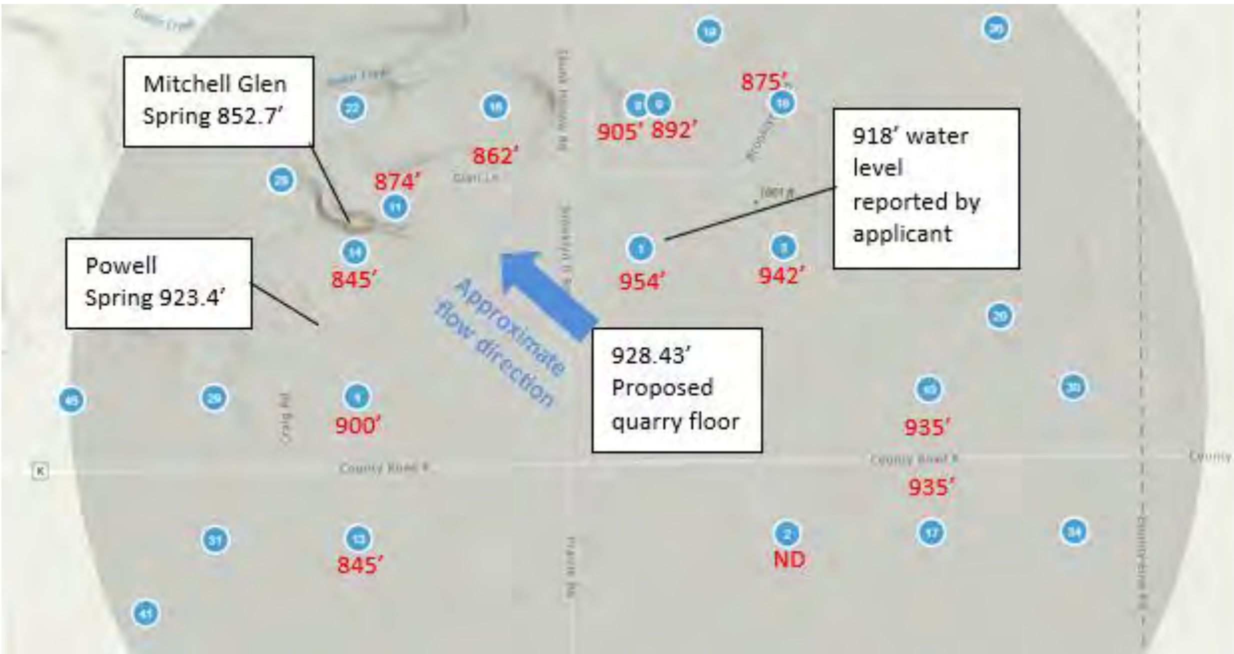


Figure 3. Comparison of water level data and proposed quarry elevation. Static water level elevations estimated from selected Well Construction Reports are labeled in red. Note drop in water levels to the north and west toward Dakin Creek and White Creek.

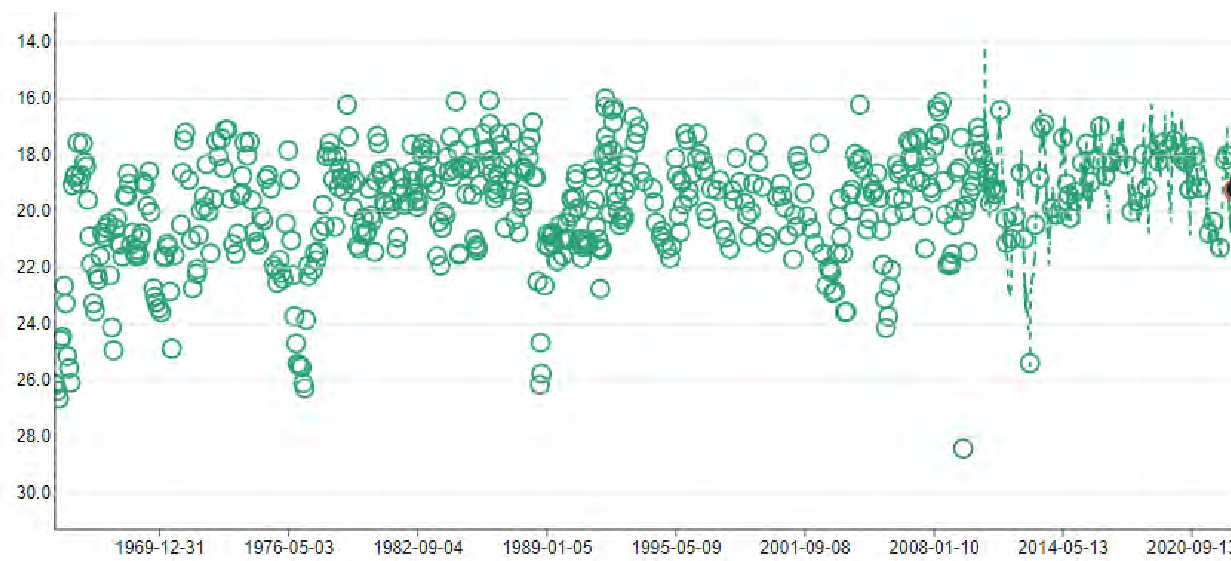


Figure 4. Variations in depth to water (in feet below ground surface) in a Dodge County well completed in the St. Peter Sandstone from 1964 to 2022 (from US Geological Survey)

Conclusions and Recommendations

1. Available information indicates that the water table at the mine site is higher than the proposed pit floor elevation.
2. Available data are not adequate to precisely determine the water table elevation at the site, and monitoring wells should be installed.
3. The water table elevation naturally fluctuates with wet and dry cycles, and it is likely that the water table elevation in the future will fluctuate above and below the level that is measured now.

2.2. Potential Groundwater Use

No groundwater dewatering is proposed, because the plan calls for the mine to be above the water table. However, the available data described above indicate that dewatering would likely be necessary to mine to the proposed depth of 928.43 ft. If ground dewatering were to be employed at the mine, this would lower the water table at the mine site and drawdown groundwater levels for some distance around the mine. This would create the potential for water availability impacts at neighboring wells and downgradient springs, as well as water quality impacts discussed in Section 3.1.

In addition, the CUP application describes the potential to install a new water well as a supply for aggregate processing, dust suppression, and portable pavement plants. No information has been provided by the applicant as to whether or not this would be a high capacity well, expected pumping rates, or the frequency of use of such a well. This makes it impossible to evaluate the potential impact of a new well on neighboring water supply wells or flow to local springs and streams. Pumping of a well would also draw down the water table with potential to affect neighboring wells and the springs.

The private water supply well at the Nehm farm is located approximately 1300 ft south-southwest of the mine site property, and DNR Well Construction Reports indicate that 13 more private water supply wells are located within 2500 ft the mine site. Potential drawdown impacts on these wells and the springs should be evaluated with a hydrologic study that includes:

a) collection/interpretation of data from monitoring wells at the mine site to estimate aquifer transmissivity (e.g. by conducting well hydraulic tests and evaluating drilling logs);
b) a drawdown analysis (e.g. the Theis method) for the proposed well to estimate drawdown at nearby wells and the springs; and
c) calculation of the expected pumping rate of the well as a percentage of the flow rates from local springs to quantify the potential reduction in spring flow that groundwater pumping at the mine could cause.

At present, no details are available on the potential pumping rate, duration, and frequency for dewatering and/or water supply pumping at the mine, so that it is not possible to evaluate potential drawdown impacts on neighboring wells and the springs.

Conclusions and Recommendations

1. If the mine is excavated to the depth proposed in the CUP application (928.43 ft), groundwater dewatering pumping is likely to be necessary.
2. No information is available on the rate, duration, or frequency of pumping from a new water supply well for the mine.
3. Before groundwater pumping at the mine is approved, a hydrologic study should be conducted to predict impacts on neighboring wells and the springs.
4. There is not sufficient information on potential groundwater pumping at the mine to evaluate these impacts.
5. It is unclear who would review this information to approve installation of a well.

3. GROUNDWATER QUALITY

3.1. Mobilization of Metals Below the Water Table

Concerns have been raised about the potential for the Skunk Hollow Mine to contaminate groundwater with arsenic and other metals. Drinking water contaminated with arsenic has been associated with cancer and other health problems, and this issue has gotten a lot of attention in eastern Wisconsin over the past 20 years or more. Arsenic is present in naturally occurring sulfide minerals in the dolomite and sandstone bedrock, and human activities that introduce oxygen into the aquifer can cause chemical reactions that release arsenic into the groundwater. Mining at or below the water table would have potential to trigger this process, as could pumping of a water supply well at the mine site. Mobilization of metals in groundwater at mines below the water table has been documented by the DNR in southwestern Wisconsin in the same rock formations as present at the mine site.[2]

Elevated arsenic concentrations occur in Green Lake County's groundwater. Wisconsin Department of Natural Resources data[3] for water supply wells in the county from 2014 – 2021 show that about 4% of samples had arsenic above the state drinking water Enforcement Standard of 10 ug/L, which is based on public health recommendations, with a maximum of 601 ug/L. An additional 29% of samples were above the state's Preventive Action Limit of 1 ug/L, which is a threshold that can trigger additional investigation

[2] Johnson, DM, 2009. Water supply and water quality issues in southwestern Wisconsin. In The Upper Mississippi Valley lead-zinc district revisited: mining history, geology, reclamation, and environmental issues thirty years after the last mine closed. Illinois State Geological Survey, Guidebook 38.

[3] Johnson, DM, Wisconsin Department of Natural Resources, written communication, November 18, 2022.

and corrective action. An irrigation well on the Machovich property approximately 1 mile northeast of the proposed mine site had very high concentrations of arsenic (2310 ug/L) and nickel (4310 ug/L) in 2012.

As noted in the CUP application, the bedrock that is proposed to be quarried is presumed to be the Sinnipee Group dolomite. The literature indicates that sulfide minerals can be present in the Sinnipee Group. Gotkowitz (2002) notes the source of arsenic in wells in the Fox Valleys is believed to be a sulfide-rich horizon at the base of the Platteville Formation, which is the lowest formation in the Sinnipee Group.[4] Brown and Maass (1992)[5] found that the iron sulfide mineral pyrite was abundant in rock cuttings from the Sinnipee Group in 53 water wells examined in Dodge, Fond du Lac, and Winnebago Counties. They also noted that pyrite is commonly observed in quarries in the Sinnipee dolomite, including a quarry in Dodge County, and that it occurs as coatings along joints and replacing fossils.

The CUP application notes that a water supply well could be installed at the site as a source of water for washing and processing aggregate materials and for dust suppression. A new supply well at the site would presumably be drilled into the bedrock units underlying the Sinnipee Group, which include the St. Peter Sandstone, Prairie du Chien Group dolomites, and the Cambrian Sandstone units. The Machovich well with the high arsenic and nickel concentrations noted above was also open to these rock units. Use of well water with elevated metal concentrations in the mine would result in exposure risks to groundwater (through infiltration to the water table) and surface water (through pumping out of the pit). If a new well were to be installed, it should be constructed based on DNR recommendations for the Arsenic Advisory Area of northeastern Wisconsin and tested for metals annually. Re-using stormwater from the pit would be preferable to a new water supply well for quarry operations to reduce the potential to mobilize metals.

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[4] Gotkowitz, M, 2002. Report on the preliminary investigation of arsenic in groundwater near Lake Geneva, Wisconsin. Wisconsin Geological and Natural History Survey, Open-File Report 2000-02.

[5] Brown, BA and RS Maass, 1992. A reconnaissance survey of wells in eastern Wisconsin for indications of Mississippi Valley type mineralization. Wisconsin Geological and Natural History Survey, Open-File Report 92-3.

Conclusions and Recommendations

1. Mining should not occur below the water table due to the risk of mobilizing metals in groundwater. The current plan does not appear to meet this criterion.
2. The areas at highest risk of groundwater contamination from the mine are north and west of the mine site, including White Creek, Powell Spring and Creek, Mitchell Glen, Glen Creek, and Dakin Creek.
3. The potential risk of groundwater impacts on other properties should be evaluated through installation of monitoring wells to identify the groundwater flow direction(s). Because the mine site is located near a groundwater divide on the USGS water table map (Figure 2), groundwater flow in multiple directions from the mine site is possible.

3.2. Mobilization of Metals Above the Water Table

Contamination of groundwater by metals is possible even if the mining is above the water table. Acid rock drainage (ARD) can occur where sulfide minerals are exposed to air and water, which is accelerated by excavation of rock. Oxidation of sulfide minerals is often accompanied by mobilization of metals.[6] As noted above, the Sinnipee Group dolomite that would be quarried commonly contains sulfide minerals, and these could be exposed to air and water from rainfall and runoff in the quarry walls and in rock stockpiles.

Acid rock drainage is a common problem well studied by the global mining industry. In the upper Midwest, this issue mainly gets attention in mines and road cuts in crystalline rocks in northern Minnesota and Wisconsin. Less information is available about the occurrence of acid rock drainage in dolomite and limestone bedrock areas, such as Green Lake County. Limestone and dolomite are composed of carbonate minerals that consume acid, reducing acidity of drainage and metals mobilization. The Minnesota Department of Transportation has a guidance document for acid rock drainage from road cuts which is focused on northern Minnesota, where rocks tend to have higher prevalence of sulfide minerals (acid generators) than carbonate minerals (neutralizing agents).[7] However, even mine drainage that is buffered to a neutral pH can contain elevated metal concentrations (Figure 5).[8] Abandoned roaster waste rock piles from an old zinc mine in dolomite at Mineral Point, Wisconsin created acid drainage and high

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[6] Global Acid Rock Drainage Guide, 2014. The International Network for Acid Prevention. www.gardguide.com

[7] MnDOT, 2019. Guidance Manual for Potentially Acid Generating Materials in Northern Minnesota. Report 2019-40.

[8] www.gardguide.com

concentrations of heavy metals that caused Brewery Creek to become sterile until the site was reclaimed by the DNR in 1993.[9]

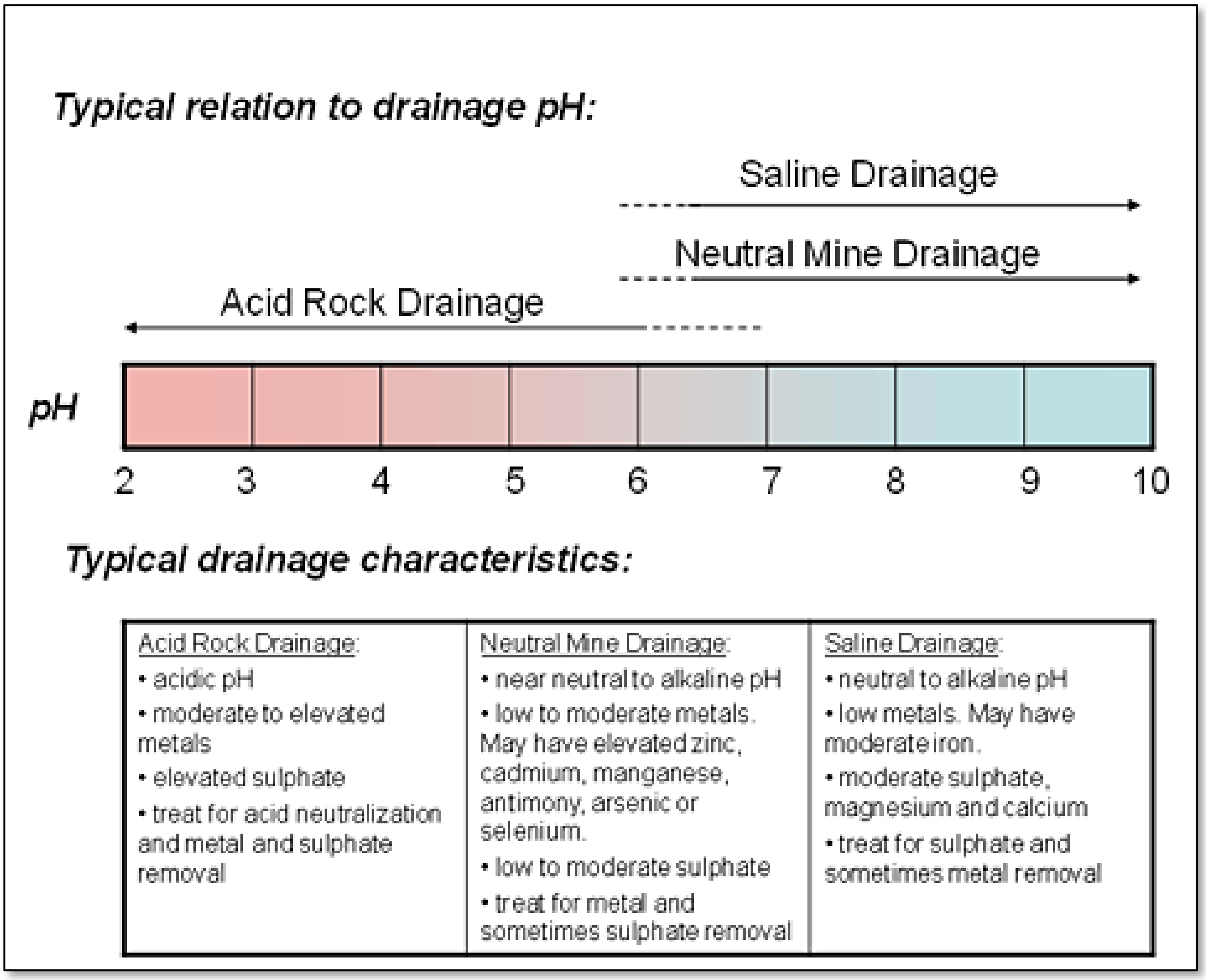

Figure 5. Types of drainage produced by sulfide oxidation (www.gardguide.com).

It takes time for sulfide minerals to oxidize enough to generate acid drainage, and EOR's experience is typically takes 5 – 10 years for acid mine drainage to be detected. It is also possible for the rate of acid drainage development to increase over the years as different rock weathering and acid buffering mechanisms take effect.[10] The mine is proposed for operation for more than 30 years, and rock materials

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[9] Hunt, TC, 2009. Reclamation of zinc roaster waste, Mineral Point, Wisconsin. In The Upper Mississippi Valley lead-zinc district revisited: mining history, geology, reclamation, and environmental issues thirty years after the last mine closed. Illinois State Geological Survey, Guidebook 38.

[10] www.gardguide.com

will be stockpiled in the mine where they will be exposed to air and water. The length of time that rock materials are stockpiled will likely depend on the demand for aggregate products. The reclamation plan is to incrementally fill the quarry throughout its life as mining is completed in different parts of the pit. This would reduce the time that quarry walls are exposed to air and water, reducing acid rock drainage risk. Details are not available about how long quarry walls would typically be exposed.

Acid drainage and metals from the quarry could infiltrate downward to the water table and migrate downgradient in the groundwater to private wells, the springs, streams, and Green Lake. Movement of an acidification front in groundwater will be slower in a well-buffered environment, but as noted above even neutralized mine drainage can contain elevated concentrations of metals.[11] Dissolution of carbonate minerals by acid drainage can increase the potential to develop sinkholes and other karst solution features; monitoring for development of these features should be conducted if the mine is approved.

Measures that can be used in mines to reduce the risk of acid drainage and metals mobilization include monitoring water draining from stockpiles and pit walls for pH and metals, and sampling groundwater in monitoring wells downgradient of a mine for metals and sulfides. Note that multiple wells are prudent in fractured rock settings, such as typically formed by the Sinnipee Group dolomite, because of the chance for preferential groundwater flow paths to bypass a well. Monitoring downstream receiving waters, such as streams and springs, for changes in temperature, metals, or other water quality parameters, such as sulfate can detect and track impacts once they have occurred. Aggregate stockpiles containing sulfide minerals can be placed on liners to collect and treat acidic water that leaches through them before it drains off-site. Finally, reclaiming areas of the pit where mining is completed as soon as practicable reduces the time that sulfide minerals are exposed to air and water.

Conclusions and Recommendations

1. The literature demonstrates that sulfide minerals are present in the Sinnipee Group dolomite that is proposed for mining.
2. Mobilization of metals through the acid rock drainage process is possible at this site, even with buffering by the carbonate minerals in the dolomite bedrock.
3. Humidity cell testing of rock samples from the proposed mine site following ASTM Method D5744-07e1 is recommended to evaluate the risk of acid rock drainage at the site. It could take multiple years for acidification to occur, so a long-term test is recommended. This is administratively challenging, and it is unclear what organizations would conduct the testing, review the results, and act upon them.

[11] www.gardguide.com

4. Because acid rock drainage can take years to develop, if the mine is approved, it could already be in operation before laboratory testing and/or field monitoring detects a problem with acid rock drainage.

3.3. Blasting

Blasting is part of the proposed quarrying operations. Blasting is regulated by Wisconsin Administrative Code Chapter SPS 307, which addresses potential physical effects on neighboring properties, including vibrations and damage to structures. Monitoring of vibrations with a seismograph is required, which would provide data on the timing of blasts and magnitude of ground vibrations.

It is uncertain how the blasting might affect water supply wells and springs in the area. Blast vibrations have potential to change the nature of fractures through which groundwater flows, which could affect the quality or quantity of flow to wells and springs. Information provided by the DNR (Attachment B) shows monitoring well sampling data for a sand mine in western Wisconsin with large nitrate increases after blasting. A mixture of ammonium nitrate and fuel oil is the most common explosive used in quarries, creating a nitrate source.[12] The petroleum compounds in the explosives are another potential contaminant of concern. The DNR information also notes that the Department commonly receives complaints about silt and rust in wells related to blasting. These impacts could occur downgradient of the mine as well as in other areas that are disturbed enough by vibrations to cause physical and chemical changes to the aquifer.

Conclusions and Recommendations

1. Blasting is a potential source of nitrates and petroleum compounds.
2. The DNR has documented contamination of groundwater with nitrates after blasting at a Wisconsin sand mine.
3. The DNR reports that they commonly receive complaints about sediment and metal staining in well water near blasting sites.
4. Powell Spring and Mitchell Glen are located downgradient of the mine site, and physical or chemical changes in the aquifer due to mining could affect the springs.
5. The risk of impacts on groundwater quality, neighboring wells, and the springs should be understood and considered in reviewing the CUP application.

[12] Illinois Department of Natural Resources, FAQ Aggregate Blasting. https://www2.illinois.gov/dnr/mines/EAD/Pages/FAQAgreggateBlasting.aspx

4. STORMWATER RUNOFF

Stormwater runoff from the mine site currently flows north across Brooklyn G Rd. through the property of Ernie Neuenfeldt at N5139 Brooklyn G Rd. and northwest across Skunk Hollow Rd. to Mitchell Glen, as indicated by topographic contours and the CUP application. Stormwater and wastewater at the mine site would be regulated by the DNR under General Permit WI-0046515-07-0 for Mineral (Nonmetallic) Mining and/or Processing. The DNR is in the process of reviewing the Erosion Control and Storm Water Management Plan for the Skunk Hollow Quarry (the Plan) and has not yet issued the permit. The permit regulates discharges to both surface water and groundwater and includes requirements for water quality sampling for common contaminants of concern. These include pH, Total Suspended Solids, nitrate, sulfate, arsenic, and other metals.

The Plan describes a containment berm around the quarry site, a sediment trap on the mill level that will discharge off-site (location not identified on drawings), a sediment trap and sump located on the pit floor, a sediment basin situated north of the site, and a drainage swale to convey water pumped from the sump in the quarry to the sediment basin. Overflow from the sediment basin would flow northwest through the Neuenfeldt property to Dakin Creek. The Plan states that water will be pumped from the sediment trap and sump in the quarry only after a 10-yr or larger rainfall, but no other details of the pumping system operation are provided to evaluate the frequency, discharge, or duration of pumping to the surface drainage swale. No information is provided to determine whether the drainage swale or downstream channel would be subjected to erosive conditions during these pumping episodes. Pumping would likely be necessary more frequently if water in the pit does not seep away to groundwater quickly enough to provide storage volume for the next rainfall. No analysis is provided on the rate at which water is expected to seep into the pit floor to back up the assertion that pumping will only be necessary after the 10-yr or larger event. Similarly, the level of detail in the Plan is insufficient to determine if the proposed sediment trap(s) and basin will provide adequate settling treatment.

Neither the Erosion Control and Storm Water Management Plan nor the Stormwater Pollution Prevention Plan address any of the chemicals contained in blasting agents or if the sediment trap and basin would provide adequate treatment for them. The contaminants of concern in blasting agents – nitrates and petroleum compounds – are typically dissolved in water, and particulate settling is not an effective treatment for them. Contamination of groundwater is therefore a concern, particularly if process water rapidly infiltrates from the pit into fractures in the bedrock.

Conclusions and Recommendations

1. The locations and characteristics of all the proposed discharges to surface water and groundwater are not adequately described in the Erosion Control and Storm Water Management Plan.
2. The timing, amount, and quality of water that would be discharged from the pit to the surface drainage system off-site is not described in enough detail to understand risks of impacts.

3. Treatment of chemicals used in blasting is not addressed in the Erosion Control and Storm Water Management Plan nor in the Storm Water Pollution Prevention Plan. The particulate settling in the proposed sediment traps and sediment basin are not effective for treating these dissolved pollutants (nitrate and petroleum compounds).
4. Infiltration of stormwater and process water in the pit poses a water quality risk to groundwater, and the downgradient springs and streams.

5. SUMMARY

Our specific conclusions and recommendations are summarized in the preceding sections of this report. Available information suggests that the Skunk Hollow Mine cannot be operated as proposed without adverse impacts on the health and welfare of nearby residents or without degradation of aquatic resources including Powell Spring and Creek, White Creek, Mitchell Glen, Glen Creek, and Dakin Creek. The CUP application materials lack important information needed to provide confidence that the public health and the environment can be protected with the mine in operation.

ATTACHMENT A

Resume for Steve Gaffield

Project Experience

Groundwater Modeling, Analysis, and Planning

Black Earth Creek Watershed Green Infrastructure Plan
Capital Area Regional Planning Commission / Project Manager
Coordinated technical analysis and engagement of farmers and other stakeholders. Developed hydrologic modeling approach to evaluate benefits of urban and rural green infrastructure for flood reduction and water quality improvement. Presented project information to stakeholder steering committee and general public. Developed green infrastructure recommendations, including funding, and implementation planning.

Little Plover River Restoration Plan
Village of Plover, WI / Project Manager
Leading analysis of streamflow and habitat restoration alternatives for trout stream heavily impacted by groundwater pumping. Performing QA/QC on MODFLOW transient groundwater modeling and other water budget analyses. Coordinating with team of local & state government, non-profits and agricultural industry group.

Cheryl Drive
City of Fitchburg, WI / Project Manager
Provided QA/QC and technical oversight for the SWMM modeling of the storm drainage system, including model design, hydraulic modeling results, diagnosis of critical infrastructure limitations, and infrastructure maintenance, and upgrade recommendations.

Middleton Floodplain Study, Scenarios, and Costing
City of Middleton, WI / Project Manager
Coordinated planning, development, and calibration of a 1D/2D PCSWMM model of the Pheasant Branch Creek watershed. Oversaw mapping of the 1% and 0.2% annual chance floodplains. Led use of model to evaluate benefits of potential flood mitigation projects and conceptual cost estimates. Presented project findings to City commission and at public meetings, and discussed the potential project mitigation with dairy farm representatives.

Cross Plains Flood Mitigation
Jewell Associates Engineers / Principal-in-Charge
Provided technical advice and QA/QC review for hydrologic and hydraulic analysis of potential flood mitigation projects in the Village of Cross Plains, WI, including green infrastructure (wetland/floodplain restoration), and gray infrastructure (flood control dam and street crossing improvements).

Private Wetland Mitigation Bank in Dodge County, WI
Eco-Resource Consulting / Project Manager
Reviewed soil test pit and groundwater monitoring well data. Conducted groundwater modeling using analytic element code GFLOW to evaluate groundwater rise from proposed drainage disablement. Reviewed and drafted hydrologic and hydraulic sections of the draft Mitigation Bank Instrument. Oversaw development of restoration grading design and plan sheets.

Spring Harbor Watershed Study in Madison, WI
AE2S / Project Manager
Led EOR's support to AE2S' development of a SWMM watershed model for the City of Madison, WI. Participated in 3 public stakeholder meetings to gather input from break-out groups. Led development of conceptual design drawings and cost estimates for potential infrastructure improvements for flood mitigation.

Stephen J. Gaffield, PhD, PE, CFM

Water Resources Engineer

Steve has 28 years of experience in hydrogeology and water resources engineering. He has been project lead for many groundwater protection, floodplain, stormwater design and wetland restoration projects. He is active on research committees at the University of Wisconsin, presents frequently at technical conferences, and contributes to technical journals. Steve also has extensive experience with public participation and education.

Education

1988	Bachelor of Arts in Geology and Physics Albion College
1991	Masters of Sciences in Geology University of Wisconsin-Madison
2000	Doctor of Philosophy in Geological Engineering University of Wisconsin-Madison

Professional Registration

#39140 WI Professional Engineer: civil
US-16-09286 Certified Floodplain Mgr.

Professional Activities

2012-22	Univ. of Wisc. Groundwater Research Advisory Council
2009-22	Wisconsin Geological & Natural History Survey Geologic Mapping Committee
2011	American Water Resources Assoc. WI - former president

Areas of Expertise

Groundwater Analysis
Watershed Planning
Stormwater Management
Floodplain & Dam Hydraulics
Non-point Source Monitoring & Analysis
Project Management

McCandless Remap Feasibility
Village of Plover, WI / Project Manager
Planned and reviewed evaluation of the accuracy of Flood Insurance Study hydrologic and hydraulic models. Provided advise on actions the City could take to improve the accuracy of floodplain maps.

Evansville Wetland Mitigation Design
Heartland Ecological Group / Principal-in-Charge
Provided technical input and review for wetland mitigation site grading and drainage disablement at a Wisconsin Department of Natural Resources mitigation site. Planned and reviewed Lateral Effect modeling of the effect of breaking drain tiles.

Plover Wetland Mitigation
Village of Plover, WI / Project Manager
Leading development of wetland mitigation plan with subconsultants, Wisconsin DNR and Portage County. Coordinated wetland design and site preparation with farmer selling the land. Planned and reviewed MODFLOW groundwater modeling of restoration and developing transient spreadsheet screening model. Lead restoration design, including ditch fill and irrigation well shut-down.

Big Hollow Wetland Mitigation Bank
Black Bear Enterprises / Project Manager
Led hydrologic monitoring, modeling, and civil site design for a proposed 190-acre wetland mitigation bank near Spring Green, WI, in collaboration with a restoration ecology partner. Supported submittal of a draft Mitigation Bank Instrument to the Interagency Review Team. Coordinated 2D modeling of surface runoff with PCSWMM and performed groundwater analysis with the analytical Theis equation and MODFLOW. Coordinated design and submittal activies closely with the landowner, who has actively farmed the site.

F&A Dairy Groundwater Review
The Probst Group/ Project Manager
Led groundwater review components of a WPDES permit renewal for a Wisconsin dairy that land-applies process water to farm fields. Reviewed water quality data for groundwater monitoring wells and the irrigation water, as well as details of wastewater application locations and timing. Coordinated evaluation of regional groundwater flow system and analysis of contamination risk for local water supply wells.

Stormwater Infiltration Mounding and Design
Terravessa Plat, Fitchburg, WI / Technical Advisor
Modeled groundwater mounding below regional infiltration basins with analytical equations and MODFLOW, including interference with system performance and off-site impacts. Developed iterative approach to balance infiltration volume from WinSLAMM design model with groundwater mounding constraints.

PolyMet Mine Groundwater Review
Great Lakes Indian Fish & Wildlife Commission / Project Manager & Technical Lead
Reviewed MODFLOW groundwater model of proposed mine under closure conditions. Critiqued analysis of mining company's consultant and tested their assumptions through a model sensitivity analysis to identify substantial risk of contaminated groundwater migration off-site under the proposed plan.

Proposed Non-Metallic Mine Environmental Review
Town of Vienna, WI / Project Manager & Technical Lead
Evaluated potential groundwater impacts related to three proposed quarry sites, including two sand and gravel pits and a dolomite bedrock quarry. Evaluated water quantity and quality impacts through site inspections, review of the proposed operating plans, and analysis of available hydrogeologic data. Key issues included the depth of mines relative to the water table, management of potential contaminant sources such as fuel for equipment, washing operation details, and design of site erosion control and stormwater management plans. Presented findings to the Town planning commission.

Proposed Gravel Pit Environmental Review
Town of Milton, WI / Project Manager & Technical Lead
Evaluated potential groundwater and surface water impacts related to a proposed gravel pit on behalf of the Town, as part of their condition use permit process. Inspected the site and reviewed applicant's plans for excavation, equipment operation and reclamation. Reviewed data on soils and hydrology to identify potential impacts on a stream, wetlands and groundwater. Coordinated wetland ecological evaluation and impact analysis. Presented findings to the Town planning commission in a condition use permit hearing.

Utility Construction Dewatering
Village of Cross, WI / Project Manager
Worked with Village public works director, Village engineer, and contractor/technical advisor to scope potential dewatering system issues and designs. Constructed GFLOW analytic element groundwater model of dewatering systems to predict pumping rates and impact on adjacent trout stream flow and temperature. Led permitting with Wisconsin Dept. of Natural Resources for high capacity wells and discharge to creek.

Stevens Point Municipal Well Impact Analysis
Town of Hull, WI / Technical Lead
Provided groundwater expert support to the Town and its legal counsel in dispute with the City of Stevens Point over loss of water in dozens of private residential wells after the City started operation of a large collector well nearby. Reviewed monitoring well data trends to identify drawdown impacts of the City well and refined and calibrated an existing MODFLOW groundwater model to simulate potential future drawdown impacts. Represented the Town in numerous settlement negotiation meetings and presented at a public meeting to describe the agreement.

Richfield Dairy Groundwater Impact Expert Testimony
Pleasant Lake Management District / Project Manager & Technical Lead
Reviewed groundwater modeling and reports by proposed dairy's consultants to evaluate expected impacts on lake level and flow in a trout stream and springs. Evaluated modeling assumptions, hydrologic data and scientific literature. Inspected hydrologic conditions at the site. Testified in a State of Wisconsin contested case hearing that led to a decision that the State must consider cumulative impacts of high capacity wells.

Madison Water Utility East Side Master Plan
Black & Veatch, Inc. / Technical Lead
Analyzed PCE, Mn and Fe trends in 3 water supply wells and recommended plan to evaluate PCE reduction alternatives. Evaluated hydrogeologic, land use, and infrastructure factors for potential sites for a new well in an urban area with a long history of industrial use. Presented in a series of public meetings to gather input and provide project details.

Groundwater Susceptibility Mapping
Calumet County, WI / GIS Specialist at the Wisconsin Geological & Natural History Survey
Assisted in identifying key risk factors for glacial and dolomite aquifers. Conducted GIS analysis of geologic and hydrologic factors to map the water table and susceptibility of both aquifers to contamination by human activities. Resulted in publication of WGNHS Miscellaneous Map 56.

Wetland & Lake Restoration

Plover Wetland Mitigation
Village of Plover, WI / Project Manager
Leading development of wetland mitigation plan with subconsultants, Wisconsin DNR and Portage County. Planning and reviewing MODFLOW groundwater modeling of restoration and developing transient spreadsheet screening model. Leading restoration design, including ditch fill and irrigation well shut-down.

Leopold Memorial Reserve Treatment Wetland
Sand County Foundation / Project Manager
Planned design for 4-acre wetland enhancement demonstration project to remove nitrogen from agricultural runoff in Sauk County, WI near Aldo Leopold's famous farm. Planned and assisted hydrologic and water quality monitoring pre- and post-project, including selection, purchase and installation of flow meter, automated sampler, telemetry, monitoring wells and water level loggers. Evaluated cost, performance and permitting feasibility of several designs. Led construction drawing and specification preparation, performed construction observation, and worked with subconsultants to establish native vegetation. Directed four years of performance monitoring and data analysis. Planned and edited Journal of Soil and Water Conservation paper describing successful denitrification results.

Stormwater BMP Feasibility & Design

Warner Lagoon Water Quality Study
City of Madison, WI / Project Manager
Performed evaluation of water quality and fishery improvement options for 30-acre wetland/pond system adjacent to Lake Mendota, in collaboration with fisheries experts and graphic designer. Directed stormwater treatment design and WinSLAMM modeling and performed QC model review. Synthesized data and recommendations from biologist team members for carp control and exclusion, including a physical barrier and baited trap netting. Estimated costs for stormwater treatment, habitat dredging, and mechanical aeration. Led 3 stakeholder meetings. Planned and directed preparation of 30% drawings of stormwater treatment and dredging projects and wrote feasibility report.

UW-Madison Neighborhood Stormwater Study
UW-Madison & WI Dept. of Administration / Project Manager
Planned and directed WinSLAMM model analysis of stormwater runoff volume and sediment controls for 6 parcels on the UW-Madison campus planned for future redevelopment. Researched performance of green infrastructure / low-impact development options including green roofs and walls, permeable pavement and water harvesting and reuse. Directed installation and sampling of monitoring wells to evaluate subsurface hydraulic properties of fine-grained glacial lake sediment and performed groundwater mounding analysis to determine limitations of stormwater infiltration. Simulated green roof performance with EPA's Stormwater Calculator. Developed new technique to model tree canopy interception over impervious surfaces to evaluate quantity and quality benefits in WinSLAMM; published in the Center for Watershed Protection's Watershed Science Bulletin in collaboration with U.S. Forest Service. Developed integrated conceptual stormwater plan for campus neighborhood, including several options for future site design evaluation, and cost per gallon of runoff reduced and pounds of sediment removed.

Floodplain Modeling, Planning & Management

Steve has performed floodplain modeling and permitting analyses for nearly 20 projects over the past 15 years, and he is a Certified Floodplain Manager. His experience includes hydrologic modeling of flood discharge with HEC-HMS, NRCS methods and statistical regression, and hydraulic modeling of flood elevations and mitigation alternatives using HEC-RAS. Steve's role in floodplain projects commonly include evaluating existing Flood Insurance Study models, modifying models to simulate proposed floodplain fill and stream crossings, designing mitigation alternatives to minimize floodplain impacts, QA/QC review, and helping clients understand the opportunities and constraints of floodplain regulations.

- ***Lake Belle View Restoration*** *(for Village of Belleville, WI)*
- ***Front St. Development*** *(Clifton Corporation, Watertown, WI)*
- ***Rowan and Hinkson Creeks Letter of Map Amendment*** *(for Town of Dekorra, WI)*
- ***Cell Tower Permitting*** *(Edge Consulting, Oneida County, WI)*
- ***Clark Creek Flood Study*** *(for Sauk County, WI)*
- ***Bike Trail Floodplain Permitting*** *(for City of Jefferson, WI)*
- ***Campground Fill Permitting*** *(Riverbend RV Resort, Watertown, WI)*
- ***Blackhawk Island Floodplain Permitting*** *(Luke Purucker, Jefferson County, WI)*
- ***Tenney Avenue Crossing*** *(Smart Realty Company, Waukesha, WI)*
- ***Traynor Aggregate Pit Bridge*** *(Dodge Concrete, Rock County, WI)*
- ***Brewing Expansion Permit Scoping*** *(New Glarus Brewing, New Glarus, WI)*
- ***Drumlin Grove Floodplain Delineation*** *(Burse Surveying & Engineering, Cottage Grove, WI)*
- ***Kinnickinnic River Restoration Design*** *(Milwaukee Metropolitan Sewerage District, Milwaukee, WI)*
- ***McCoy Property Development Permitting*** *(D'Onofrio Kottke Assoc., Sun Prairie, WI)*
- ***Zander Farms Development Permitting*** *(D'Onofrio Kottke Assoc., Cross Plains, WI)*
- ***Three Waters Reserve Flood Impact Analysis*** *(Applied Ecological Services, Brodhead, WI)*
- ***After-the-Fact Floodplain Permitting*** *(Ripon Rifle & Pistol Club, Fond du Lac County, WI)*
- ***Warner Park Channel Restoration Design*** *(for City of Madison, WI)*
- ***Powerplant Floodplain Analysis*** *(SCS Engineers, WI)*

Publications and Research Activities

Steve has been an active member of the University of Wisconsin-Madison's Groundwater Research Advisory Council since 2012. Each year, he reviews approximately 15 groundwater research proposals submitted to the UW-Madison Water Resources Institute (WRI) for funding, participates in discussion of the strengths and weaknesses of the proposals with other Council members, and provides recommendations to WRI for funding priorities. This experience provides valuable insights into current groundwater research topics and methods in Wisconsin.

Gaffield, Wudel & Kuehler, Dec. 2017. *Calculating stormwater volume and Total Suspended Solids reduction under urban tree canopy in Wisconsin using available research*. Watershed Sci. Bull.

Fehling, Gaffield & Laubach, 2014. *Using enhanced wetlands for nitrogen removal in an agricultural watershed.* Jour. Soil & Water Conservation 69(5): 145A-148A.

Gotkowitz, MB and SJ Gaffield, 2006. *Water-Table and Aquifer-Susceptibility Maps of Calumet County, Wisconsin*. Wisc. Geol. & Nat. History Survey Miscellaneous Map 56.

Gaffield, SJ, KW Potter and L Wang, 2005. *Predicting the Summer Temperature of Small Streams in Southwestern Wisconsin*. Jour. Amer. Water Res. Assoc. 41(1): 25-36.

Coauthor of Ch. 7: Water Quantity and Quality, in H Frumkin, L Frank and R Jackson, 2004, *Urban Sprawl and Public Health*. Island Press.

Gaffield, SJ, RL Goo, LA Richards and RJ Jackson, 2003. *Public Health Effects of Inadequately Managed Stormwater Runoff*. Amer. Jour. of Public Health 93(9): 1527-1533

Potter, KW and SJ Gaffield, 2001. Watershed assessment with synoptic base-flow surveys. In Geomorphic Processes and Riverine Habitat, American Geophysical Union, Water Science Application Volume 4, p. 19-25.

Syverson, KM, SJ Gaffield, and DM Mickelson, 1994. Comparison of esker morphology and sedimentology with former ice-surface topography, Burroughs Glacier, Alaska. Geological Society of America Bulletin, v 106, p 1130-1142.

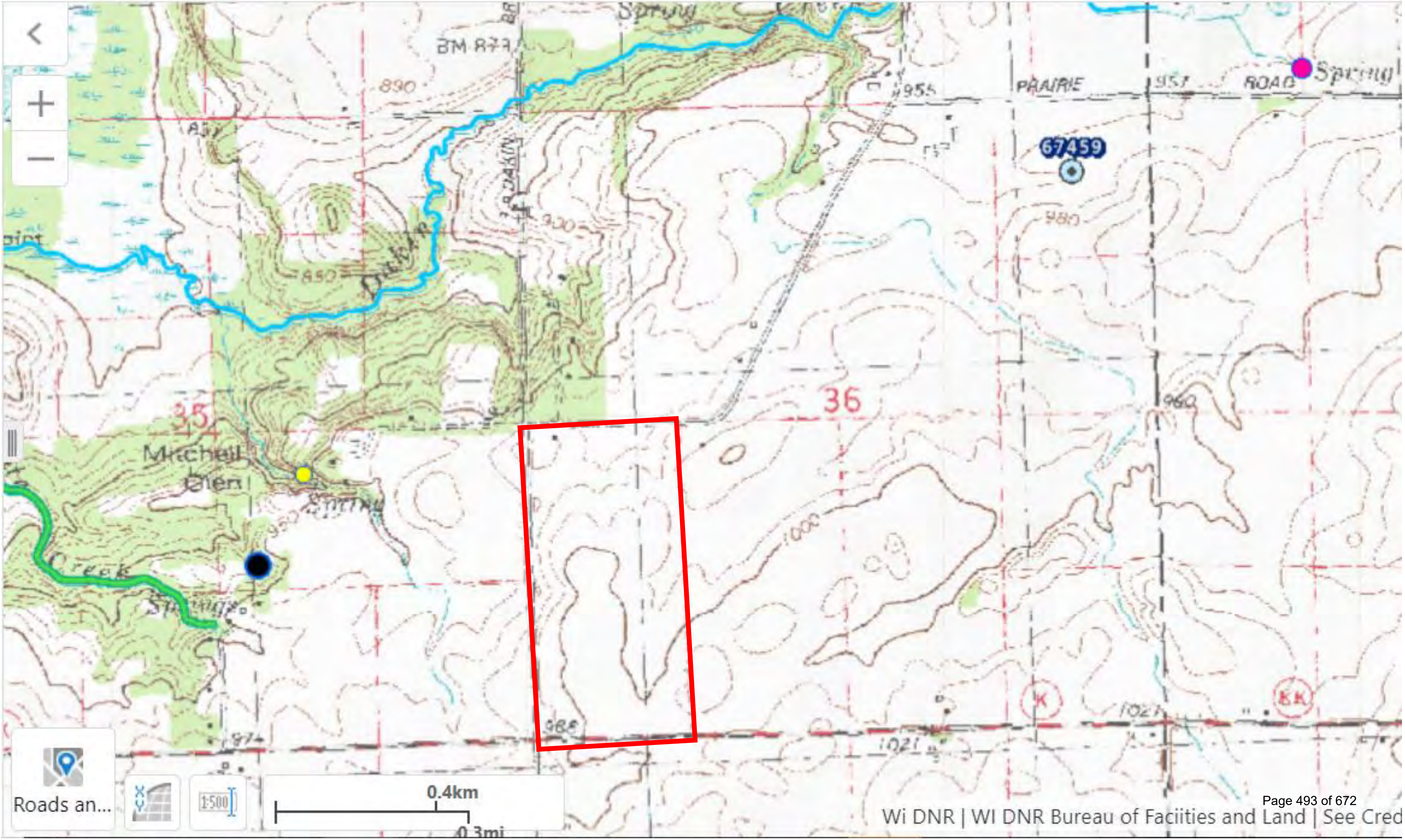
Gaffield, SJ and DM Mickelson, 1995. Driving stress, hydraulic head and landform genesis at the southeastern Burroughs Glacier. Proceedings of the Third Glacier Bay Science Symposium, 1993. DR Engstrom (Ed.), Anchorage, Alaska.

ATTACHMENT B

Presentation on Powell Spring and the Proposed Skunk Hollow Mine from the Wisconsin Department of Natural Resources.

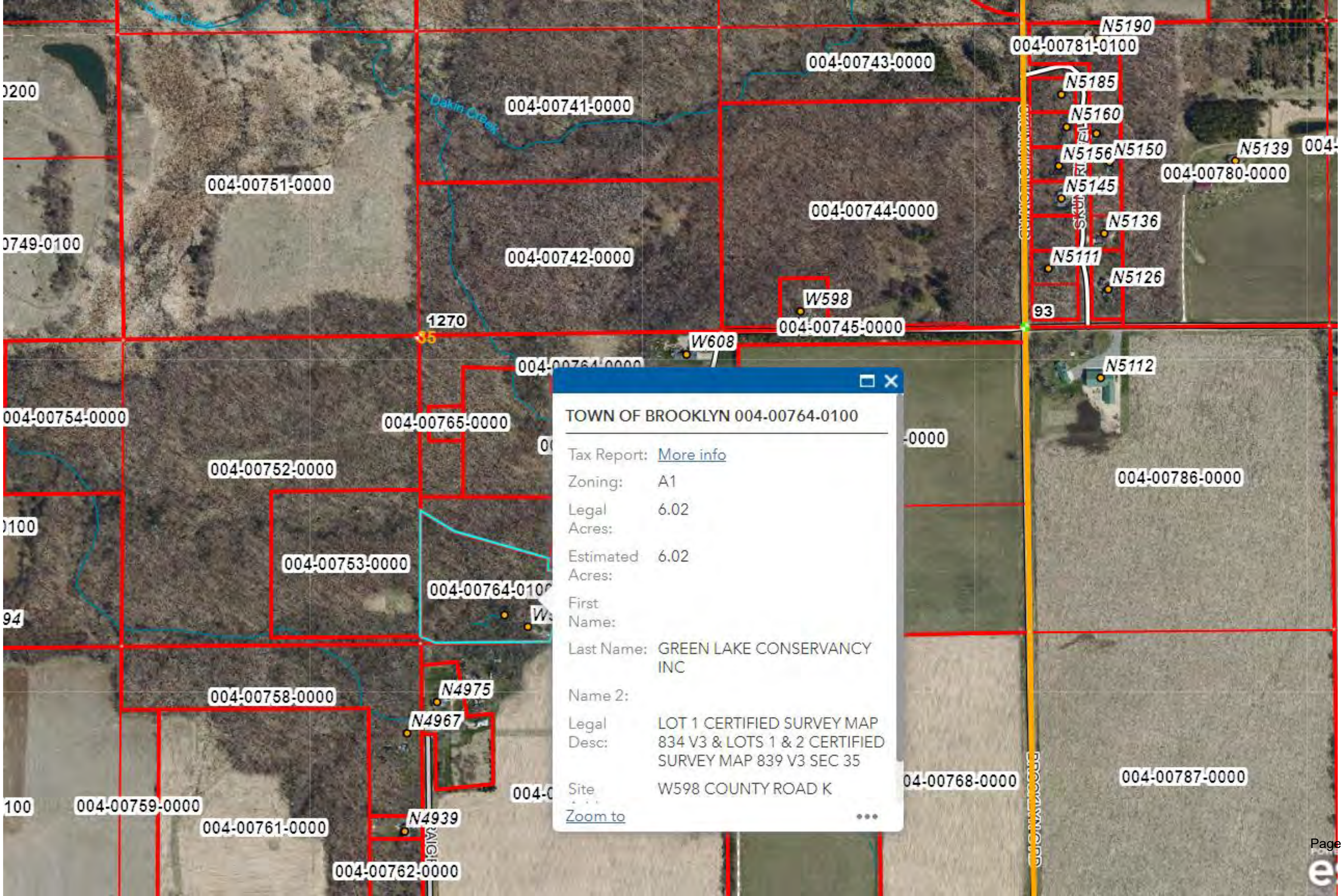
Powell Spring


Dakin Cr.
Maug Road
Skunk Hollow Road
Dakin Cr.
Glen Lane
White Cr.
Craig Road
67459
K
Roads an...
0.4km
Wi DNR | WI DNR Bureau of Faciities and Land | See Cred

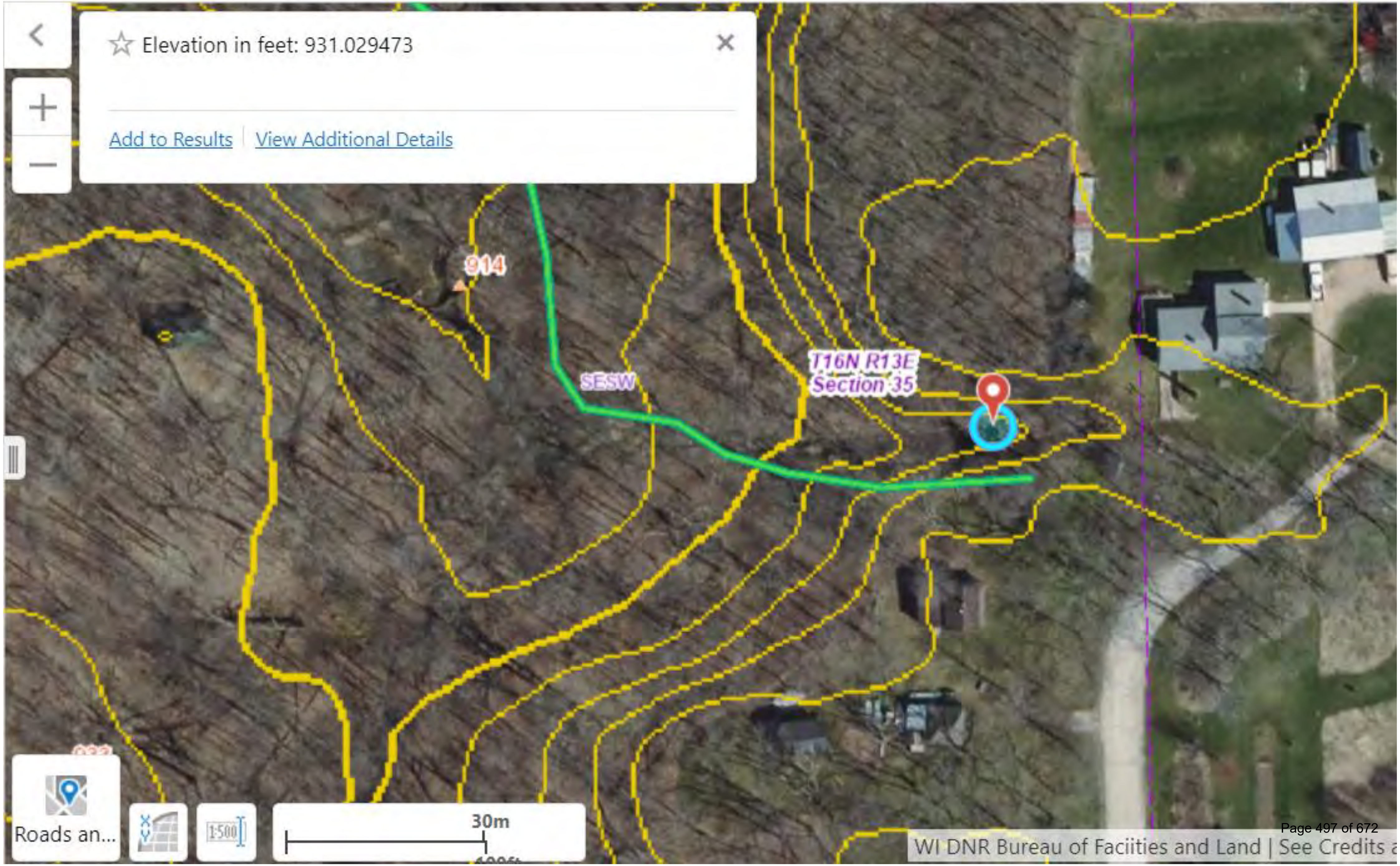


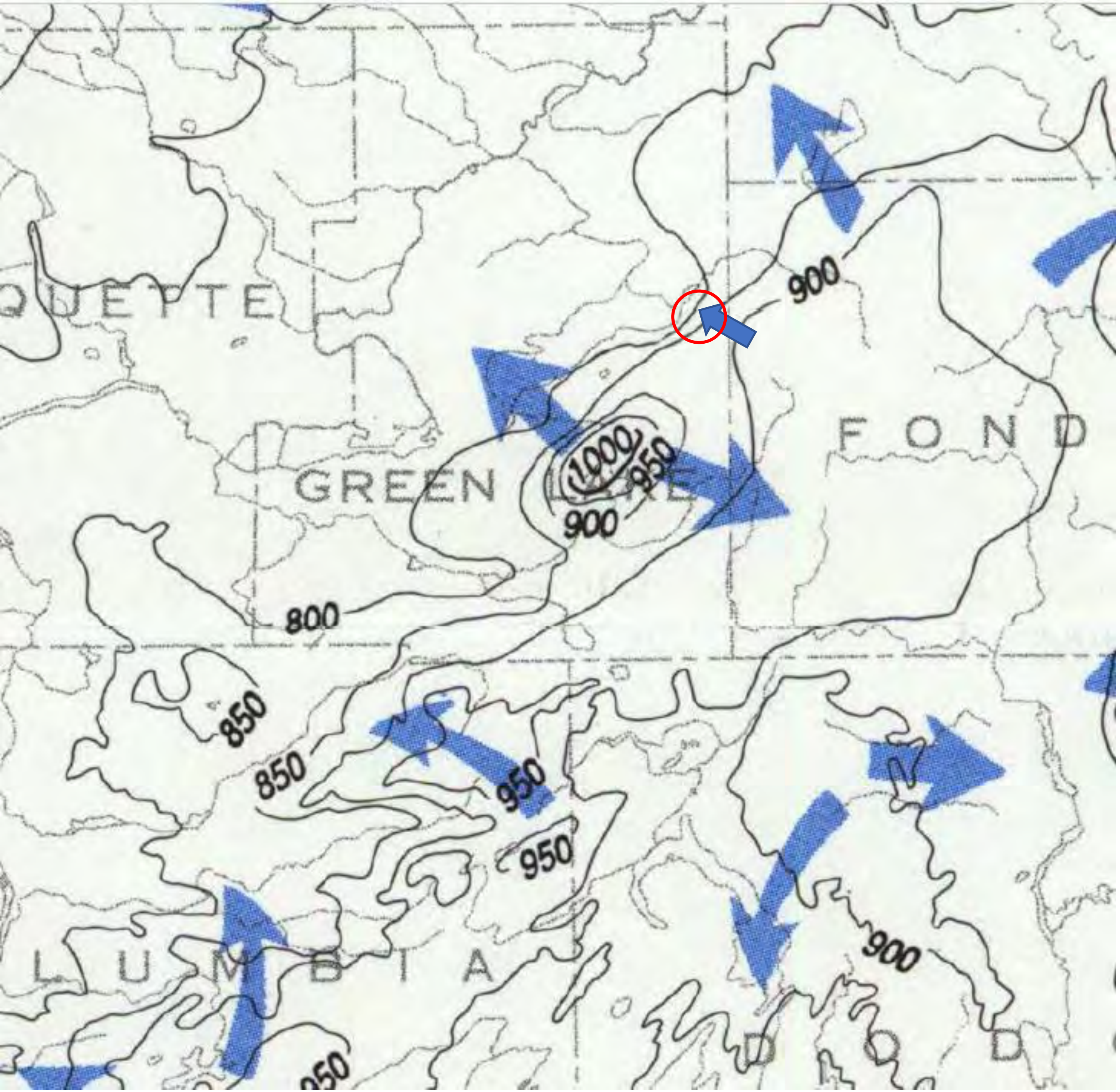
BM 873
890
955
PRAIRIE
957
ROAD
Spring
67459
980
Oakr
850
35
36
Mitchell
Glen
Spring
960
1000
Creek
Springs
985
974
1021
1027
K
KK
Roads an...
0.4km
0.3mi
Wi DNR | WI DNR Bureau of Faciities and Land | See Cred


35
36
T16N R13E
Glen Lane
Ridge Lane
2,117.26 ft
2,405.26 ft
Total: 2,135.71 ft
Total: 2,407.21 ft


TOWN OF BROOKLYN 004-00764-0100
Tax Report: More info
Zoning: A1
Legal Acres: 6.02
Estimated Acres: 6.02
First Name:
Last Name: GREEN LAKE CONSERVANCY INC
Name 2:
Legal Desc: LOT 1 CERTIFIED SURVEY MAP 834 V3 & LOTS 1 & 2 CERTIFIED SURVEY MAP 839 V3 SEC 35
Site W598 COUNTY ROAD K
Zoom to
Dakin Creek
004-00741-0000
004-00742-0000
004-00743-0000
004-00744-0000
004-00745-0000
004-00751-0000
004-00752-0000
004-00753-0000
004-00754-0000
004-00758-0000
004-00759-0000
004-00761-0000
004-00762-0000
004-00765-0000
004-00764-0100
004-00768-0000
004-00780-0000
004-00781-0100
004-00786-0000
004-00787-0000
N5190
N5185
N5160
N5156
N5150
N5145
N5139
N5136
N5126
N5111
N5112
W598
W608
N4975
N4967
N4939
1270
35
93


Elevation in feet: 924.212592
Add to Results
View Additional Details
NWSE
T16N R13E
Section 35
NESW
949
SWSE
Roads an...
30m
WI DNR Bureau of Faciities and Land | See Credits associat


Elevation in feet: 931.029473
Add to Results
View Additional Details
914
SESW
T16N R13E
Section 35
Roads an...
30m
WI DNR Bureau of Faciities and Land | See Credits



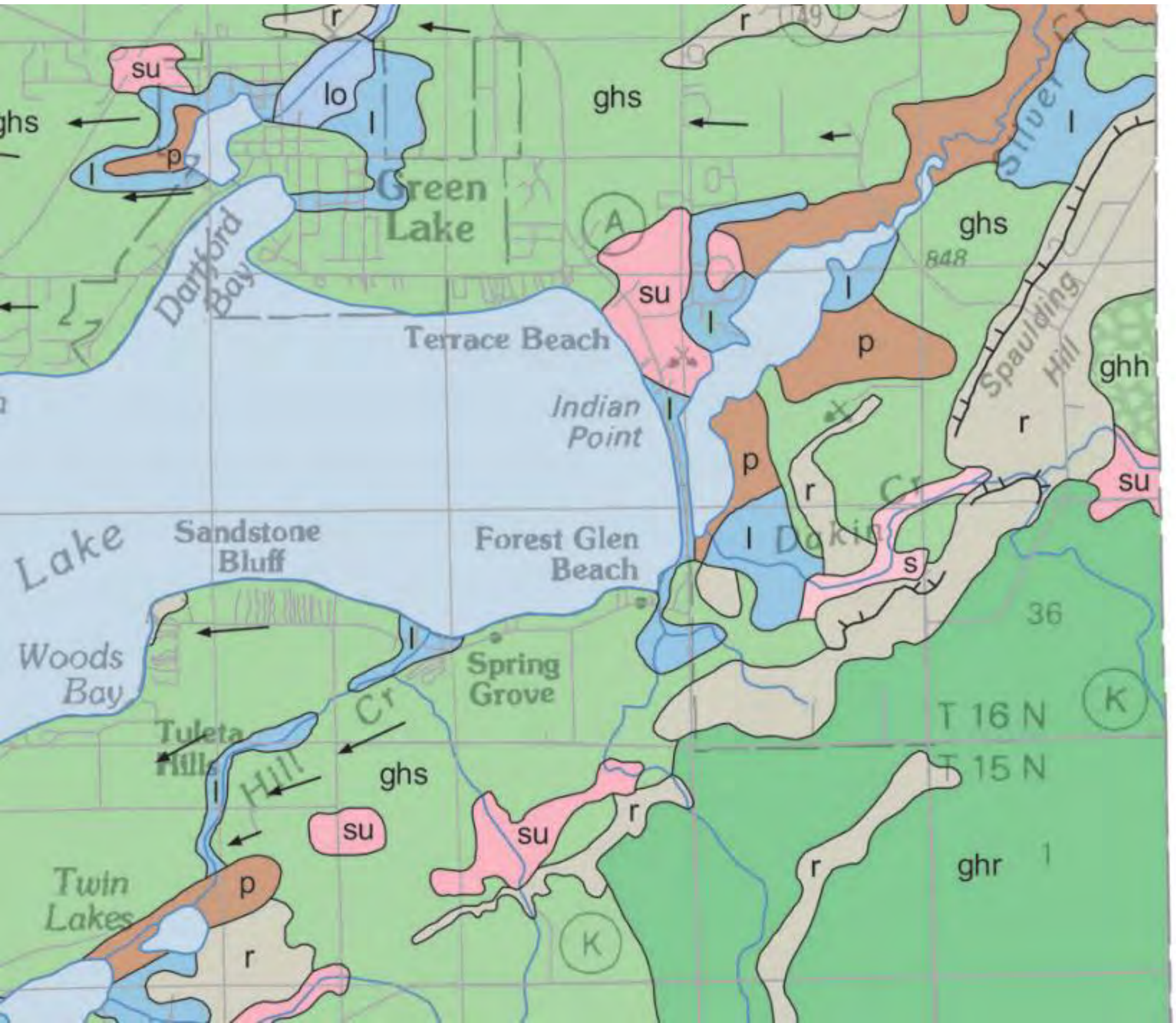
EXPLANATION

— 800 — **Water-table contour** – Shows altitude of water table. Contour interval 50 feet. Contours omitted in areas of steep slopes. Datum is sea level

Generalized horizontal direction of ground-water flow in the shallow aquifer system

This is a composite map, derived from many sources (see inset map). Contours were modified from source maps in some areas. Although the source maps cover a time span of approximately 30 years, they are suitable for preparation of a composite map with a 50-foot contour interval. There are very few places in Wisconsin where the water table has fluctuated more than 20 feet in this time span.

Groundwater flow is from the proposed quarry toward the spring(s).



Explanation

Postglacial deposits

Fill. Consists of various materials including gravel, sand, silt and clay.

Windblown sand. Well sorted, generally vegetated. Dunes between 2 and 7 m thick, generally no more than 5 m high. Active blowouts and dunes exist in some places. Deposited immediately following deglaciation. Distribution is obscure in most places and is more widespread than indicated on map.

Peat. Unit **p:** Peat occupying low-lying, flat to low-relief surfaces; thickness varies, but is typically between 1 and 5 m thick. Unit **po:** Peat over silty and clayey lake sediment (or over sandy beach sediment near margins of wetlands) of glacial Lake Oshkosh; usually occurs in areas that are less than 234 m above sea level in elevation (may be beach sediment near margins of wetland). Unit **pw:** Peat over lake sediment of glacial Lake Wisconsin; usually occurs in areas that are between 234 and 296 m above sea level in elevation. Unit **ps:** Peat overlying postglacial or meltwater stream sediment consisting of silty and sandy sediment with some channel sand and silt.

Stream sediment. Commonly consists of silty and sandy sediment with some channel sand and silt; typically between 1 and 15 m thick. Deposited in flood plains adjacent to post-glacial streams; most of this sediment was probably deposited during the recent past.

Glacial deposits, undifferentiated

Lake sediment. Unit **l:** Sand, silt, and clay. Unit **low:** Glacial Lake Oshkosh sediment covered with thin patches of windblown sand generally less than 2 m thick. Unit **lo:** Sediment deposited in glacial Lake Oshkosh, usually at elevations below 234 m above sea level; largely silt and clay where deposited in deeper water grading to sand near the shoreline; typically between 1 and 80 m thick; material deposited near the shoreline may include windblown sediment, washed hillslope sediment, and patches of peat that could not be mapped separately. Unit **lww:** Glacial Lake Wisconsin sediment covered with thin patches of windblown sand generally less than 2 m thick. Unit **lw:** Sand, silt, or clay deposited in glacial Lake Wisconsin usually at elevations above 234 m above sea level; largely silty sand where deposited in deeper water grading to sand near the shorelines.

Meltwater-stream sediment. Sand and gravel deposited directly by streams originating from the margin of the Green Bay Lobe; commonly between 1 and 30 m thick. Unit **se:** Eroded meltwater-stream sediment; gullied topography resulting from erosion in postglacial time. Unit **sc:** Collapsed (kettled) meltwater-stream sediment deposited in alluvial fans, deltas, and proglacial river channels. Unit **sg:** Subaqueous morainal bank deposited adjacent to the former margin of the Green Bay Lobe; commonly flat on top. Unit **sa:** Meltwater-stream sediment deposited in an alluvial fan or delta immediately adjacent to a moraine or ice-contact face. Unit **su:** Meltwater-stream sediment deposited in proglacial river channels or in tunnel channels beneath the margin of the Green Bay Lobe.

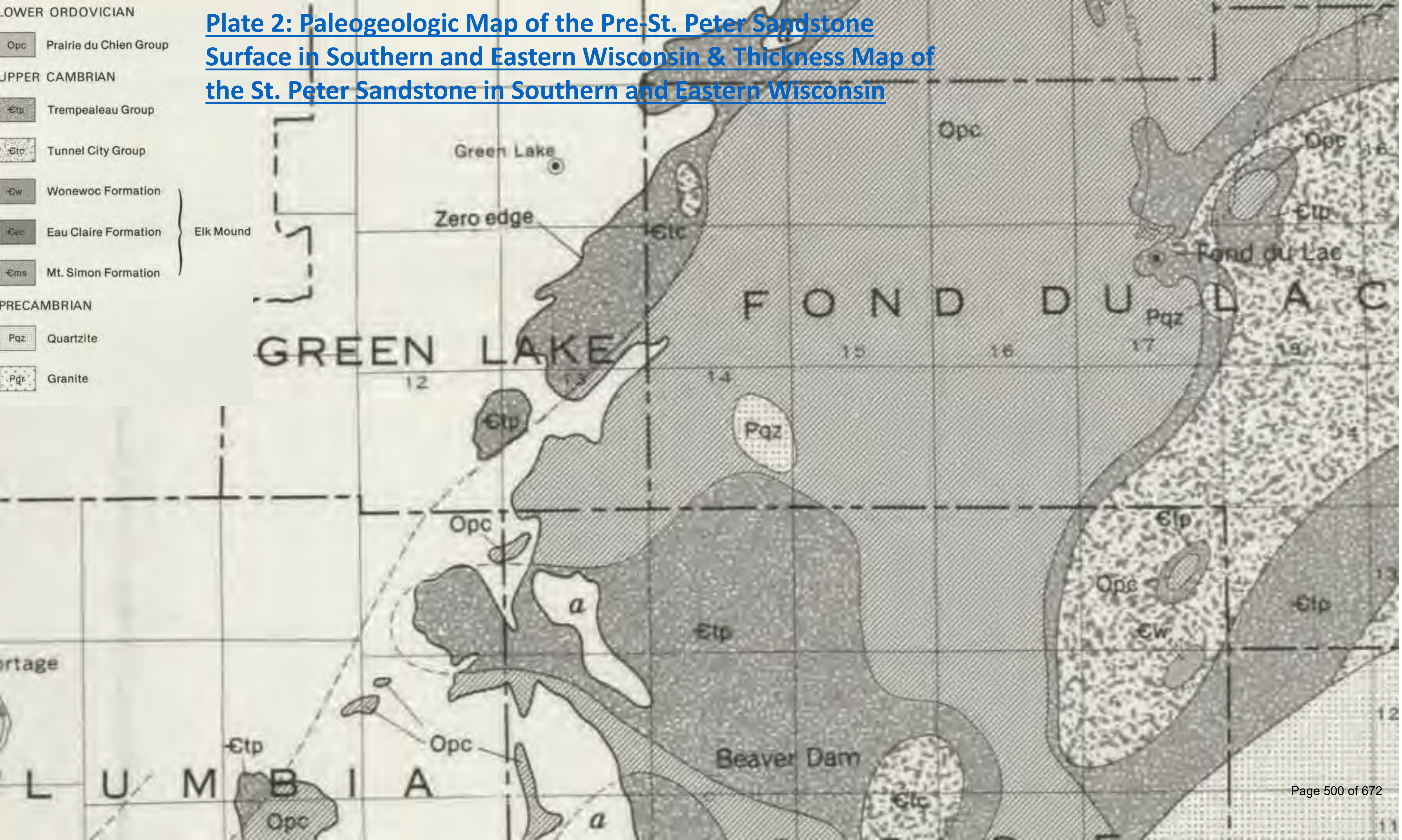
Holy Hill Formation, Horicon Member

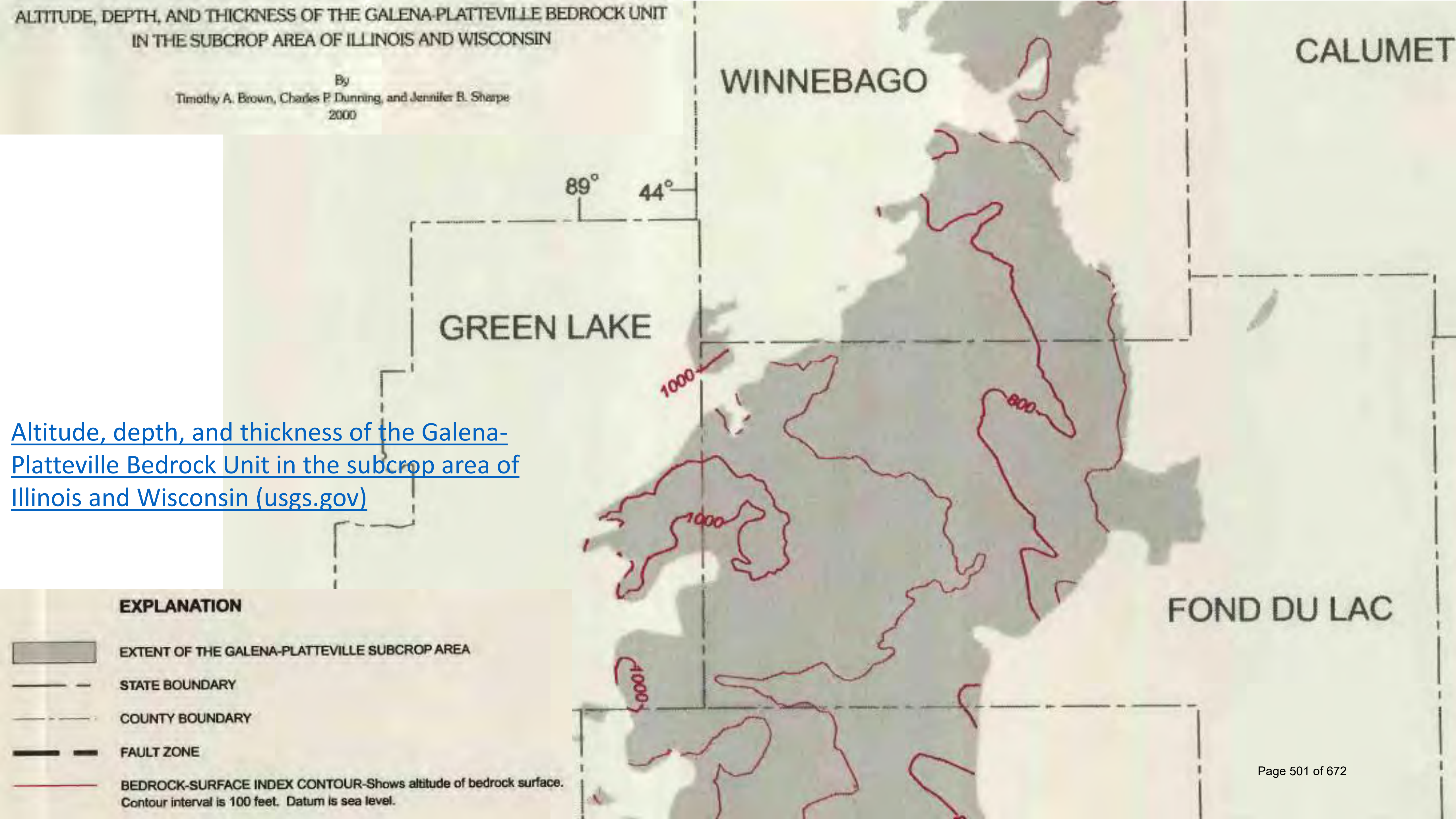
Till. Brown to reddish-brown, gravelly, clayey, silty sand deposited by the Green Bay Lobe; generally at least 3 m thick; includes many small to large inclusions of windblown sediment, hillslope sediment, and glacial lake sediment that could not be mapped separately. In some areas, the modern surface reflects the landscape that was present before the last part of the Wisconsin glaciation. Unit **ghh:** Mostly low-relief, nondescript, hummocky topography; includes many areas of enclosed depressions. Unit **ghr:** Generally rolling topography in areas lacking drumlins. Unit **ghs:** Rolling topography that was subglacially molded; contains streamlined landforms including drumlins and flutes; many drumlins in the western part of the study area are composed of stratified sand and gravel rather than till of the Horicon Member.

Bedrock

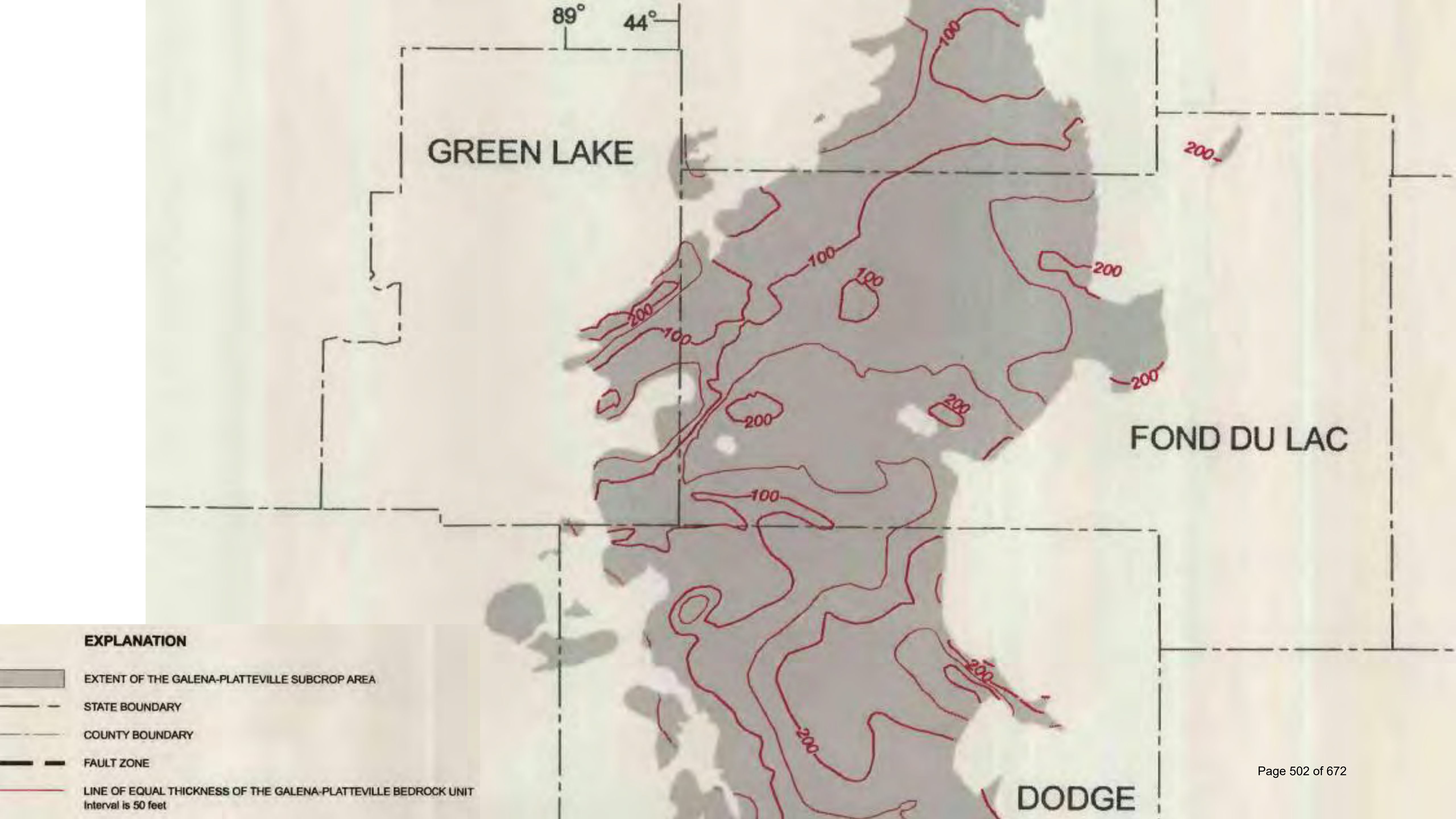
Bedrock. In glaciated areas, includes dolomite, sandstone, quartzite, rhyolite, or granite; in the Driftless Area, includes Paleozoic limestone and sandstone. Glacially scoured bedrock is covered by less than 2 m of sediment (sandy till of the Holy Hill Formation or windblown sediment), which is too thin to map.

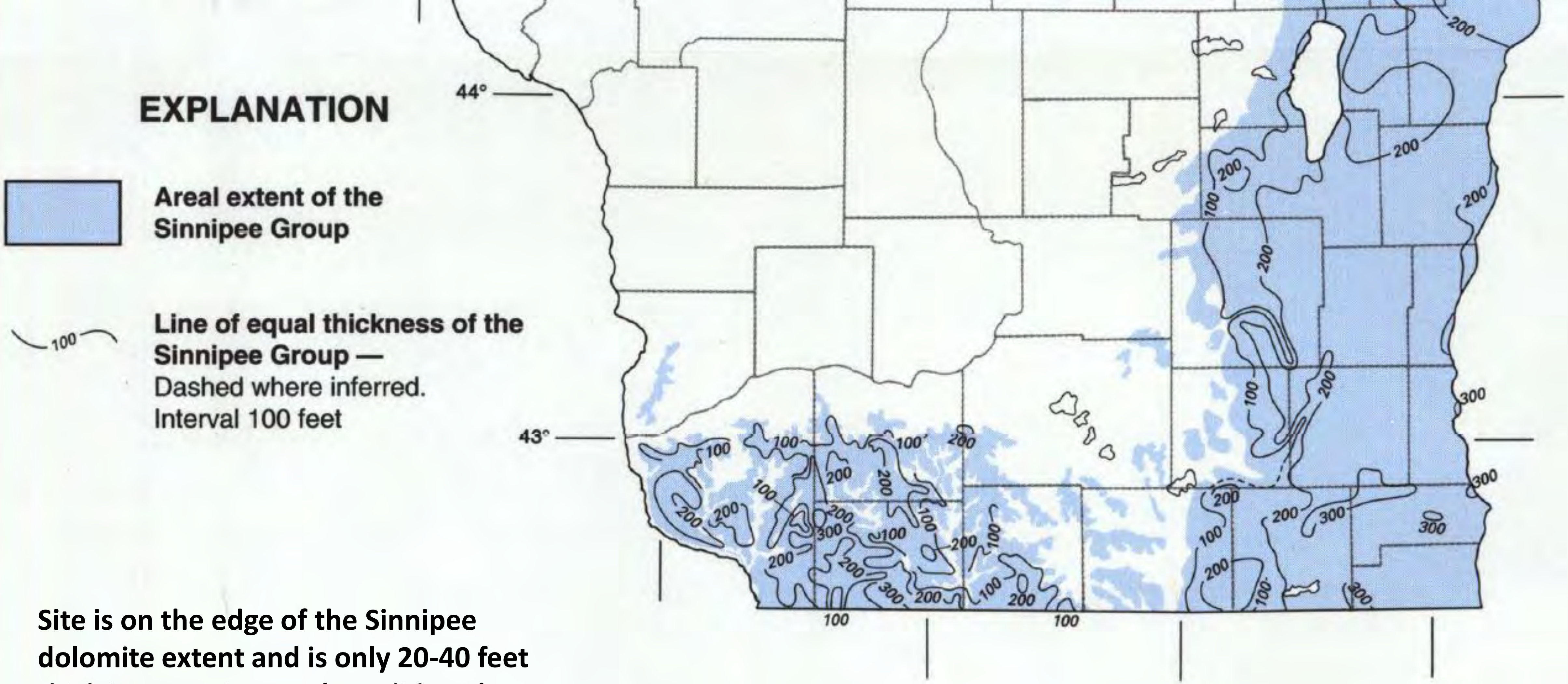
Plate 2: Paleogeologic Map of the Pre-St. Peter Sandstone Surface in Southern and Eastern Wisconsin & Thickness Map of the St. Peter Sandstone in Southern and Eastern Wisconsin





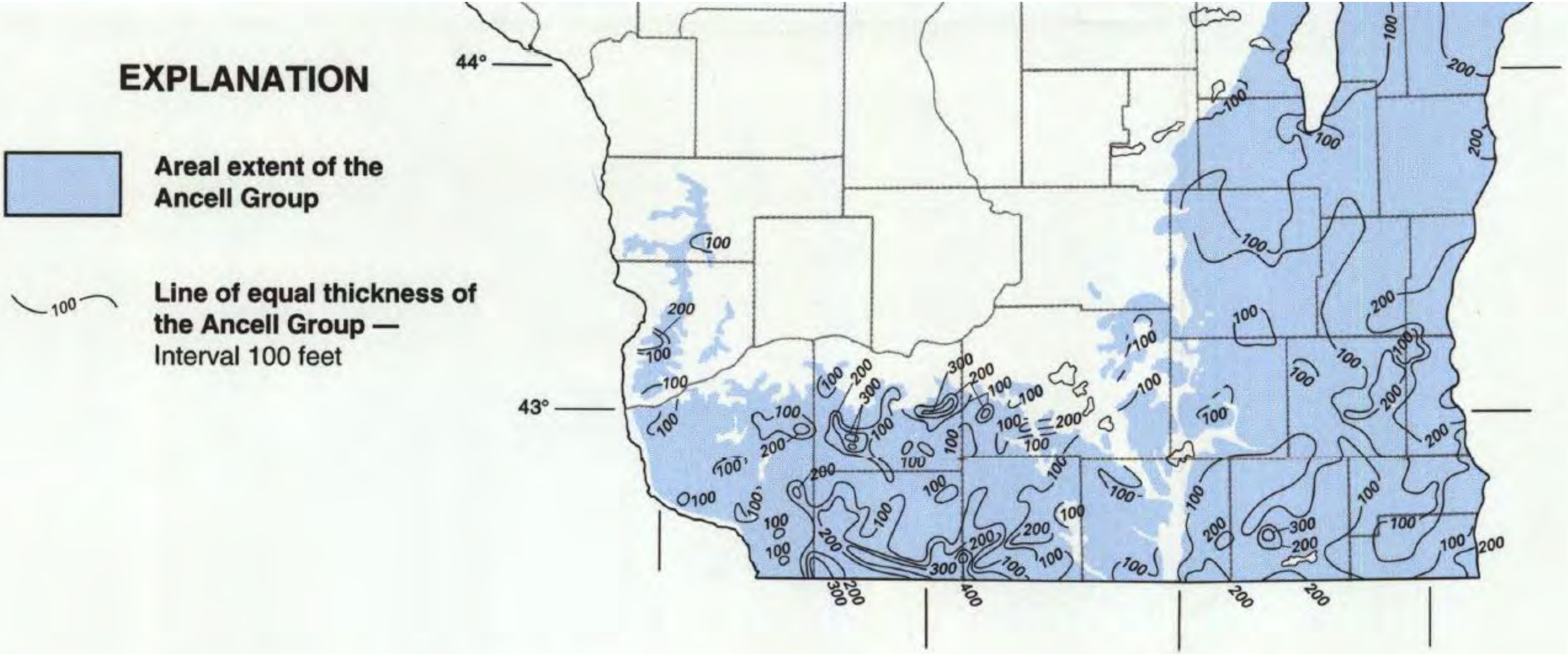
[Altitude, depth, and thickness of the Galena-Platteville Bedrock Unit in the subcrop area of Illinois and Wisconsin (usgs.gov)]


89°
44°
GREEN LAKE
FOND DU LAC
DODGE
100
200
EXPLANATION
EXTENT OF THE GALENA-PLATTEVILLE SUBCROP AREA
STATE BOUNDARY
COUNTY BOUNDARY
FAULT ZONE
LINE OF EQUAL THICKNESS OF THE GALENA-PLATTEVILLE BEDROCK UNIT
Interval is 50 feet

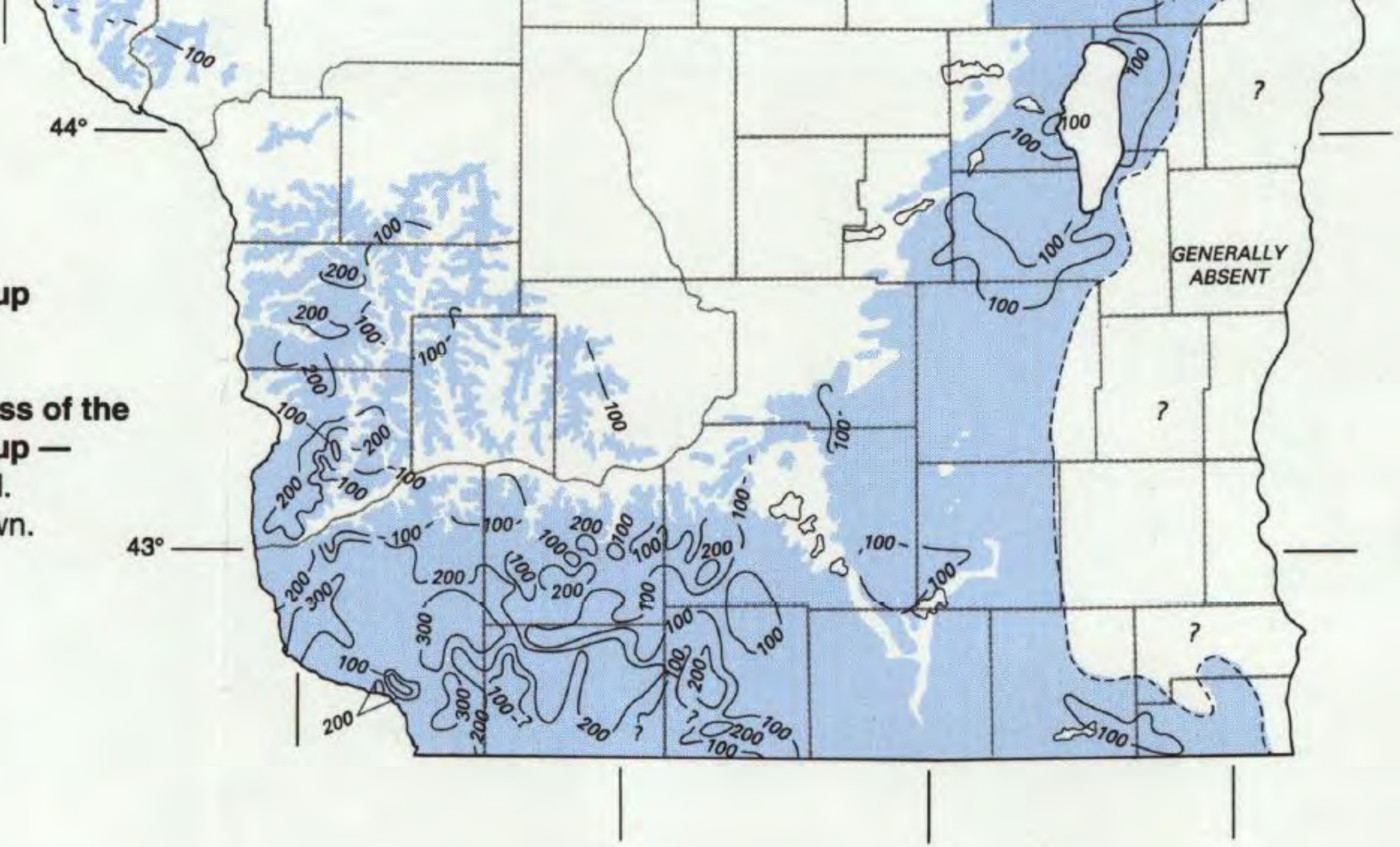


Site is on the edge of the Sinnipee dolomite extent and is only 20-40 feet thick in WCRS in area (see slide 13)

THICKNESS OF THE SINNIPEE GROUP



THICKNESS OF THE ANCELL GROUP



EXPLANATION

Areal extent of the Prairie du Chien Group

Line of equal thickness of the Prairie du Chien Group — Dashed where inferred. Queried where unknown. Interval 100 feet

THICKNESS OF THE PRAIRIE DU CHIEN GROUP


Prairie du Chien Group
Detailed description
Dolomite with some sandstone and shale; includes Shakopee and Oneota Formations
Prairie du Chien Group
Detailed description
Dolomite with some sandstone and shale; includes Shakopee and Oneota Formations
Extreme Transport
Ancell Group
Detailed description
Orthoquartzitic sandstone with minor limestone, shale and conglomerate; includes Glenwood and St. Peter Formations
Cambrian, undivided
Detailed description
Sandstone with some dolomite and shale, undivided; includes Trempealeau, Tunnel City, and Elk Mound Formations
Sinnipee Group
Detailed description
Dolomite with some limestone and shale; includes Galena, Decorah, and Platteville Formations
K
K
A

Well Construction Report For WISCONSIN UNIQUE WELL NUMBER SQ446

State of WI - Private Water Systems - DG/2
Department of Natural Resources, Box 7921
Madison, WI 53707
Please type or Print using a black Pen
Please Use Decimals Instead of Fractions

Form 3300-77A (R 8/00)

Ele 984'

Property Owner: MACHKOVICH, STEVE
Telephone Number: –
Mailing Address: W235 PRAIRIE RD
City: RIPON State: WI Zip Code: 54971
County of Well Location: Green Lake
County Well Permit No.: W
Well Completion Date: 08/20/2004

Well Constructor (Business Name): DANIEL J STEFFES
License #: 6109
Facility ID Number (Public Wells)
Address: BADGER WELL DRLG
Public Well Plan Approval #: W–24131
City: FOND DU LAC State: WI Zip Code: 54935
Date of Approval (mm/dd/yyyy): 07/07/2004
Hicap Permanent well #: 67459
Common Well #: 2
Specific Capacity: 2.7 gpm/ft

1. Well Location: [X] Town [ ] City [ ] Village of BROOKLYN
Fire # (if available)
Grid or Street Address or Road Name and Number
Subdivision Name Lot # Block #
Gov't Lot # or NE 1/4 of NE 1/4 of Section 36 T 16 N; R13 [X] E [ ] W
Latitude Deg. Min.
Longitude Deg. Min.
Lat/Long Method: GPS008

2. Well Type: [X] New [ ] Replacement [ ] Reconstruction
of previous unique well # constructed in
Reason for replaced or Reconstructed Well?
[X] Drilled [ ] Driven Point [ ] Jetted [ ] Other

3. Well serves # of homes and or IRRIGATION (e.g. barn, restaurant, church, school, industry, etc.)
High capacity Well? [X] Yes [ ] No
Property? [X] Yes [ ] No

4. Is the well located upslope or sideslope and not downslope from any contamination source, including those on neighboring properties? [X] Yes [ ] No
Well located within 1,200 feet of a quarry? [ ] Yes [ ] No If yes, distance in feet from quarry:
Well located in floodplain? [ ] Yes [X] No
Distance in Feet from Well to Nearest:

1. Landfill
2. Building Overhang
3. Septic [ ] Holding Tank [ ]
4. Sewage Absorption Unit
5. Nonconforming Pit
6. Buried Home Heating Oil Tank
7. Buried Petroleum Tank
8. Shoreline [ ] Swimming Pool [ ]
9. Downspout/Yard Hydrant
10. Privy
11. Foundation Drain to Clearwater
12. Foundation Drain to Sewer
13. Building Drain [ ] Cast Iron or Plastic [ ] Other
14. Building Sewer [ ] Gravity [ ] Pressure [ ] Cast Iron or Plastic [ ] Other
15. Collector or Street Sewer: [ ] Sanitary units in. diam. [ ] Storm [ ] =<6 [ ] >6
16. Clearwater Sump
17. Wastewater Sump
18. Paved Animal Barn Pen
19. Animal Yard or Shelter
20. Silo
21. Barn Gutter
22. Manure Pipe [ ] Gravity [ ] Pressure [ ] Cast Iron or Plastic [ ] Other
23. Other Manure Storage
24. Ditch
25. Other NR 812 Waste Storage

5. Drillhole Dimensions and Construction Method

Dia (in)	From (ft.)	To (ft.)
16	0	62
12	62	465

Upper Enlarged Drillhole / Lower Open Bedrock:
[X] 1. Rotary - Mud Circulation [ ]
[ ] 2. Rotary - Air [ ]
[ ] 3. Rotary - Air and Foam [ ]
[ ] 4. Drill-Through Casing Hammer
[ ] 5. Reverse Rotary
[ ] 6. Cable-tool Bit in. dia. [ ]
[ ] 7. Dual Rotary [ ]
[ ] 8. Temp. Outer Casing in. dia. depth (ft)
Removed? [ ] Yes [ ] No
If no, why not?

8. Geology

	Type, Caving/Noncaving, Color, Hardness, etc.	From (ft.)	To (ft.)
K-I-	BLACK DIRT	0	3
–YP	HARDPAN STONES SAND	3	34
–L-	LIMESTONE	34	87
–N-	SANDSTONE	87	115
–NL	SANDSTONE LIMESTONE	115	197
–N-	SANDSTONE	197	465

6. Casing, Liner, Screen

Dia. (in.)	Material, Weight, Specification	From (ft.)	To (ft.)
12	ASTM A53B IPSCO PARAGON 12.750 X .375 EL 21 PLAIN END	0	62

Dia. (in.) Screen type, material & slot size

9. Static Water Level: ft. above ground surface; 38 ft. below ground surface
10. Pump Test: Pumping Level 225 ft. below surface; Pumping at 500 GPM for 1 hours
11. Well is: [X] Above Grade 24 in. [ ] Below Grade
Developed? [X] Yes [ ] No
Disinfected? [X] Yes [ ] No
Capped? [X] Yes [ ] No

7. Grout or Other Sealing Material. Method

Method: TREMIE PIPE PUMPED / Kind of Sealing Material	From (ft.)	To (ft.)	# Sacks Cement
NEAT CEMENT GROUT	0	62	45

12. Did you notify the owner of the need to permanently abandon and fill all unused wells on this property? [ ] Yes [ ] No If no, explain:
13. Signature of the Well Constructor or Supervisory Driller: DJS Date signed: 08/20/2004
Signature of Drill Rig Operator (Mandatory unless same as above) Date signed

Make additional comments on reverse side about geology, additional screens, water quality, etc. Variance issued [ ] Yes [X] No

This well is a mile and a half NE of the spring. The water quality is on the right.

Wisconsin Department of Natural Resources
Laboratory Report

09/24/2012 Lab: 113133790 Sample: IX007160 Page 1 of 2

Laboratory: Wisconsin State Laboratory of Hygiene
2601 Agriculture Dr
Madison WI 53718
Phone: 800-442-4618 Fax Phone: 608-224-6213
DNR ID 113133790

Sample:

Field #:
Collection Start: 09/12/2012 12:00 am
Collected by: PATRICK GORSKI
ID #: SQ446
County: Green Lake
Sample Location: TOWN OF BROOKLYN (SEC 36 NE:1/4 NE:1/4 T16N R13E)
Sample Description: IRRIGATION WELL # SQ446
Sample Source: Private (other)
Date Reported:
Project No:
Sample #: IX007160
Collection End:
Waterbody/Outfall Id:
ID Point #:
Account #: PP010
Sample Depth:
Sample Status: PARTIAL
Sample Reason: Investigation

Analyses and Results:

Analysis Method: DIG, ICP, PRIVATE (SW846 3005A) Analysis Date: 09/17/2012 Lab Comment:

Code	Description	Result	Units	LOD	Report Limit	LOQ
99404	DIG TOTAL REC SW846 3005A	COMPLETE				

Analysis Method: METALS PANEL, TOTAL REC, ICP (EPA 200.7) Analysis Date: 09/18/2012 Lab Comment: NO CHARGE

Code	Description	Result	Units	LOD	Report Limit	LOQ
1104	ALUMINUM,TOTAL RECOVERABLE	16700.	UG/L	3		10
978	ARSENIC TOTAL RECOVERABLE	2310.	UG/L	5		16
1113	CADMIUM TOTAL RECOVERABLE	64.	UG/L	0.5		1.6
918	CALCIUM TOTAL RECOVERABLE	142.	MG/L	0.1		0.3
1118	CHROMIUM TOTAL RECOVERABLE	197.	UG/L	1		3
979	COBALT TOTAL RECOVERABLE	2160.	UG/L	1		3
1119	COPPER TOT REC	9830.	UG/L	2		6
899	HARDNESS TOTAL RECOVERABLE CALCULATION	534.	MG/L	1.4		4.6
980	IRON TOTAL RECOVERABLE	426.	MG/L	0.1		0.3
1114	LEAD TOTAL REC	82.	UG/L	3		10
921	MAGNESIUM TOTAL RECOVERABLE	43.7	MG/L	0.1		0.3
1123	MANGANESE ICP TOTAL RECOVERABLE	1720.	UG/L	1		3.0
1074	NICKEL ICP TOTAL RECOVERABLE	4310.	UG/L	1		3

With only 106 hours of pumping the water stripped all the galvanizing off the brand-new center pivot irrigation equipment. This was caused by sulfide s in the Platteville and St Peter being oxidized as acid mine drainage reaction.


Just below red line you can see where the irrigation
water had stunted the growth of the soybeans

First Water Quality Test For
WISCONSIN UNIQUE WELL NUMBER AT 573

State of Wisconsin
Department of Natural Resources
Private Water Supply — W8/2
Box 7921
Madison, WI 53707

AUG 17 1988

Property Owner: Ron Wahoske — Telephone Number: (414) 748-6175
Mailing Address: Brooklyn G
City: Ripon — State: Wi — Zip Code: 54971
County: Green Lake — County Well Location Permit No.: W — Well Completion Date: 7-9-88 (M M D D Y Y)

Well Constructor (Business Name): Zoellner Central Well Drilling — Registration #: 140
Address: P.O. Box 105
City: Brandon — State: Wi — Zip Code: 53919

2. Mark well location in correct 40-acre parcel of section. (N, S, E, W)

1. Location (Please type or print using a black pen.)
☒ Town ☐ City ☐ Village of Brooklyn — Fire # (if available)
Grid or Street Address or Road Name and Number (if available)
Subdivision Name — Lot # — Block #
Gov't Lot # ____ or SW ¼ of SE ¼ of Section 25; T 16 N; R 13 ☒ E ☐ W

3. Well Type ☒ New ☐ Replacement ☐ Reconstruction/Rehabilitation of well constructed in 19 ____.
Reason for new, reconstructed, replaced, or rehabilitated well? New Home
☒ Drilled ☐ Driven Point ☐ Jetted ☐ Other

4. Well serves 1 # of homes and/or ____ (ex: barn, restaurant, church, school, industry, etc.)
High Capacity Well? ☐ Yes ☒ No
High Capacity Property? ☐ Yes ☒ No

5. Well Located on Highest Point of Property, Consistent with the General Layout and Surroundings? ☒ Yes No
Well Located in Floodplain? ☐ Yes ☒ No
Distance In Feet From Well To Nearest:

____	1. Landfill	____	9. Downspout/Yard Hydrant	____	17. Wastewater Sump
15'	2. Building Overhang	____	10. Privy	____	18. Paved Animal Barn Pen
____	3. Septic or Holding Tank	____	11. Foundation Drain to Clearwater	____	19. Animal Yard or Shelter
____	4. Sewage Absorption Unit	____	12. Foundation Drain to Sewer	____	20. Silo — Type
____	5. Nonconforming Pit	____	13. Building Drain ☐ Cast Iron or Plastic ☐ Other	____	21. Barn Gutter
____	6. Buried Home Heating Oil Tank	____	14. Building Sewer ☐ Gravity ☐ Pressure ☐ Cast Iron or Plastic ☐ Other	____	22. Manure Pipe ☐ Gravity ☐ Pressure ☐ Cast Iron or Plastic ☐ Other
____	7. Buried Petroleum Tank	____	15. Collector Sewer	____	23. Other Manure Storage
____	8. Shoreline/Swimming Pool	____	16. Clearwater Sump	____	24. Other NR 112 Waste Source: Plumbing not Completed

6. Drillhole Dimensions

Dia. (in.)	From (ft.)	To (ft.)
8 3/4	surface	62
6	62	144

Method of constructing upper enlarged drillhole. (If applicable ✓ more than one.)
☒ 1. Rotary — Mud Circulation
☐ 2. Rotary — Air
☐ 3. Rotary — Foam
☐ 4. Reverse Rotary
☐ 5. Cable-tool Bit ____ in. dia.
☐ 6. Temp. Outer Casing ____ in. dia. Removed? ☐ Yes ☐ No If no, explain
☐ 7. Other

9. Geology

	Type, Caving/Noncaving, Color, Hardness, Etc.	From (ft.)	To (ft.)
C	Clay	surface	7
L	Limerock	7	38
N	Sandrock	38	144

7. Casing, Liner, Screen

Dia. (in.)	Material, Weight, Specification, Mfg. & Method of Assembly	From (ft.)	To (ft.)
6	New Black Steel 18.97# per ft. 1780 PSI ASTMA 53 Gr B P.E. Sumotomo	surface	62

Dia. (in.)	screen type and material	From	To

8. Grout or Other Sealing Material
Method: Pressure

Kind of Sealing Material	From (ft.)	To (ft.)	# Sacks Cement
Mud + Cuttings	surface	6	

10. Static Water Level
____ ft. above ground level
58 ft. below ground surface

11. Pump Test
Pumping Level 66 ft. below surface
Pumping at 15 GPM for 3 hours

12. Well Is: 12 in. ☒ Above ☐ Below Grade
Developed? ☒ Yes ☐ No
Disinfected? ☒ Yes ☐ No
Capped? ☒ Yes ☐ No

13. Were all unused, noncomplying, or unsafe wells properly filled with sealant? ☐ Yes ☐ No If no, explain N/A

14. Signature of Well Constructor: Larry L. Alager LJS — Date Signed: 7-11-88
Signature of Drill Rig Operator — Date Signed

WELL CONSTRUCTOR'S REPORT TO WISCONSIN STATE BOARD OF HEALTH

See Instructions on Reverse Side

RECEIVED JAN 31 1950 BUREAU SAN. ENG.

1. County: Green Lake — ☒ Town ☐ Village ☐ City (Check one and give name): Brooklyn
2. Location: NE NW N. E. of [illegible] Sec. 36 Township 16 north Range 13 E (Name of street and number of premise or Section, Town and Range numbers)
3. Owner ☒ or Agent ☐: August Quick (Name of individual, partnership or firm)
4. Mail Address: Ripon Route 2 (Complete address required)
5. From well to nearest: Building 35 ft; sewer 45 ft; drain 50 ft; septic tank 55 ft; dry well or filter bed 78 ft; abandoned well 200 ft.
6. Well is intended to supply water for: Home & Farm

7. DRILLHOLE:

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
8	0	75			
6	75	140			

10. FORMATIONS:

Kind	From (ft.)	To (ft.)
clay gravel	0	15
Limestone	15	55
Sand-stone	55	140

8. CASING AND LINER PIPE OR CURBING:

Dia. (in.)	Kind	From (ft.)	To (ft.)
6	Standard Weight steel pipe	0	75

9. GROUT:

Kind	From (ft.)	To (ft.)
Drill cuttings	0	18
cement	18	75

11. MISCELLANEOUS DATA:
Yield test: 1 Hrs. at 30 GPM.
Depth from surface to water-level: 52 ft.
Water-level when pumping: 55 ft.
Water sample was sent to the state laboratory at: Oshkosh (City) on Jan. 18 1950

Construction of the well was completed on: Dec. 29 1949
The well is terminated 8 inches ☒ above, below ☐ the permanent ground surface.
Was the well disinfected upon completion? Yes X No
Was the well sealed watertight upon completion? Yes X No

Signature: R. J. Schafer & Sons (Registered Well Driller) — Fremont Wis. (Complete Mail Address)

Please do not write in space below

Rec'd JAN 20 1950 No. 53505
Ans'd
Interpretation

	10 ml	10 ml	10 ml	10 ml	10 ml
Gas—24 hrs.	O	O	O	O	O
48 hrs.	O	O	O	O	O

Arsenic data from pump work samples October 2014 – 2021.

		# sample	detects	>10	>20	>50	>100	max	% Detect	% >10	%>20	% >50	% >100
Dane County	13	1139	325	52	35	12	5	737	28.5	4.6	3.1	1.1	0.4
Dodge County	14	534	277	67	44	26	19	1510	51.9	12.5	8.2	4.9	3.6
Door County	15	769	264	15	4	1		96.1	34.3	2.0	0.5	0.1	0.0
Douglas County	16	142	67					8.9	47.2				
Dunn County	17	526	104	13	7	2		95	19.8	2.5	1.3	0.4	
Eau Claire County	18	501	109	7	2			32.1	21.8	1.4	0.4		
Florence County	19	253	121	32	18	5	3	500	47.8	12.6	7.1	2.0	1.2
Fond du Lac County	20	840	355	85	59	38	19	435	42.3	10.1	7.0	4.5	2.3
Forest County	21	71	38	11	3	1		96.6	53.5	15.5	4.2	1.4	
Grant County	22	223	65	7	4	1		72.2	29.1	3.1	1.8	0.4	
Green County	23	433	212	55	33	17	7	474	49.0	12.7	7.6	3.9	1.6
Green Lake County	24	255	108	10	6	2	2	601	42.4	3.9	2.4	0.8	0.8
Iowa County	25	228	77	20	14	6	5	983	33.8	8.8	6.1	2.6	2.2
Iron County	26	35	17	1				14.4	48.6	2.9			
Jackson County	27	292	79	5	2			23.9	27.1	1.7	0.7		
Jefferson County	28	374	180	47	31	14	4	630	48.1	12.6	8.3	3.7	1.1
Juneau County	29	286	35	2	1			25	12.2	0.7	0.3		
Kenosha County	30	655	410	26	9	3	1	460	62.6	4.0	1.4	0.5	0.2
Kewaunee County	31	162	85	12	6	3		74.8	52.5	7.4	3.7	1.9	
La Crosse County	32	587	193	20	7	2		99	32.9	3.4	1.2	0.3	

A RECONNAISSANCE SURVEY OF WELLS IN EASTERN WISCONSIN FOR INDICATIONS OF MISSISSIPPI VALLEY TYPE MINERALIZATION

by

B. A. Brown and R. S. Maass

Winnebago Co.

Open File Report 92-3
31 p.

	Well #	T R.E. Sec	Minerals Geol	Formation	Depth	
	1	2	3	4	5	
1	Wi-1	20 17 20	Py Thwaites	Gal/Pv, P du C.	65-85, 175-195	1
2	Wi-9	20 17 21	Py "	"	110-115	2
3	Wi-18	20 17 2	Py "	Galena/Pv	45-55	3
4	Wi-25	20 16 23	" "	"	128-135	4
5	Wi-27	20 17 27	" "	P du C	237-260	5
6	Wi-31	18 16 24	" "	Platteville	125-150	6
7	Wi-48	17 16 15	" Ostrom	"	55-140	7
8	Wi-58	20 17 21	"/Chalco Thwaites	P du C	190-210	8
9	Wi-59	20 17 28	" "	"	175-230	9
10						10
11						11
12						12
13						13
14						14
15						15
16						16

Note: Trace amounts Pyrite reported in most wells which penetrated Galena/Platteville and Prairie du Chien

Fond du Lac Co.

	Well#	T	R.E.	Sec	Minerals	Geologist	Formation	depth	
	1	2			3		4	5	
1	FL-15	15	14	21	Py	Thwaites	PduC	110-170	1
2	FL-37	15	17	9	Py	"	Galena/Pville	200-220	2
3	FL-41	15	17	15	Py	"	"	190-250	3
4	FL-56	15	14	26	"	"	"	185-190	4
5	FL-275	16	18	17	"	"	"	~~[illegible]~~-320-325	5
6	Fl 311	15	17	17	"	Stevrwald	"	25-45, 130-145	6
7	Fl 332	15	16	19	"	"	"	100-110	7
8	FL 334	14	15	3	"	"	"	70-80, 195-205	8
9	FL-342	16	14	Ripon	"	Ostrom	"	50-60	9
10	FL-343	15	17	22	"	"	"	235-280	10
11	FL-347	15	17	16	"	"	"	60-105	11
12	FL-351	16	14	21	"	"	Gal/Pville & PduC	5-60 & 130-155	12
13	FL 352	14	15	31	"	"	Galena/Pville	55-80	13
14	FL 355	16	18	32	"	"	Little from Silurian Thru PduC		14
15	FL-373	14	16	14	"	warren	galena/Pville	125-200	15
16	FL-369	14	15	36	"	"	"	40-50	16
17									17
18									18
19									19
20									20
21									21
22									22

Note most wells penetrating Niagara, Maquoketa, Galena/Pville St Peter and Prairie du Chien report trace to minor pyrite no other sulfides noted

Green Lake County Spring #11

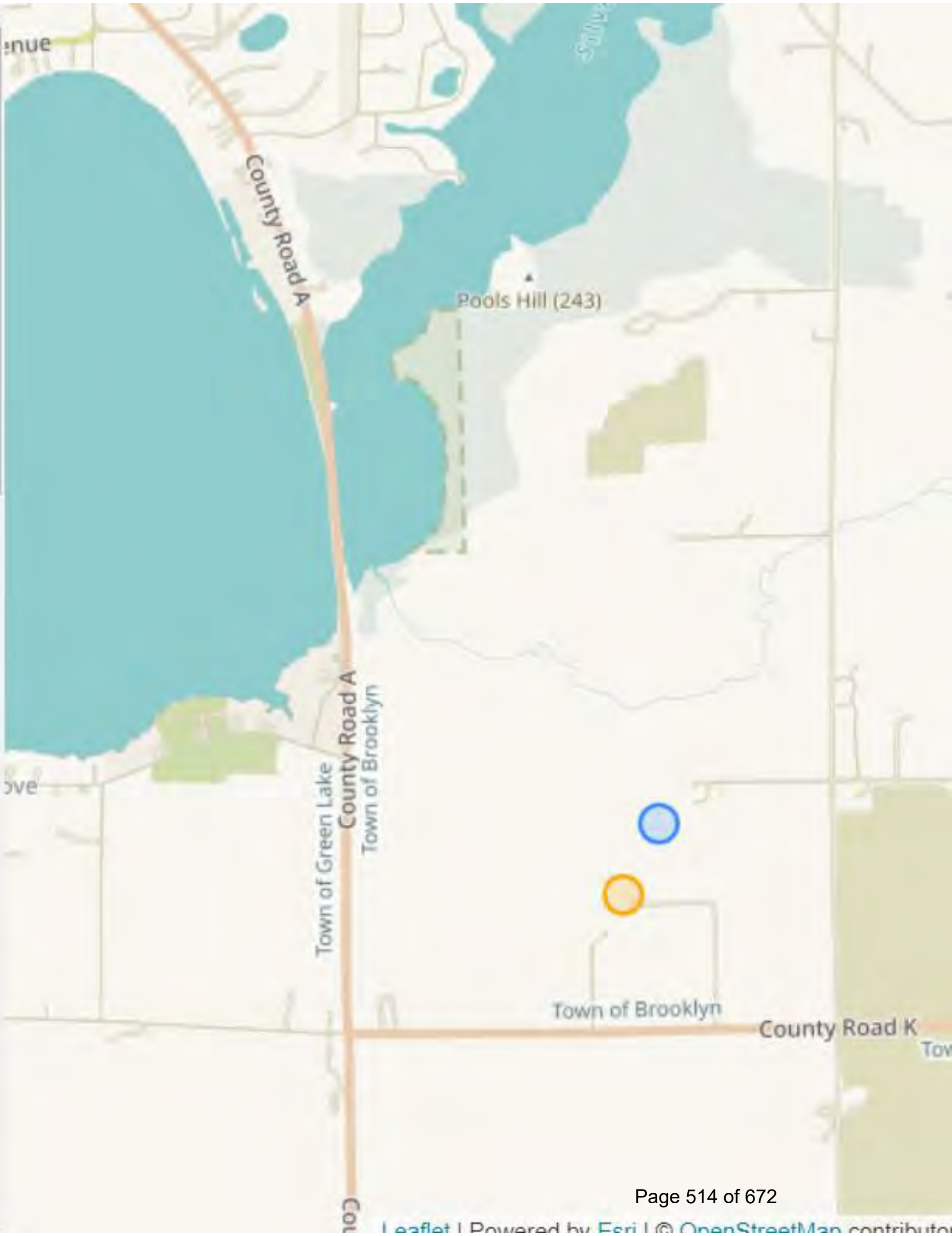
PP1

Spring orifice and back wall

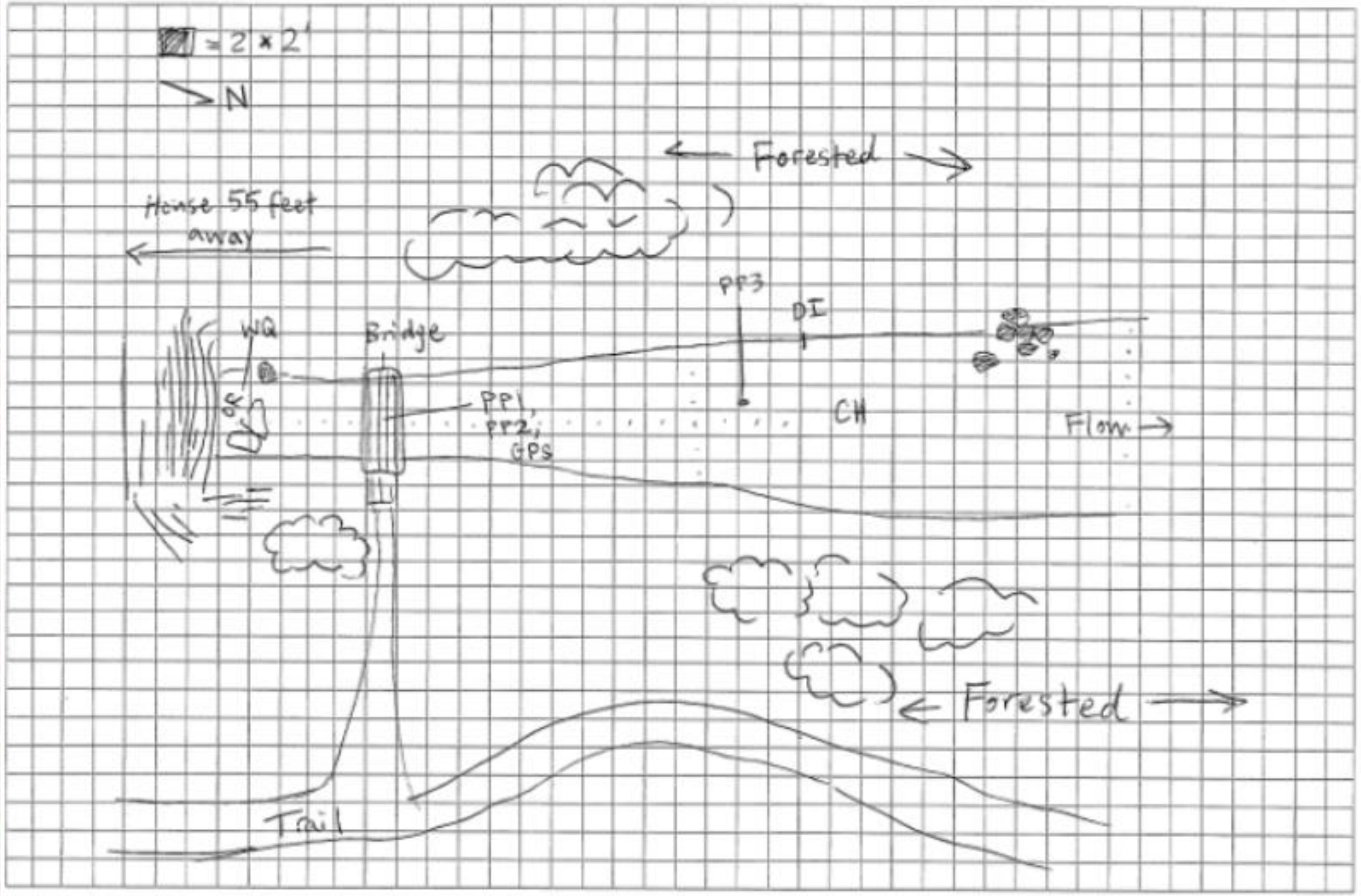
Site sketch map

Water quality

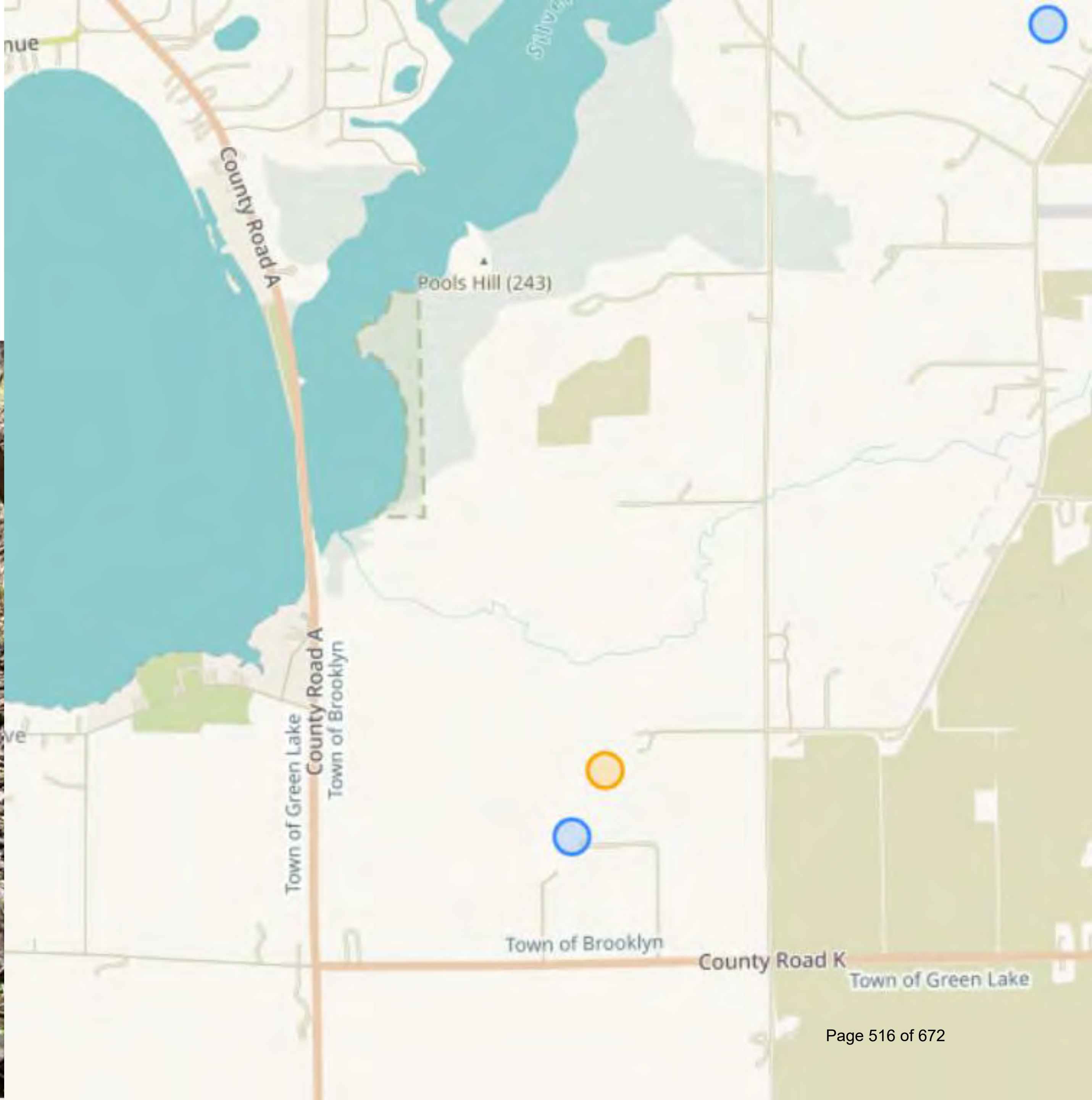
Discharge (ft^3/s): 3.414

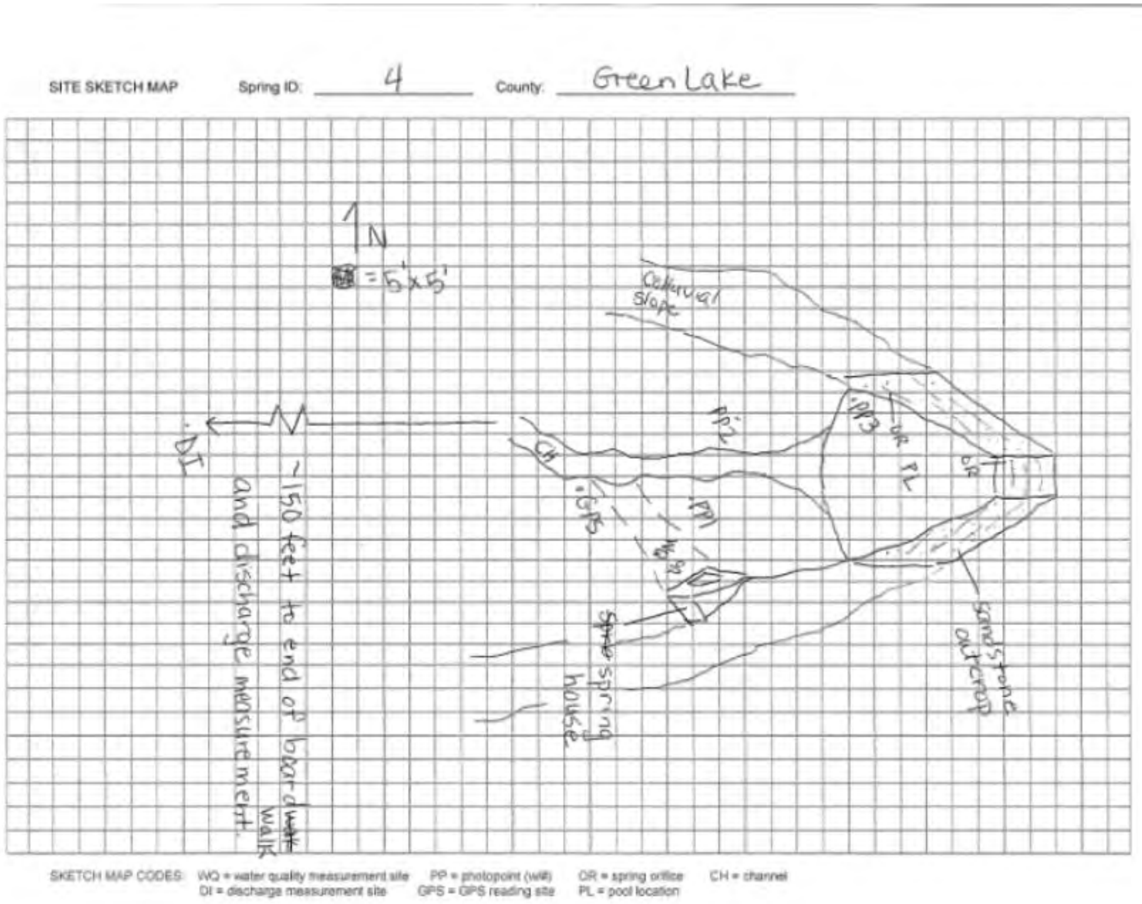


SITE SKETCH MAP Spring ID: 11 County: Green Lake

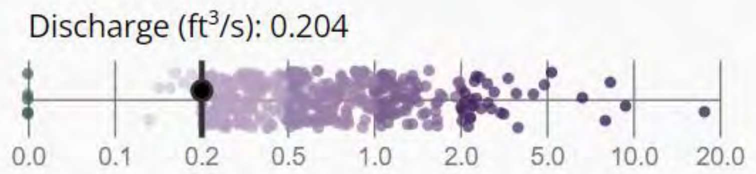


SKETCH MAP CODES: WQ = water quality measurement site PP = photopoint (w/#) OR = spring orifice CH = channel
DI = discharge measurement site GPS = GPS reading site PL = pool location


County Road A
Pools Hill (243)
County Road A
Town of Green Lake
Town of Brooklyn
Town of Brooklyn
County Road K
Town of Green Lake



SITE SKETCH MAP
Spring ID: 4
County: Green Lake
N
= 5'x5'
Colluvial slope
PP2
PP3
OR
PL
CH
GPS
PP1
DI
~150 feet to end of boardwalk and discharge measurement
spring house
sandstone outcrop
SKETCH MAP CODES: WQ = water quality measurement site PP = photopoint (will) OR = spring orifice CH = channel
DI = discharge measurement site GPS = GPS reading site PL = pool location



Discharge (ft^3/s): 0.204
0.0
0.1
0.2
0.5
1.0
2.0
5.0
10.0
20.0

Download

RE: Springs, Streamflow and Proposed Mine

Rosnow, Joseph J - DNR
To Freihoefer, Adam T - DNR
Cc Johnson, Dave M - DNR; Clayton, Nicole L - DNR

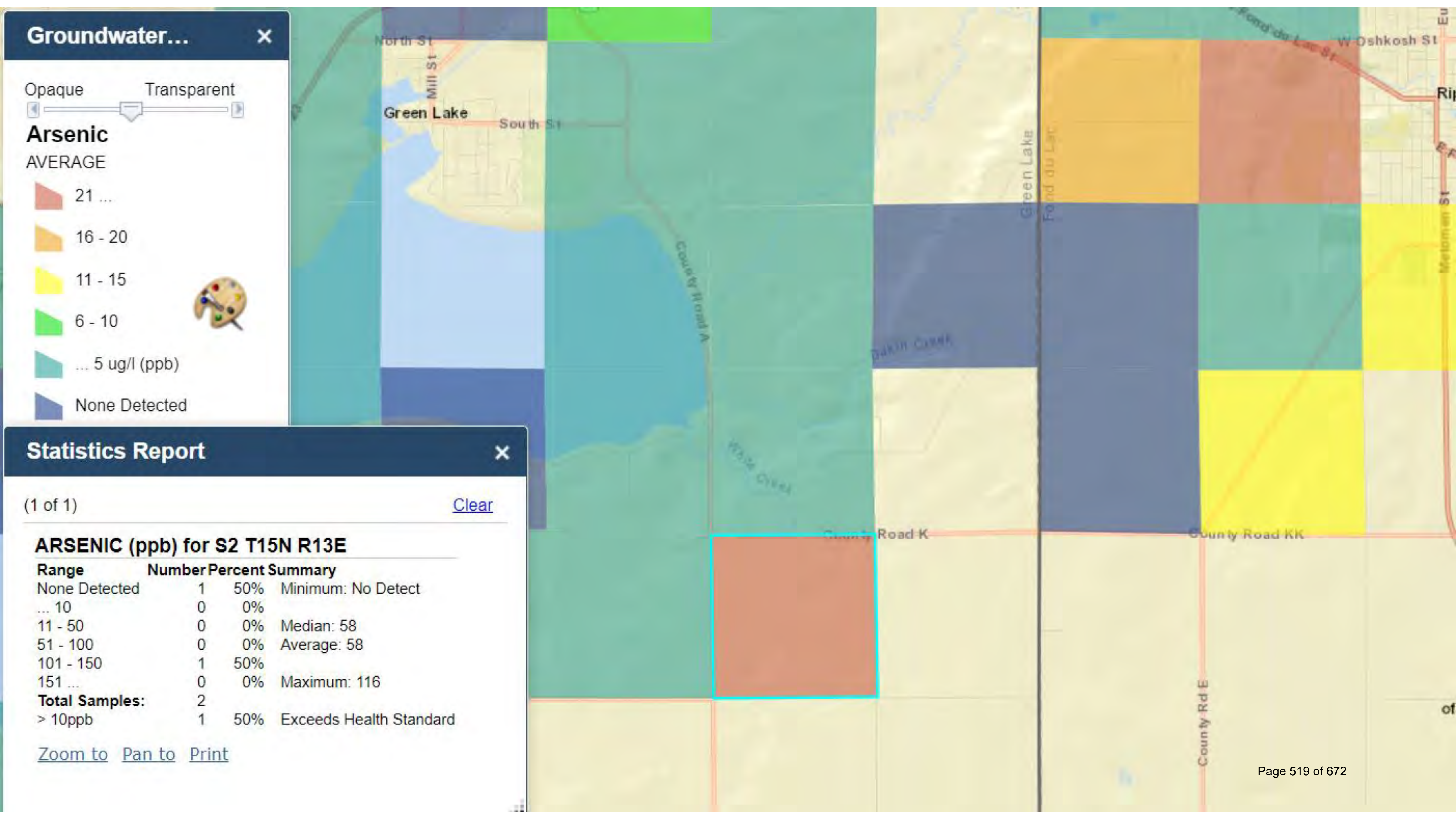
Reply | Reply All | Forward | ...

Tue 8/2/2022 10:57 AM

I visited all three spring in this area two years ago and two of them are quite unique in their biological, ecological and geological makeup. The headwater spring of White creek (>3 cfs) is the largest spring in the county and quite possibly all of East central Wisconsin. Please let me know what help I can be going forward, I do have the contact information for all three property owners.

Joe

Joseph J. Rosnow
Water Supply Specialist- Bureau of Environmental Management
Cell Phone: (608) 220-1226
Email: Joseph.Rosnow@Wisconsin.gov


Groundwater...
Opaque
Transparent
Arsenic
AVERAGE
21 ...
16 - 20
11 - 15
6 - 10
... 5 ug/l (ppb)
None Detected
Statistics Report
(1 of 1)
Clear
ARSENIC (ppb) for S2 T15N R13E
Range Number Percent Summary
None Detected 1 50% Minimum: No Detect
... 10 0 0%
11 - 50 0 0% Median: 58
51 - 100 0 0% Average: 58
101 - 150 1 50%
151 ... 0 0% Maximum: 116
Total Samples: 2
> 10ppb 1 50% Exceeds Health Standard
Zoom to Pan to Print
North St
Mill St
Green Lake
South St
County Road A
White Creek
Dakin Creek
Green Lake
Fond du Lac
W Oshkosh St
County Road K
County Road KK
County Rd E

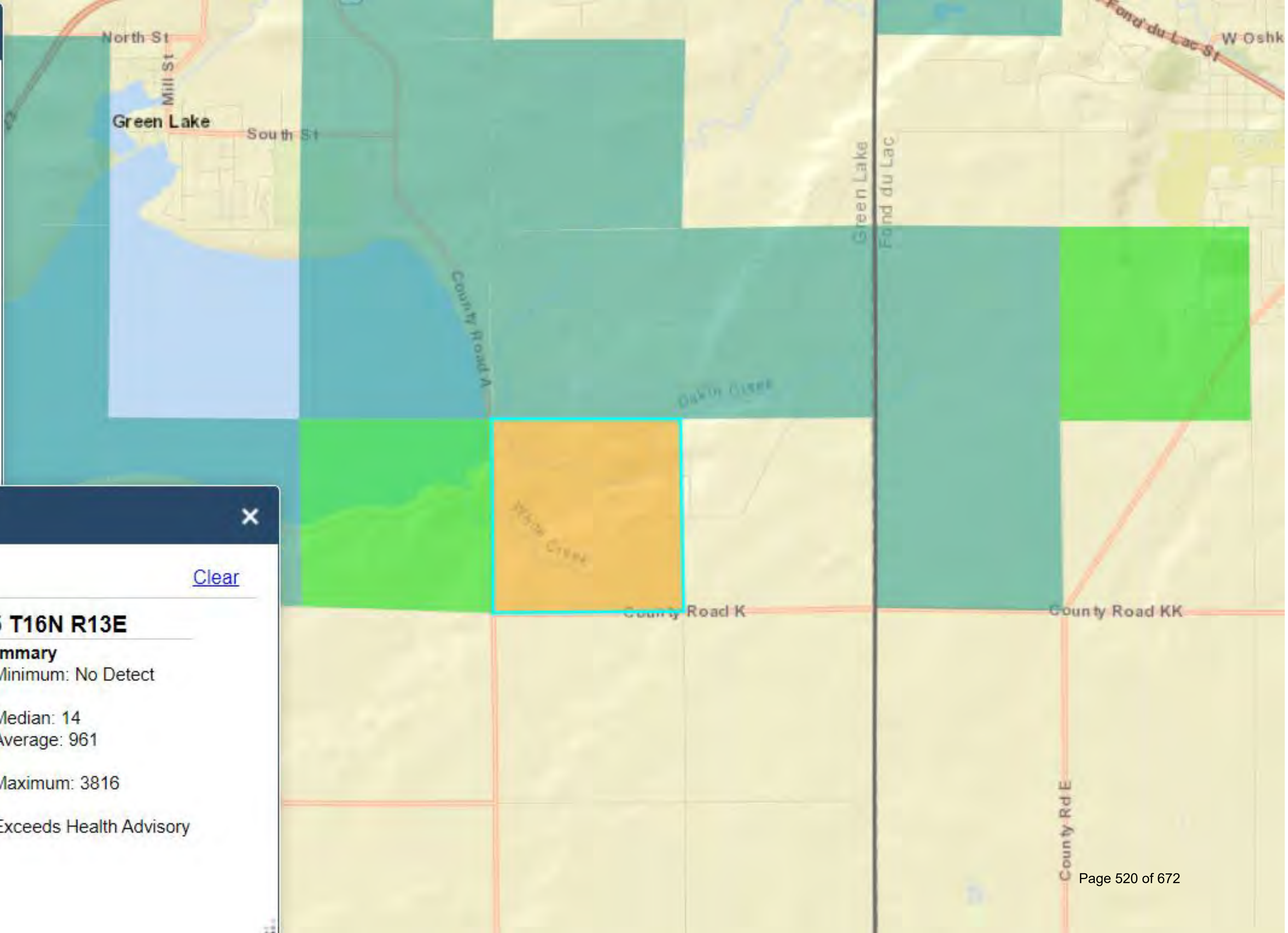
Groundwater...

Opaque Transparent

Manganese

AVERAGE

- 1001 ...
- 501 - 1000
- 301 - 500
- 51 - 300
- ... 50 ug/l (ppb)
- None Detected



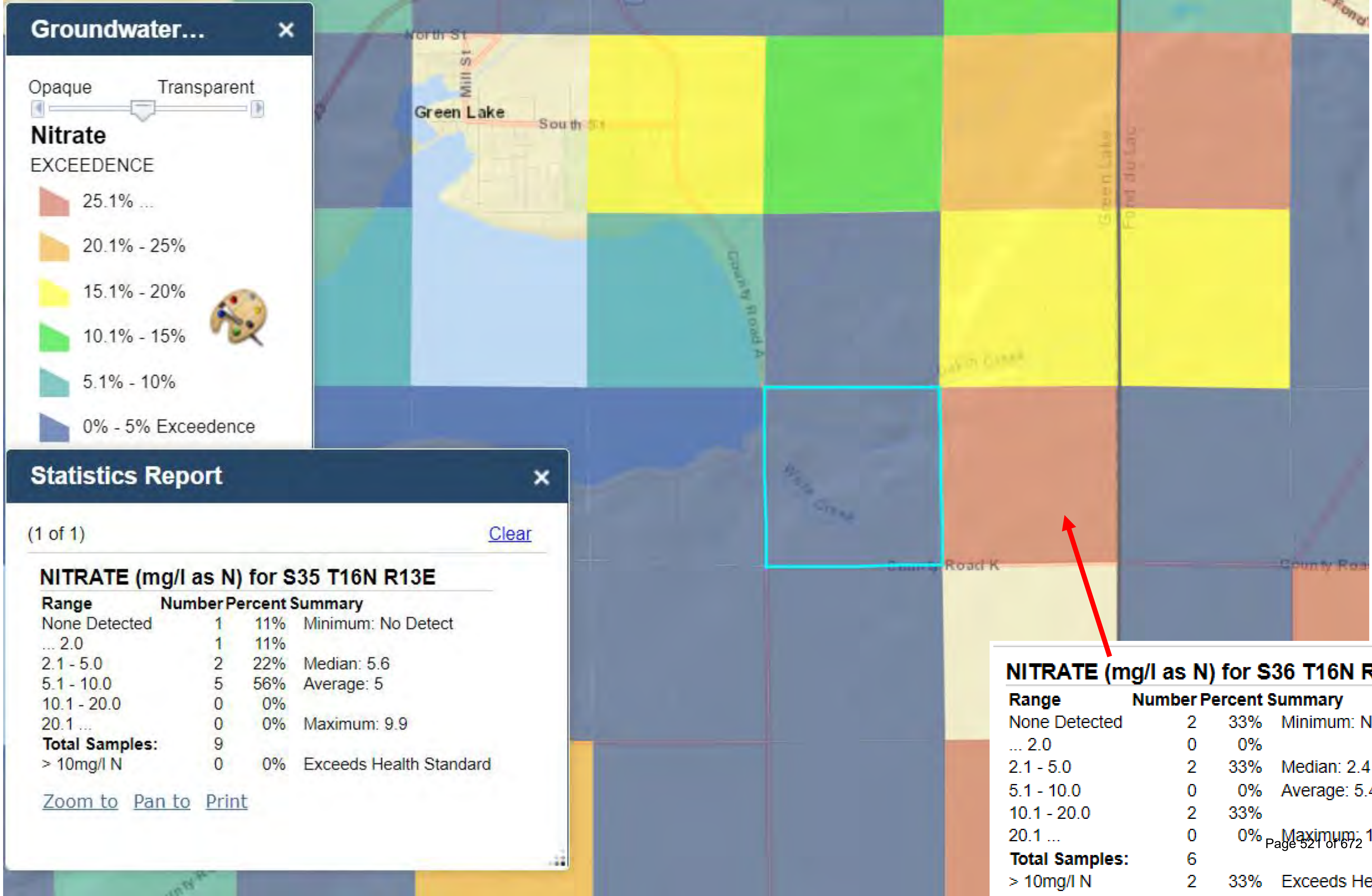
Statistics Report

(1 of 1) Clear

MANGANESE (ppb) for S35 T16N R13E

Range	Number	Percent	Summary
None Detected	1	25%	Minimum: No Detect
... 50	2	50%	
51 - 300	0	0%	Median: 14
301 - 500	0	0%	Average: 961
501 - 1000	0	0%	
1001 ...	1	25%	Maximum: 3816
Total Samples:	4		
> 300ppb	1	25%	Exceeds Health Advisory

Zoom to Pan to Print



Groundwater...

Opaque Transparent

Nitrate

EXCEEDENCE

- 25.1% ...
- 20.1% - 25%
- 15.1% - 20%
- 10.1% - 15%
- 5.1% - 10%
- 0% - 5% Exceedence

Statistics Report

(1 of 1) Clear

NITRATE (mg/l as N) for S35 T16N R13E

Range	Number	Percent	Summary
None Detected	1	11%	Minimum: No Detect
... 2.0	1	11%	
2.1 - 5.0	2	22%	Median: 5.6
5.1 - 10.0	5	56%	Average: 5
10.1 - 20.0	0	0%	
20.1 ...	0	0%	Maximum: 9.9
Total Samples:	9		
> 10mg/l N	0	0%	Exceeds Health Standard

Zoom to Pan to Print

NITRATE (mg/l as N) for S36 T16N R13E

Range	Number	Percent	Summary
None Detected	2	33%	Minimum: No Detect
... 2.0	0	0%	
2.1 - 5.0	2	33%	Median: 2.4
5.1 - 10.0	0	0%	Average: 5.4
10.1 - 20.0	2	33%	
20.1 ...	0	0%	Maximum: 16
Total Samples:	6		
> 10mg/l N	2	33%	Exceeds Health Standard

In reviewing a high capacity well application, the Department will consider on a case-by-case basis whether:

- A proposed high capacity well falls within a groundwater protection area [Wis. Stat. §§ 281.34(4)(a)1. and (5)(b); Wis. Admin. Code § NR 820.30]
- A proposed high capacity well results in > 95% water loss [Wis. Stat. §§ 281.34(4)(a)2. and (5)(c); Wis. Admin. Code § NR 820.32]
- A proposed well's construction degrades safe drinking water, degrades the groundwater resource or impacts public safety [Wis. Admin. Code § NR 812.09(4)]
- A proposed high capacity well, when combined with existing wells, will result in a significant environmental impact to a > 1 cfs spring [Wis. Stat. §§ 281.34(4)(a)3. and (5)(c); Wis. Admin. Code § NR 820.31; *See Lake Beulah*, 2011 WI 54, ¶¶ 39, 44-46, 62-63]
- A proposed high capacity well, when combined with existing wells, will result in a significant adverse environmental impact to a navigable water [Wis. Stat. §§ 281.11, 281.12, 281.34(2); *See Lake Beulah*, 2011 WI 54, ¶¶ 30-34, 39, 44-46, 62-63]
- A proposed high capacity well, when combined with existing wells, impairs a public water system. [Wis. Stat. §§ 281.11, 281.12, 281.34(5)(a); See Lake Beulah, 2011 WI 54, ¶¶ 39, 44-46, 62-63]

If any of these conditions is met in a particular case, the Department may consider adding specific conditions in the high capacity well approval, such as conditions addressing location, construction, pumping capacity, rate of flow, or amount of water that may be withdrawn. [Wis. Stat. §§ 281.11, 281.12, 281.34(2), (5)(a)-(d); Wis. Adm. Code § NR 812.09(4) and ch. NR 820; *Lake Beulah*, 2011 WI 54, ¶¶ 4, 39, 63]. If the Department conditions or denies a well approval, it will provide the applicant with a technical analysis of the scientific evidence it considered when it issued its decision on the application.

A description [PDF] of the Department's high capacity well application review process is available.

1. High Capacity Well Application Received by DNR

2. Potential Environmental Impacts

Does the Proposed High Capacity Well:

- ✓ fall within a Groundwater Protection Area ?
  (Within 1,200 feet to trout stream, outstanding or exceptional resource water body)
- ✓ result in 95% Water Loss?
- ✓ impact groundwater quality?

Do the Proposed High Capacity Well & Existing Wells :

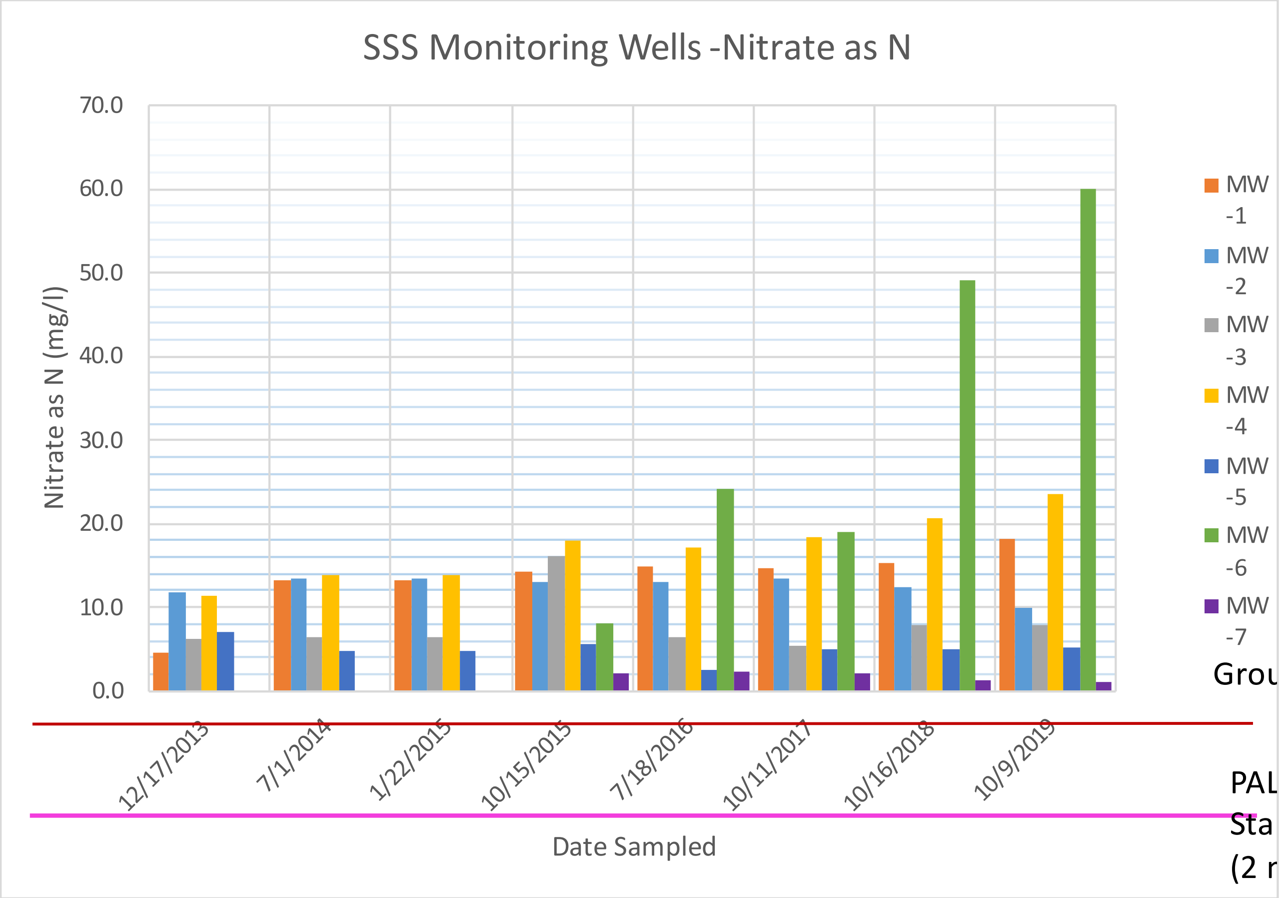
- ✓ impact a spring (> 1 cfs)?
- ✓ impact a navigable lake or stream?
- ✓ impact a municipal well?

Wis. Stat. 281.34, Admin. Code NR 812.09 & ch. NR 820

3. Potential Outcomes

- ✓ Approved as Submitted
- ✓ Approved with Conditions – Technical Support Document Provided to Applicant
- ✓ Denied-Technical Support Document Provided to Applicant

Nitrate is normally present in waters associated with mining as a result of blasting activities using ammonium nitrate or dynamite. [Remove Nitrogen in Mining Effluent Water (911metallurgist.com)]`



The graph on the left is from a Sand mine in western Wisconsin. The nitrate increased due to left over ammonium nitrate used in blasting. There are about 30 private wells downgradient of the site too. Blasting can also result in silt and rust in wells after the shot, as this is a common compliant, we receive.

State of Wisconsin
Department of Natural Resources
Box 450
Madison, Wisconsin 53701

DEC 30 1976

NOTE:
White Copy – Division's Copy
Green Copy – Driller's Copy
Yellow Copy – Owner's Copy

WELL CONSTRUCTOR'S REPORT
Form 3300–15
Rev. 10–75

1. COUNTY Green Lake
CHECK (✓) ONE: ☑ Town ☐ Village ☐ City
Name Brooklyn

2. LOCATION NW, NW ¼ Section SW | Section 36 | Township 16 N | Range 13 E
OR – Grid or Street No. Street Name Brooklyn
AND – If available subdivision name, lot & block No.

3. NAME ☑ OWNER ☐ AGENT AT TIME OF DRILLING CHECK (✓) ONE
Elmer Lefke
ADDRESS Green Lake
POST OFFICE Green Lake

4. Distance in feet from well to nearest: (Record answer in appropriate block)

Building	Sanitary Bldg. Drain C.I.	Sanitary Bldg. Drain Other	Sanitary Bldg. Sewer C.I.	Sanitary Bldg. Sewer Other	Floor Drain Connected To: C.I. Sewer	Floor Drain Connected To: Other Sewer	Storm Bldg. Drain C.I.	Storm Bldg. Drain Other	Storm Bldg. Sewer C.I.	Storm Bldg. Sewer Other
10										

Street Sewer San. / Storm; Other Sewers C.I. / Other; Foundation Drain Connected to Sewer / Clearwater Dr. / Sewage Sump / Clearwater Sump; Sewage Sump C.I. / Other; Clearwater Sump; Septic Tank 40; Holding Tank; Sewage Absorption Unit: Seepage Pit / Seepage Bed 60 / Seepage Trench

Privy; Pet Waste Pit; Pit: Nonconforming Existing – Well / Pump / Tank; Subsurface Pumproom Nonconforming Existing; Barn Gutter; Animal Barn Pen; Animal Yard; Silo With Pit; Glass Lined Storage Facility; Silo w/o Pit; Earthen Silage Storage Trench Or Pit

Temporary Manure Stack; Watertight Liquid Manure Tank; Solid Manure Storage Structure; Subsurface Gasoline or Oil Tank; Waste Pond or Land Disposal Unit (Specify Type); Other (Give Description)

5. Well is intended to supply water for: Home

6. DRILLHOLE

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
10	Surface	48			
6	48	142			

7. CASING, LINER, CURBING AND SCREEN

Dia. (in.)	Material, Weight, Specification & Method of Assembly	From (ft.)	To (ft.)
6	New Black P/Bond 18.97 – A53 ASTM VSP	Surface	48

8. GROUT OR OTHER SEALING MATERIAL

Kind	From (ft.)	To (ft.)
Slurry Cement	Surface	48

9. FORMATIONS

Kind	From (ft.)	To (ft.)
Sandy Clay	Surface	15
Limestone	15	100
Sandstone	100	142
Water Bearing		

10. TYPE OF DRILLING MACHINE USED
☐ Cable Tool ☐ Rotary-air w/drilling mud ☐ Rotary-w/drilling mud ☑ Rotary-hammer w/drilling mud & air ☐ Rotary-hammer & air ☐ Reverse Rotary ☐ Jetting with ☐ Air ☐ Water

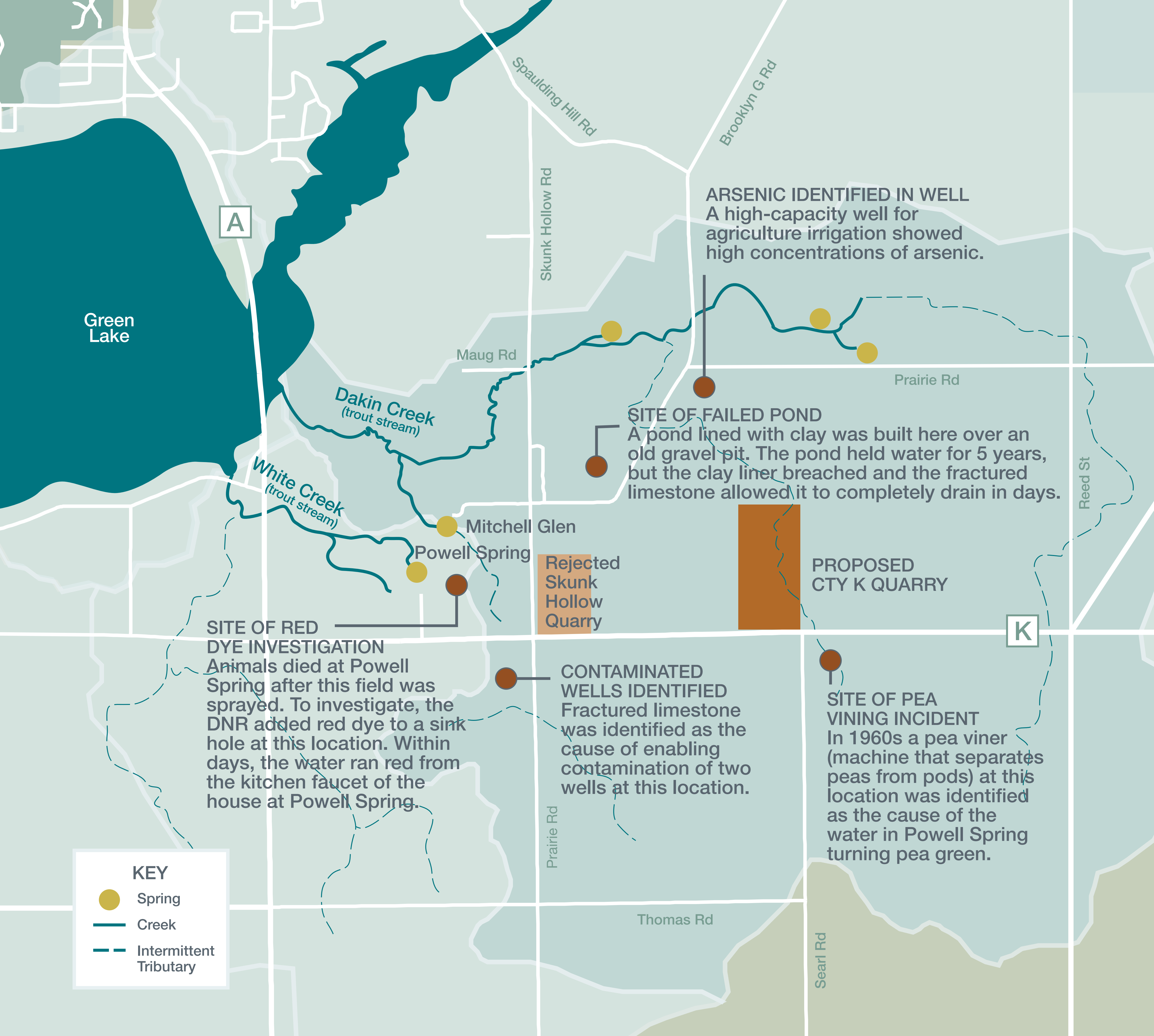
Well construction completed on Nov 29 1976
Well is terminated 16 inches ☑ above ☐ below final grade
Well disinfected upon completion ☑ Yes ☐ No
Well sealed watertight upon completion ☑ Yes ☐ No

11. MISCELLANEOUS DATA
Yield Test: 8 Hrs. at 10 GPM
Depth from surface to normal water level 26 Ft.
Depth of water level when pumping 28 Ft. Stabilized ☑ Yes ☐ No
Water sample sent to Oshkosh laboratory on Dec 7 1976

Your opinion concerning other pollution hazards, information concerning difficulties encountered, and data relating to nearby wells, screens, seals, method of finishing the well, amount of cement used in grouting, blasting, etc., should be given on reverse side.

Signature Wallace Clark Registered Well Driller
Complete Mail Address 5411 Ajon Rd. Osh R 3

This is the well on the property.



PROPOSED CTY K QUARRY

What happens here, doesn't stay here.

The area surrounding the proposed Cty K Quarry is comprised of fractured limestone. The horizontal fractures in the limestone allow water to move laterally. Within the watershed this means contaminated water could flow quickly and easily from the Cty K Quarry site.


Fractured limestone at the surface level.

The map on the left details historical events that illustrate the quick water movement within the fractured limestone beneath the surface. A quarry in the Dakin Creek Environmental Corridor threatens potential harm to this unique and fragile area surrounded by natural freshwater springs and DNR designated trout streams.

GREEN LAKE CONSERVANCY

Sent from my U.S.Cellular© Smartphone
Get Outlook for Android

From: Keith Graff <kgraff@ghoguc.com>
Sent: Wednesday, May 29, 2024 2:19:25 PM
To: cbuss@greenlakecountywi.govg <cbuss@greenlakecountywi.govg>; thom@greenlakecountywi.gov <thom@greenlakecountywi.gov>; nhoffman@greenlakecountywi.gov <nhoffman@greenlakecountywi.gov>; Boutwell, Bill <bboutwell@greenlakecountywi.gov>; Talma, Curtis <ctalma@greenlakecountywi.gov>; Reabe, Harley <hreabe@greenlakecountywi.gov>; Clerk <clerk@greenlakecountywi.gov>
Subject: County K Quarry Concerns

[CAUTION: EXTERNAL SENDER This email originated from outside Green Lake County. Do not click links or open attachments unless you recognize the sender and know the content is safe.]

To all concerned,

As a property owner on the north shore of BIG Green Lake I am writing with concerns surrounding the proposed County K Quarry and it's potential negative impact on residents, visitors, the lake and surrounding areas.

In 2022 an effort was made to approve a quarry project referred to as the "Skunk Hollow Mine". That effort was rejected as Kopplin and Kinas were unable to meet basic requirements protecting the area from a number of issues, most notably the health and safety of nearby occupants. The new quarry proposal sits on land less than a mile from the rejected Skunk Hollow site which begs the question, what makes this any different?

Recent soil testing near the proposed quarry site revealed high levels of arsenic and sulfide, that coupled with the potential for acid rock drainage during the mining process poses a major concern for contamination of the groundwater. Contamination to groundwater will most definitely cause a negative impact on streams, creeks and tributaries which feed into Big Green Lake which is already in endangered territory. Any additional, unnecessary negative impact to the lake will trickle down to decreased property values as well as the disaster it would mean for the local economy. Who knows what impact the groundwater contamination could have on the health of the residents in the surrounding areas, now and into the future?

The proposed quarry is likely to have a negative impact on the area zoned as farmland as well. Given the fact that approximately 1/3rd of Green Lake County land is currently unzoned, why are they not exploring these unzoned areas, safe distances from large bodies of water for their mining?

I'd like to request a written plan for the mitigation of the aforementioned issues, unfortunately I don't believe one exists as these hazards seem to be inherent to the process of mining.

I respectfully request that this communication be included in the board member packets for the 6/14/24 meeting.

Regards,

K. Graff

May 29, 2024

Michael Hawkes
N5663 Lac Verde Circle
Green Lake, WI

Green Lake County Land Use Planning and Zoning Committee
571 County Road A
Green Lake, WI

Dear Green Lake County Land Use Planning and Zoning Committee,

I am writing to express my opinion that the conditional use permit requested by Kopplin & Kinas for the planned County K Quarry should not be granted, due to a failure to meet the requirements for conditional use in the A-1 zoning district.

The criteria for issuing a conditional use permit for nonmetallic mining in a farmland preservation district require that the applicant prove that (1) the conditional use will "**not change the essential character of the same area"** (per criterion (b)), and (2) the operation and its location in the farmland preservation district **"is reasonable and appropriate, considering alternative locations outside the farmland preservation district"** (criterion (h)). On its face, the application does not meet either of these legal requirements for the county to grant a conditional use permit under the terms of the applicable zoning laws.

A mine is obviously a substantially different use than farming; there is little activity that changes the character of farmland more than digging out all the land to a depth of seventy feet. The substrate used to replace the removed material during the reclamation phase will additionally have entirely different properties than the material removed, particularly as the Kopplin & Kinas plan describes the use of fill materials obtained from other projects. The mineral composition, water retention, nutrient content, and soil makeup will irrevocably be altered, even with the stated intent to replace the existing topsoil. The increase in heavy vehicle traffic and noise would further change the character of the area. The proposed quarry therefore does not meet the requirement that the conditional use "not change the essential character of the same area."

Additionally, roughly 30% of the county area is unzoned, and in such areas mining is permitted as a primary activity. It is not reasonable and appropriate to permit mining use in a Farmland Preservation district when such a significant area of the county is already open to mining activities. The application thus does not meet criterion (h).

A major purpose of zoning is to ensure stability and predictability of land use. Conditional uses are not automatic uses, but the more conditional uses are granted, the more they become expected uses. There are already three mines operating in Green Lake County in A-1 zoning, and with further mines permitted on A-1 lands, the conditional use incrementally will become an expected use. This has a detrimental effect on land values in the county, as landowners can no longer have confidence in the uses to which adjacent properties may be put. It is incumbent on the Land Use and Planning Commission to consider carefully how their decisions will affect the broader community.

It would be inconsistent with Farmland Preservation zoning to construct a housing subdivision on this land with a promise to tear it down after seventy years, yet that would be less destructive to the future use as farmland than mining and reclamation.

I respectfully submit that the applicant has not met the requirements necessary to be granted a conditional use permit and request that the permit be denied.

Sincerely,

Michael Hawkes

PINES BACH

Pines Bach LLP
122 W Washington Ave, Ste 900
Madison, WI 53703

608.251.0101 Phone
608.251.2883 Fax
pinesbach.com

Attorney Christa O. Westerberg
cwesterberg@pinesbach.com

May 29, 2024

VIA E-MAIL
jmann@greenlakecountywi.gov
cbuss@greenlakecountywi.gov

Jeffrey Mann, Corporation Counsel
Green Lake County
Government Center
571 County Road A
Green Lake, WI 54941

Chuck Buss, Chair
Green Lake County Land
Use Planning & Zoning
Committee
571 County Road A
Green Lake, WI 54941

Re: Land Use Planning & Zoning Committee Meeting, Friday, June 14
Public Hearing Agenda Item #7, Public hearing procedures

Dear Attorney Mann and Chairman Buss:

This letter is submitted on behalf of Green Lake Association (GLA) and Green Lake Sanitary District (GLSD) for the Land Use Planning & Zoning Committee's review and inclusion in the record for the above-referenced agenda item regarding the proposed Kopplin & Kinas mine conditional use permit (CUP). Specifically, this letter concerns public hearing procedures for the CUP.

I understand from our prior correspondence that Green Lake County believes the 15 minutes of public hearing it offered at the May 2, 2024, hearing were adequate for this matter, except for the failure to offer the applicant time to speak. I also understand from the notice for the June 14 hearing that the County intends to permit the applicant to testify, then take 15 minutes of public comment again (with 3 minutes per speaker maximum), along with discussion/deliberation, decision, and completing a decision form.

While we were encouraged that the County intends to permit some limited additional time for public comment, we are still concerned that 15 minutes will not be enough for all the people who would like to speak on this high-profile issue. The room was full for the May 2 hearing and several people were in line who did not get to speak.

We have both previously referred to the CUP proceedings as quasi-judicial or quasi-adjudicative. My clients do not believe this term is limited to trial-type proceedings which guarantee a right to speak only to parties, as you suggested in your correspondence on May 8, 2024. Rather, it is a term used to distinguish proceedings where existing law is applied to individual facts and circumstances from legislative proceedings, as the Wisconsin Supreme Court recently explained in *Miller v. Zoning Board of Appeals of Village of Lyndon Station*, 2023 WI 46, ¶ 19, 407 Wis. 2d 678, 991 N.W.2d 380.

How a proceeding is characterized also dictates what process is due; for quasi-judicial proceedings, the process includes an impartial decisionmaker and an opportunity to be heard. *Id.* ¶¶ 15-20. That opportunity is not limited to "parties," which are not present at this stage, but is extended to the general public, as my correspondence of May 6, 2024, explained. *See also Roberts v. Manitowoc County Board of Adjustment*, 2006 WI App 169, ¶ 23, 295 Wis. 2d 522, 721 N.W.2d 499 (finding due process was satisfied in conditional use permit proceeding where at least sixteen members of the public spoke and "all who wished to speak had the opportunity to do so").

There are no obvious downsides to allowing more than 15 minutes of public comment. The three-minute limit on each speaker will ensure comments are short and to the point, and it is likely understood by Committee members that their government service requires listening to the public. The County's ordinances acknowledge that public hearings on conditional use permits are "for the purpose of determining the effect of the proposed use or the location thereof on the character of the neighborhood and its suitability for development …" Ord. § 350-54(A). Moreover, there will be greater trust and confidence in the Committee's decision if everyone who wishes to speak has that chance and feels they were treated fairly.

We urge you to consider a longer overall public comment period for this and other public hearings.

Finally, we wish to retain a court reporter for the June 14 hearing, just as we did for the May 2 hearing. We appreciate that you accommodated the reporter previously and are happy to work with you to ensure a smooth process for next month's meeting.

Thank you for your consideration.

Sincerely,

PINES BACH LLP

Christa O. Westerberg

COW:hej

cc (via email):

Cate Wylie, County Administrator (via email only)
cwylie@greenlakecountywi.gov

Matt Kirkman, Land Use Planning & Zoning Department Director
mkirkman@greenlakecountywi.gov

I'm not apposed to the new
Quarry opening by Kolpin + Kenas.
I grew up on a Dairy Farm
near there Quarry on CTY T.
They were always Clean + Respectful.

Jay Hardt
N 4726 ST. Rd 73
Princeton WI
54968

Green Lake County
Land use Planning &
Zoning
To Whom it may
Concern.

I am in favor of
Kopplin & Kinas Co.
K Quarry.

Thank You

Mark White
W762 State Rd 23/49
Green Lake WI 54941

To Whom It May Concern

My name is Cordelia Bresnen and I am resident of Princeton. I live at W4671 County Rd. T

I'm writing this to let you know that I AM in favor of the K Quarry on the proposed Site

Thank You

Cordelia Bresnen

To whom it may Concern, 5/13/24

I H.L. Holmes would like to support Kopplin & Kinas.
It would be a benefit to my company with the opening of their quarry.
It would save my company money on gas with the hauling.
I also think it would benefit the county with having a new business.

HL Holmes Asphalt Paving
HL Holmes

May 28, 2024

To whom it may concern,

I'm writing this letter today regarding the proposed quarry in the township of Brooklyn. Many things come to mind with this potential site and all these things would benefit the area in one way or another. I do not know the specific details of this site, nor do I think those would change my opinion on how this could be beneficial.

The pure avail of increased revenue to the township and county was the first thing that came to my mind when I was made aware of this. I'm certain anyone involved with local government finances wouldn't turn away extra tax dollars from increased sales. I imagine a contractor who specializes in road construction would have the ability to become more aggressive on project pricing when they can access material from their own source as well. That money in turn can be spent on things otherwise unaffordable or better yet be kept in the taxpayer's pocket. One of the biggest things I see as a benefit to having this quarry in the area is the potential for another source of ag lime. Over the last 5 years we have dealt with a product shortage in the spring and fall resulting in substantial cost increase and the unavailability of product period. With the ground being pushed to its limits and fertilizers at all-time highs growers are quickly realizing the importance of lime in their portfolio. This has led to an increase in application which in turn led to a shortage of product. This is not going to change anytime soon. Last year alone we used over 30,000 ton of product and I don't see how having another source would do anything but benefit the local ag industry.

Again, I don't know the specifics of this quarry, but I do see the potential for a lot of good things that could come from it. Its hard to understand how we can cover thousands of acres with solar panels and wind towers that only the landowners and big city investors reap the benefits of, but a quarry on a fraction of the land that has the potential to benefit many taxpayers in the area can get so much push back. I would much rather see money from our local resources be kept at home. If we spent this amount of energy shutting down other things that pollute our landscape, I think the countryside we all care so much about would be in a lot better place. I've had the pleasure of working with the Kinas family and their employees for many years now and never once have I had an unpleasant experience. They are great people to do business with and knowing this, I trust the decision they've made to pursue this quarry is not only to their benefit but also the benefit of many others.

Sincerely,

Denny Shoup

PHC Transit LLC

25 May 2024

TO: Green Lake County Land Use Planning and Zoning Committee

FROM: Edmund And Shirley Pyrcioch, W5514 Fox Ridge Drive, Princeton Wisconsin, 54968

SUBJECT: Quarry Plan By Kopplin and Kinas Near County Road K, In Green Lake County

My wife Shirley and I have no objection to the Planned Quarry being proposed by Kopplin and Kinas of Green Lake County. We feel it would be beneficial to the community and the surrounding communities.

Shirley Pyrcioch

Green Lake County Planing and Zoning

I am not opposed to the County K Quwrry.Kopplin and Kinas have always put conservation and enveronmental concerns first and foremost in all their operations. The County K location would be beneficial to all concerned.

Thank you,

Barbara A Stampnick

Barbara A.Stampnick
W4613 County Rd. T
Princeton WI 54968

GREEN LAKE COUNTY PLANING & ZONING,

I AM NOT OPPOSED TO THE COUNTY K QUARRY. KOPPLIN & KINAS HAVE ALWAYS PUT CONSERVATION AND ENVIRONMENTAL CONCERNS FIRST & FOREMOST IN THEIR OPERATIONS. THE COUNTY K LOCATION WOULD BE BENEFICIAL TO ALL CONCERNED.

THANK YOU,

RAYMOND STAMPNICK

Raymond Stampnick

W 4613 COUNTY Rd T, S

PRINCETON, WI 54968

Green Lake County Land Use planning and Zoning,

Everyone these days wants to buy local, shop local, etc. I think locally sourced aggregates are good for everyone. We need to support our local contractors! Kopplin and Kinas has been mining within a stones throw of Green Lake for over 100 years with no damage to the lake or anything else. Please let common sense prevail for the good of our economy and well being of all our citizens.

Thank You,

Zachary A Bierman

611 N Lawson Dr
Green Lake WI
54941

Green Lake County Land Use planning and Zoning,

I have worked in the Non metallic Mining Industry for over 30 years. There are many quarries in the state with municipal wells with in a ¼ mile. I have worked in 100's of pits and quarries all over Wisconsin. Neither I or the company I represented in my tenure has ruined any wells, lakes, rivers or streams.

I believe the Green Lake Association has misled many well meaning and good people of the public by telling them many half truths and non truths. County K quarry is a good choice for location. Kopplin and Kinas employees need to bring home a paycheck. Support your local businesses!

Live and let live.
Thank you,

MARK K BIERMAN
N 6345 FOREST RIDGE RD.
TOWN OF BROOKLYN

Mark K Bierman

5/28/2024

Green Lake County Zoning Board

I am writing to you today regarding Kopplin & Kinas Co., Inc., and the request for the CUP for the K Quarry. I am Donald Kinas, President of Kopplin & Kinas which I have been for the past 34 years. My brothers, sisters and I started taking the company over in the 1990's. We saw a need for aggregate sources in the area as well as in surrounding counties. We proceeded to open quarries or lease from others as we successfully grew our business. As many of you know, or may not know, quarries today are becoming depleted, and we need new sources of limestone in our area to stay in business. We listened to the suggestions at the BOA hearing regarding the proposed Skunk Hollow mine. It was suggested that we relocate further away from sensitive areas (Powels Spring, Michels Glen, etc.), which is exactly what we are proposing to do. It was also suggested that we move further away from a densely populated area which we are also proposing doing. I don't think a handful of people from a special interest group should be able to stop this quarry. I am aware that limestone is blasted loose for basements, sewer mains and even roadways around the Green Lake Watershed; to the best of my knowledge, I have not seen or heard of any testing for sulfides or nitrates done for these projects. The material is the same regardless of being in a quarry or in place on a project.

Kopplin & Kinas has been in business for 98 years in which we have crushed and washed rocks and produced aggregates such as sand and gravel. To my knowledge in those 98 years, we have not knowingly polluted the environment in any way. We have taken the time and initiative to go out and talk to the public, we have listened to our neighbors and openly have addressed any issues or problems they may have brought to our attention and have made it known to all of them that our door is always open for discussion if any new questions or concerns would arise.

As of today, we own and/or operate gravel & limestone pits/quarries in 6 different counties and have yet to run into any environmental issues or concerns. We have supplied you with true data and facts. It appears to me that those who are opposing the proposed quarry don't have concrete data or facts to support their reason why you should deny this CUP, they just simply don't want it. I am asking you to take the time to read our facts and data that have been presented to you and approve the CUP for our proposed quarry and for the future of our business.

Sincerely,

Donald E Kinas

Donald Kinas

Green Lake County Land Use planning and Zoning,

I think County K Quarry should be approved. There is so much emotion on the anti mining side, yet to my knowledge the is no evidence of any quarries in the area that have ruined any well, lake, river or streams.

Let them mine!

Thank You,

N5479 cty T
Green Lake Wi
54941

Green Lake County Land Use Planning and Zoning,

I am for the County K Quarry. Kopplin and Kinas has done so much for Green Lake over the years. Maybe you need to look back and see all the good they do for the community instead of trying to shut them down. The County K location is a lot farther away from the lake than the current location on County T. I don't know of any problems from that pit, but a lot of people benefit from it. With all the building going on in Green Lake, it only makes sense to use local resources.

Thank You,

Lynn Bierman
N6345 Forest Ridge Rd
~~Ripon~~ WI 54971
Green Lake

TO: Green Lake County Land Use and Planning Committee

From: Robert Bahn N7702 County Road F Berlin WI

I am sending this letter in support of the Kopplin & Kinas proposed County Road K Quarry. Being involved with Town Government and rebuilding of our Town Roads for over 35 years I have learned the importance of using quality materials is essential in making our Roads hold up to modern traffic and last for years. The Engineering Firms we have worked with over the years have told me that we are fortunate to have the highest quality limestone in this area compared to other parts of the state. The approval of this permit would assist us in being able to build high quality roads that would last for many years. I'm also a strong proponent of supporting local business and employing local people. Kopplin & Kinas have proven themselves over the years to be a very reliable and competent business and vary community minded with their donations and community support. Road repairs and construction is the number one expense in Town Government. By approval of this permit would allow us to source a quality product at a reasonable price to make our Road Repair Budget dollars go further.

The other concern I have is that this is a Conditional Use Permit, thus meaning it is allowed in this zoning district with conditions. I would certainly think there could be reasonable conditions agreed up by both sides to accomplish approval. A flat out "NO" vote would simply violate the intent of the code. Hopefully some middle ground can be reached and a local Business can continue to operate as they have for many years.

Thank you,

Robert H Bahn

Robert Bahn

To whom it may concern,

The GLA only uses issues like the quarry application to rile up their non-resident members and raise money. The local silent majority support the Quarry and the application. This quarry has **NO** negative impact on the environment and a positive impact on our community through the products, employment opportunities and industry it creates within Green Lake County.

Don't be steam rolled again by the GLA, do what is right and in the best interest of the County by issuing the appropriate permits for the County K Quarry.

Thanks & Regards,
Chuck Hurley
President

The Dry Dock
W3886 Cty Rd T
Princeton, WI 54968

Darlene Katsma

W1896 CTY RD E

Cambria WI 53923

To Green Lake County

Dear Sir or Madam, 5/22/24

I am writing this letter to you in support of Kopplin and Kinas Co. Inc. for the proposed lime stone quarry.

Please use facts in basing your decision as there are many unproven opinions being circulated out there.

Thank you

Darlene Katsma

Darlene Katsma

To Green Lake County

Dear Sir or Madam, 5/21/24

I am writing this letter to you in support of Kopplin and Kinas Co. Inc. for the proposed lime stone quarry.

Please use facts in basing your decision as there are many unproven opinions being circulated out there as fact.

We know that if you build a house, toolshed, or parking lot that we are changing the local area but the risks must be weighed against the rewards. We know as a fact that there is over 8 million tons of limestone in this proposed site thus making a long-term supply and competitive financial environment for all surrounding areas. Also, once it is approved there are many other agency's that take over in supervising this site including but not limited to the Wisconsin Department of Natural Resources, the US Occupational Safety and Health Administration, and the Mine Safety and Health Administration just to name a few.

One of my personal concerns is that if you do not approve this request and there are no provable facts for the denial that you will probably never be able to approve a quarry in Green Lake County again creating an aggregate dessert and drastically raising costs in the surrounding area. Because if you did approve another quarry after denying this one would open the door for Kopplin and Kinas to have legal action against the county.

Thank you,

Dale Paul

Dale Paul

W10673 County Road F

Fox Lake Wi 53933

Dear Sir or Madam,

5/21/24

I am writing this letter to you to encourage you to approve the limestone quarry being proposed by Kopplin and Kinas. This would be a great addition to the county in supplying aggregate for many years to come. I personally can see no adverse effect to the area by opening this quarry and you are the first step in the process as I am sure the DNR and other agencies will have to over see this site once you approve it.

I have had business dealings with Kopplin and Kinas for over 25 years and have found they are a very responsible company. If I see a problem or feel something is not right they have been there to help in any way they can to address the situation . Having opened a quarry in my area has greatly reduced trucking costs, kept gravel prices competitive and aided me in reducing my carbon footprint.

Thank you for your time,

Laura Helmer

Laura Helmer

N8049 State Road 73N

Randolph, WI 53956

Theel & Son's LLC
W4129 County Road T
Princeton, WI 54968

We are Kevin and Lisa Theel and we own Theel & Son's LLC. Theel & Son's LLC is a family owned and operated business which has been in business for 24 years, serving the farmers in Green Lake, Columbia, and Marquette counties for 15 years by providing agricultural lime products. We have been working with Kopplin & Kinas Co., Inc. for approximately 15 years as well as our aggregate supplier.

Our residence and business are in the Green Lake watershed. We care about Green Lake and the surrounding areas and have no concerns that Kopplin and Kinas will mitigate any concerns associated with mining in their communities. We would even venture to say they may find ways to improve the surrounding areas if allowed to build the quarry. In our experience with Kopplin and Kinas we have found that they genuinely care about their customers, community, and environment.

Farmers depend on agricultural lime to increase yields, decrease weeds, and increase soil tilth to allow water on fields to be absorbed and filtered rather than run off into nearby lakes and streams. By having resources available nearby we would be able to cut our hauling costs by 30-50%. This cost savings would be recognized by our customers, the farmers. Less hauling distance also decreases our use of diesel, less emissions, less tire ware, less engine wear, less oil changes, all leading to less negative impact to the environment.

It is crucial to the future of our lime business that a new quarry is built very soon. Our current lime supplier is 96 miles round trip from our business. This supplier has been running out of lime each season for the past six seasons and we are rationed lime after that. We have traveled as far as Fulton, WI (186 miles round trip) and Appleton, WI (120 miles round trip) to provide the lime that our customers, the farmers, need to operate efficiently. A supplier in Ripon stopped production a couple of years ago. This last couple of seasons, a supplier in Berlin has also been running out of lime. A supplier in Rio stopped production of lime a couple of years ago, and a supplier in Dalton, has very limited availability. In the past three years we have had customers that have had to go without this key component to their crops, and we have had a reduction in income due to no availability of lime.

It is VERY important we have lime availability in the near future for our farmers and our business' future. We are confident that Kopplin & Kinas Co. Inc will work with the community to insure the quarry is a beneficial addition to the community, the environment, and it's customers. We are in support of Kopplin & Kinas Co., Inc. building a quarry in our community.

Thank You.
Kevin and Lisa Theel, Owners Theel & Son's LLC

Sherwood Farms, Inc.
W13193 State Road 23
Ripon, WI 54971

05/15/2024

Green Lake County
Land Use Planning & Zoning Committee
571 County Road A
Green Lake, WI 54941

Hello,

My name is Ralph Sherwood. I am the owner of Sherwood Farms, Inc. in Ripon, Wisconsin. I am writing to you in support of the stone quarry that Kopplin and Kinas wants to open on County Road K.

I heard there are people saying that there shouldn't be a mine allowed on agricultural lands. Where is it supposed to be then? They can't put it in the middle of a subdivision, they can't drain a marsh and put it there, and I'm pretty sure people would be really upset if they cut down an 80-acre forest to put it there. Look at where most pits are located, they are on agricultural land. Someone said they should put it in an area that isn't zoned. If they did that, it would still go on agricultural land. The field they want to use isn't even a great field. The soil report may say it's prime ground, but it isn't. It's not 80-acres of nice flat land, the Retzlaff's can't even work the whole thing because of all the ridges on it. I don't think you could find a better field to turn into a quarry.

I also heard that the people against the quarry are saying you need to think about the future. You should think about it. Think about how much it is going to cost to haul gravel in from far away some day because your county doesn't have any. It's foolish to think that trucking is going to be less expensive in the future. It is hard to make a living as a farmer, why help make something farms need more expensive? The more things cost, the less we use them. Farms might start to shrink in the future because of this. What did you preserve then? It would also help costs to have a source of ag lime on the edge of the prairie. Did you know that most of the lime around here is hauled all the way from Mayville?

The argument against this sounds more like not in my backyard than it does preserve farmland and help farmers. Thank you for your time, and please approve the Kopplin and Kinas quarry.

Sincerely,

Ralph Sherwood

Ralph Sherwood
Owner, Sherwood Farms, Inc.

May 19, 2024

To whom it may concern,

My name is Robert Smith and my wife and I are in the process of building our new home on Green Lake. Four years ago we purchased our property to build our (modest) dream home to reside full time. During the process of clearing the property of Buckthorn, improving the shoreline, etc. we came to know the name Kinas as local businesses that can be trusted. When building a house you need aggregate materials and we prefer to purchase those materials locally. We want to support local businesses that employ the community, and create long lasting bonds with those businesses. There is an actual Saturday, after Thanksgiving, that is dedicated to shopping locally so why can't aggregate materials be sourced locally so the community can benefit, by those materials and the taxes generated by that local business. After a thirty year career in law enforcement, trust is not something that I have for many people, as I am suspicious of everything and everyone, but I feel that the Kinas name is known to be good people and therefore will be good stewards with the economic engine of Green Lake County, the lake.

Thank you,

Robert Smith
W2074 Tuleta Hill Road
Markesean, WI 53946

To Whom It May Concern:

WM (Waste Management, Inc. of Wisconsin) works with Kopplin & Kinas Company, Inc. and utilizes the services and products they provide and produce from their local quarry operations.

I am writing to express support for the proposed establishment of the Limestone Quarry in the Town of Brooklyn.

First and foremost, the establishment of the quarry will contribute significantly to the local economy. The quarry is anticipated create job opportunities for members of our community, providing stable employment and stimulating economic growth. This will not only benefit individuals and families directly employed by the quarry but may also generate secondary employment opportunities in related industries, such as transportation, construction, and manufacturing.

Moreover, the quarry will serve as a valuable source of raw materials for essential construction projects within the region, including projects that serve essential services to the community. This includes Kopplin & Kinas' supply of necessary materials for several of WM's landfill several of our engineered landfill liner and cover projects at the WM Valley Trail Landfill to ensure environmentally responsible solid waste disposal. As the population continues to grow, the demand for infrastructure, housing, and other developments will inevitably increase. Having a local quarry will ensure a reliable and sustainable supply of local materials, thereby reducing transportation costs and environmental impacts associated with sourcing materials from distant locations.

I am also impressed by the commitment of Kopplin & Kinas to the local community. Generous donations of money and donated services by this company have helped build the Ripon Athletic Field and the new playground equipment at the city park in Green Lake. Additionally, they have illustrated continued support for local veterans by donating the company's time and talents to the re-construction efforts of the local American Legion Hall, and the Ward Kinas annual Fourth of July veteran boat rides on Green Lake - making this company a valuable asset to the community.

In conclusion, WM supports the establishment of the proposed quarry. The economic benefits, job opportunities, and commitment to the community make Kopplin & Kinas continued operations an asset to Green Lake County. I am confident that with careful planning and cooperation, the quarry will contribute positively to the region for years to come.

EGBERT EXCAVATING, INC.
W1302 North Lawson Drive, Green Lake, Wisconsin 54941
Phone 920-294-6668, Fax 920-294-3055
nick@egbertexcavating.com

Nick Egbert
Owner/President
Egbert Excavating
N1302 N Lawson Dr.
Green Lake, WI 54941

5/19/2024

Green Lake County
571 County Rd. A
Green Lake, WI 54941

Dear Representatives of Green Lake County,

I am writing to express my support for the establishment of the Kopplin & Kinas Co. Inc. limestone aggregate quarry on County Road K in Green Lake County. This proposed development presents numerous economic and infrastructural benefits that will significantly contribute to the prosperity and growth of our community.

Our local community is constantly evolving requiring aggregate materials for buildings, roads, bridges, and infrastructure. Our agricultural community relies on these materials for buildings, and ag lime for crops. As these resources deplete in our area, it is critical that we obtain new facilities to support this.

Egbert Excavating Inc. provides public and private building and infrastructure needs for our community and beyond. We know how important it is to have multiple local sources of limestone aggregate. On a daily basis we use materials from our own operations, as well as from Kopplin & Kinas Co. Inc. More local sources of limestone aggregate will help ensure that Egbert Excavating Inc. and other local contractors are able to obtain the large quantities of aggregate materials that are needed for local projects.

Kopplin and Kinas Co. Inc. has been a provider and supporter of this community for 98 years. Their high-quality workmanship and advanced technologies in the mining and construction industry will help ensure that the limestone aggregate quarry will operate with no environmental impact. The owners and employees live in this community and would want nothing more than to preserve the beauty and ecological health of Big Green Lake and the surrounding area.

Sincerely,

Nick Egbert
Owner/President
Egbert Excavating

RENNHACK CONSTRUCTION CO INC
N3715 CTY HWY J
REESEVILLE WI 53579
PH #920-927-3821

May 20, 2024

Green Lake County
571 CTY RD A
Green Lake, WI 54941

RE: Kopplin & Kinas Co. Inc.
Support of permitting a limestone quarry
Town of Brooklyn

Honorable Town Board-

I am the President of a construction company that installs exterior concrete. My Firm has been in business for over 50 years. I have worked on numerous projects with Kopplin + Kinas over the past 50 years, and can attest to their upstanding reputation.

In order to continue the installation of concrete I need aggregate. Aggregate is required for base material under the concrete, and the ready mixed concrete companies need aggregate to supply the concrete.

My Firm is not the only industry that depends on aggregate. Limestone enables agriculture, building contractors and road construction companies to excel as well.

Kopplin + Kinas are great contributors to society. I have seen that when I attend Community events, both in and out of Green Lake County.

I ask that you please allow permitting a limestone quarry in the Town of Brooklyn to Kopplin + Kinas Co Inc.

Thank you,

Michael Rennhack, President

Pollesch Excavating

May 11, 2024

We are writing this letter on behalf of Kopplin & Kinas for the support of opening a new quarry. To start off, the need for aggregate in our area is crucial. As excavators, this quarry would be beneficial for us no doubt. There are not a lot of resources in our area for aggregate, and as you may not realize, there is a demand for it. The existing quarries are not able to keep up with the demand for what is needed for the construction of roads & building that is going on in our area, and some of the existing quarries are reaching depletion & won't be able to mine more aggregate. Mind you, opening a quarry anywhere is not suitable as you may not get a quality product.

There is quite a negative impact on not having a quarry in close proximity to a job site. Not having aggregate in a close radius to the job you are performing then gets handed off to the customer. With the price of diesel fuel we have had no choice but to raise prices, therefore the customer has to take on the additional cost of hauling the product in from a further distance. To be able to help with "global warming" and emissions, having trucks traveling a less distance is also a positive on many levels.

Additionally, with neighboring County's coming to the quarries for product for road work as the stone has to be DOT approved, there is a depletion of what is available. If road companies have to haul product in from a farther distance it only makes the price go up. Which gets passed on to the tax payer. It's a domino effect. Aggregate is a necessity no matter which way you look at it. We can't stop infrastructure. Roads have to be fixed/constructed and homes & businesses need to be built. We live in an area where people come to enjoy the resources of our lake and Towns. If we aren't able to keep up with the demand then what? We just stop building and repairing? All construction starts with gravel, it is the base of everything. Without it we can't move forward.

Kopplin & Kinas has put a lot of time & thought into opening an additional quarry. It isn't in a residential area. It is off a county road for easy access in and out. Being that there is another quarry a few miles from where they are proposing to open this one, but that quarry doesn't seem to raise any issues why would this one? They seem to be taking into consideration all

N3633 Roy Creek Rd Markesan WI 53946 · 920-398-2419
polleschexcavating@gmail.com

Pollesch Excavating

comments & concerns from the experts involved. Kopplin & Kinas has always worked in a professional manner & followed the rules so why would they do anything short of that now.

In our opinion, preventing Kopplin & Kinas from opening a new quarry would have a negative impact on future work not only in our area, but surrounding County's too. Please take into consideration their request for opening the new quarry as it will be a beneficial resource for all involved.

Thank You-

Jason & Jennifer Pollesch

Jason & Jennifer Pollesch

N3633 Roy Creek Rd Markesan WI 53946 · 920-398-2419
polleschexcavating@gmail.com

Proposed K Limestone Quarry Supports Economy and Essential Services to Green Lake Area

May 28, 2024,

Green Lake County
Land Use Planning and Zoning Committee
571 County road A
Green Lake, WI 54941

Crushed limestone is used as the foundation for construction and maintenance of state, county, local municipal, commercial, and private roadways, parking areas, and building foundations. The process of crushing limestone is basically the same across the industry. The environmental aspects, social issues, and governance surrounding limestone quarries are common matters to consider during the application process and operation phase of the quarry. The application process ensures that appropriate and effective safeguards, controls, and best management practices (BMP) be implemented and adhered to; so as to protect against environmental degradation and/or social impacts.

Economic Values

This proposed quarry site has proposed to process approximately 100,000 to 150,000 tons of crushed limestone per year over several decades. The proximity of the site compared to point-of-use will reduce miles of transportation. This reduces the environment footprint and cost to the taxpayers. In my conservative estimate this location may reduce more than 60,000 miles per year when compared to the companies nearest current source. The reduced time and travel may save taxpayer funded projects hundreds of thousands of dollars per year.

This will support employment by not only this local company, but many other companies involved in transportation and construction. This sustains hundreds of high paying jobs in the surrounding areas. The commercial sale of products and services will generate sales tax for Green Lake County. The sale of state, county, and municipal projects will provide taxpayers a competitive and best price advantage for local roadway construction and maintenance projects.

The Applicant has also submitted a Site Reclamation Plan which is estimated to cost in excess of $2,000,000 to complete.

Environmental Aspects

Surface Water

The site management plan will feature a buffer zone with berm on all sides. In accordance with the Storm Water Pollution Protection Plan (SWPPP) the berm BMP will prohibit any off-site storm water from entering the site. The management plan and SWPPP also requires that no water from inside the berm BMP from leaving the site. Therefore, there will be no surface run-off from inside the operation. This eliminates any surface interaction with adjacent properties and nearby tributary streams. The topographic drainageway meanders northwest from the property for approximately 1.31 miles where it meets with Dakin Creek.

Surface water samples taken at two nearest limestone quarries (stormwater sumps) demonstrate test results with metals well below WDNR water quality standards being at minimal trace levels. There was no significant evidence of elevated Arsenic content in the storm water.

Surface water samples taken at three nearest stream tributaries demonstrate test results with very high levels of Coliform, E-coli, Nitrates, and Phosphorous. This is directly related to agricultural application practices (e.g.; fertilizer, liquid manure, solid manure) and/or waste water treatment in the case of Silver Creek. There was no significant evidence of elevated metals in the streams.

Ripon Public Owned Treatment Wastewater (POTW) plant frequently by-passes wastewater treatment during significant storm water events. This type of discharge situation takes years if at all to cycle thru the Big Green Lake system.

Liquid manure is excessive along the CTH K corridor. Many days I will observe a constant stream of tanker trucks making runs to the farm fields of this area. One day while passing by, I observed a farmer spreading solid manure and hitting his "No Mine" sign wit flying manure in the ditch of CTH K.

Ground Water

The Applicant's quarry plan explains that they will stay at least ten feet above ground water level (916' – 937' AMSL). The quarry poses not effect on ground water levels nor quality. The same amount of storm water will filter into the ground surface as it does currently.

The quarry will process the top portion of the limestone formation which ranges in depth from 53' to 117' in thickness. The limestone formation extends 16' – 37' below groundwater.

The area of concern for metals is in the thin layer named Sulfide Cement Horizon (SCH) which is located (approximately 900' AMSL) below the limestone and above the sandstone. This is where Sulfides, Arsenic, and metals may be released when exposed to oxygen.

The SCH layer will remain 16' – 37' below ground water and therefore not exposed to oxygen. Processing limestone does not introduce oxygen into the aquifer.

The processing of limestone and the quarry floor will be 26' – 47' feet above the SCH layer and therefore will not expose any contaminants of the SCH layer.

The quarry proposes to process less than 150,000 tons per year. Which will be processed in two sessions lasting about three weeks each. The amount of processed limestone would be estimated at less than 75,000 tons at any given time. This relatively small amount of crushed limestone does not pose significant source of polluting contaminants. This limestone formation does not contain significant levels of Sulfides, Arsenic, and/or metals.

Tests revealed extremely high arsenic and sulfide levels in a deep (high capacity) irrigation well on the adjacent Machkovich property north of the proposed mine (DNR lab report 9-7-2012). This was caused by the fact that the 416' deep well was constructed (2004) with a shallow casing which terminated just above the SCH layer. In 2012, a new well was constructed with a casing that terminated well below the SCH and the problem was resolved.

The Applicant proposes to install a regular well for purpose of periodically filling a tank wagon to wet the driving surfaces within the quarry to control dust during dry periods. This well will be constructed with a casing which extends well below the SCH layer and will not extract those contaminants.

This watering practice is needed somewhat infrequently as this region receives regular storm water events. This watering practice is in accordance with the Dust Control Plan the Applicant has submitted. The volume of water pumped from the well is not significantly different than a residential use and would have no significant impact on ground water levels. Pumping small amounts of water from a well does not introduce oxygen into the aquifer.

Acid rock drainage (ARD) will be prevented since the quarry will not interact with ground water. Acid rock drainage (ARD) will be prevented since the limestone processing will not contain hazardous contaminants and will not interact with the SCH layer. Acid rock drainage (ARD) will be prevented since the quarry will not introduce oxygen into the aquifer.

Social Conditions

A buffer zone of 100' will be established from all exterior property boundaries and the right-of-way of CTH K. A screening berm will be constructed in this area to serve as both a physical and visual barrier. Two staggered rows of Norway Spruce trees will be planted on the top third of the berm on the southern 40-acre parcel (along CTH K). the rest of the berm will be seeded with native grasses and wildflowers to enhance the screening capability and visual aesthetics of the berm.

Unfortunately, the berm will not be effective at keeping out the horrible stench of liquid manure be hauled down CHY K and applied on area fields.

Average traffic volume on CTH K is currently 2,400 cars per day. The site has proposed to accommodate approximately 2 trucks per hour on average. This is less than 1% of the current traffic volume.
The entrance to the quarry will be paved so as to control the tracking of dirt and dust onto CHY K.

Governance
Farmland Preservation Districts are meant to preserve farmland, protect soil and water, and minimize land use conflicts.

Approximately 59.45 acres of the property is currently used as agricultural field. The remaining 20.55 acres of the property is not suitable for agricultural use and is covered by grass and brush. The agricultural portion is interrupted by about a dozen islands of non-tillable areas. This is not attractive to planting row crops such as corn and soybeans. This property is not best suitable / utilized for farmland.

The area agricultural practices are not doing a responsible duty to protect the soil and water. This is evident by the high levels of Coliform, E-coli, Nitrates, and Phosphorous present in nearby tributary streams. A specific example, a nearby "sensitive" feature Mitchells Glen has over land run-off which cascades over the exposed rock face and continues to run thru the gorge that it has been eroding over the past 12,000 years. This and other over land run-off carried nutrients and contaminants into area tributary streams and into Big Green Lake system.

The proposed K Quarry is situated with about the lowest residential density in the area. There are less than five residences per square mile in this area.

The selection of a quarry depends on many factors including location / distance from the point-of-use market, presence and quality of limestone formation, depth of over-burden, and private ownership. Other M-1 mining zoned areas are further away, 75% actively occupied, and/or do not have optimum limestone formations.

The site would be located next to a liquid propane facility: Cole Propane currently stores 2 tall towers of propane and 48 residential-sized tanks which are empty (do not contain LPG). The blasting next door is extremely controlled and required to be conducted by method which does not disturb neighboring properties physically nor audibly. The Applicant has submitted documents which demonstrate the blasting process and the visual attributes and audible data thereof. The blasting will not jeopardize the safety of the neighboring LPG distribution facility.

Koplin & Kinas Co. Inc. (KKCI) has done well to provide submittals which meet all State, County, and Town regulatory requirements. Volumes of documents more than thousand pages over the course of two quarry applications. The current K Quarry application is unique and different from the 2022 Skunk Hollow Quarry application. It brings additional new geological and hydrological data specific to this site.

KKCI have satisfied and/or acquired permits of State WDNR and County requirements which include:

- Storm Water Pollution Prevention Plan (SWPPP)
- Wi NPDES permit
- Non-metallic Mining Operation & Reclamation Plan
- Fugitive Dust Control Plan
- Conditional Use Permit (CUP) application, fees, and supporting documents which satisfy the twelve criteria.

I believe, a mis-service of County governance process occurred during the 2022 Skunk Hollow Quarry hearings and KKCI received an injustice to its providence due to misapplication of course of due process of this matter.

The decision of the Land Use Planning and Zoning Committee which consists of elected officials should not be appealed to an appointed Board of Adjustment. Nor shall a re-hearing of this case be conducted by the same. For an appointed board shall not have authority over and elected committee in the same County governance. In no circumstance should a standing of two members comprise a quorum of a committee in such a manner. Appeals of such should be forwarded to the County Judicial Brach in Civil Court. This allowed for by recent State Legislative action.

Although, the data utilized in this letter was sourced from the public documents packets from the K Quarry submittals; opinions and claims made herein are formulated from my personal understanding and experience of the topics.

I studied and graduated from UW Oshkosh with a B.A. in Biology with emphasis in Limnology, Ichthyology, and Botany. I served for twelve years as an elected official on Board of Education of Green Lake School District. I served fifteen years as an elected delegate (Green Lake County) on Conservation Congress of Wisconsin. I have thirty years of service as Regional Environmental, Health, and Safety Manager for a Corporation interacting with international, federal, state and local regulations.

Concerned Constituent,

Holland Meade Grim

Holland Meade Grim
W1779 North St.
Green Lake, WI 54941

Northeast Asphalt
A WALBEC COMPANY
An Equal Opportunity & Affirmative Action Employer
20 Camelot Drive | Fond du Lac, WI 54935
920.921.5577 | walbecgroup.com

May 21, 2024

Green Lake County Land Use Planning & Zoning Committee

Green Lake County Government Center

571 County Road A

Green Lake, WI 54941

Re: Kopplin & Kinas Non-Metallic Mine Request

Dear Green Lake County Zoning Committee:

I am writing in support of Kopplin and Kinas's permitting request to open and operate a non-metallic mine in the town of Brooklyn, off of county highway K in Green Lake county.

Kopplin and Kinas produces aggregates that play a vital role in sustaining our economy and way of life. These aggregates are used in our everyday lives in places such as the roads and bridges that we travel on, for the construction of sites at school buildings, homes, and the buildings in which we work. Many of the county's residents that attend the county board and plan commission meetings probably drove on roads constructed with materials from one of Kopplin and Kinas's sites.

One of the major advantages to the community with having a local source of materials for the construction and maintenance of both public and private infrastructure is the reduction in construction costs. A local quarry greatly reduces the amount of time trucks are on the highway delivering product. Hauling aggregates from a site that is 20-30 miles away can more than double the cost of these materials to the project owner or the taxpayers.

On an industry-wide basis, the permitted reserves of aggregates in Green Lake and the surrounding counties are being used faster than they are being replenished. As demand increases and current permitted sources are depleted of marketable reserves, there will be an even greater demand for the products that are produced at this site. By approving the permitting request, the committee will be helping to ensure a local source of aggregates to service the community well into the future.

Finally, Northeast Asphalt has been working with Kopplin and Kinas for over 30 years and have found them to be a proven and reputable company with a long history and excellent track record of working with the towns, counties and neighbors in the area.

Thank you for your time and consideration. If you have any questions and/or need additional information, please do not hesitate to contact me at (920) 716-5828.

Sincerely,

Northeast Asphalt, Inc.

Taylor Tauer

Taylor Tauer, P.E.

Area Manager

From: Elaine Swanson <elaineseverin@yahoo.com>
Sent: Wednesday, May 29, 2024 11:45:36 PM
To: Clerk <clerk@greenlakecountywi.gov>
Subject: Comments on Proposed County K Quarry

[CAUTION: EXTERNAL SENDER This email originated from outside Green Lake County. Do not click links or open attachments unless you recognize the sender and know the content is safe.]

Please include this letter in board member packets prior to Land Use Planning and Zoning Committee Meeting, June 14th.

TO: The Green Lake Land Use Planning and Zoning Committee

RE: Proposed County K Quarry

I write from rural Pickett where our family has been living for over 30 years. We are not farmers but stewards of the land. Instead of row crops, we've planted hardwoods and conifer trees, worked to establish prairie, created pond scrapes and bluebird trails. I monitor bats for the State and tag Monarch butterflies during their annual migration. We cherish our connection to the land, but this reverence and respect for the land goes far beyond our property.

We live a short distance from Green Lake. Our family has cherished memories of visiting the area for many years. I've worked as a volunteer on Green Lake Conservancy projects. Any time spent in the area has deepened my awareness that finite resources need to be protected and preserved. Hence, these personal comments on the proposed mine, which we strongly oppose.

Water is a finite resource. As the water resource engineer from Madison stated, "there is no way to eliminate risks to water quality" if this mine is allowed to operate. There is great risk that arsenic and other metals will contaminate the groundwater. Wisdom and sense of responsibility to the future would suggest that denying the permit is simply the right decision.

The proposal by the applicant to build a berm around the site to dampen the sound of drilling and blasting is an admission to the reality of the noise pollution the mine would produce. Trucks would be exiting the mine from 5:30AM to 6PM. One can foresee the resulting loss of sanctuary that people and wildlife now enjoy. The mine would irreparably destroy the environmental integrity of not only Green Lake but also the surrounding creeks and streams, and the Green Lake aquifer itself.

Please deny the permits for the County K Quarry.

Thank you for giving consideration to our comments.

Elaine and Severin Swanson
W10732 Triangle Road
Pickett, WI 54964

Eric and Ann Marie Godfrey
P O Box 75
Ripon, Wisconsin 54971-0075

May 29, 2024

Green Lake Land Use Planning and Zoning Committee
Attention: Liz Otto, County Clerk
517 County Road A
Green Lake, Wisconsin 54941

To the Committee:

RE: Zoning Meeting, Friday, June 14. We request inclusion of this letter in board member packets.

Re: Status of the proposed quarry on County K:
We urge that permits needed for the quarry be denied, for the following reasons.

1. The proposed mine will undermine farming.
The proposed site currently has growing crops and is in a Farmland Preservation Area in the County Zoning Plan. Such areas exist for good reasons. Farming is the strength of Wisconsin's rural economy; in a farming preservation area the best use of the land is just that . . . for farming. If exceptions are granted, the reason should be for resources or uses urgently needed by the community or state, which can be satisfied nowhere else. The proposed mine is not such an urgent exception. An exception here, an exception there and pretty soon farmland preservation becomes1 meaningless. Granting an exception in this specific case sets a bad precedent, especially since other areas of Green Lake County are zoned to permit this type of mine.

2. The proposed mine will be an environmental hazard.
The proposed mine site is in an especially environmentally sensitive area for Green Lake. It is less than a mile from the spring that originates about ⅔ of the flow of Dakin Creek (measurement done by the Wisconsin Geological & Natural History Survey in 2014 about ½ mile east of Brooklyn J). The proposed mine site lies within the Dakin Creek subwatershed, which is a Class II trout stream, and some of the cleanest water feeding Green Lake. Green Lake is a key part of the economy of the county and this area; it would be unwise to allow land use that risks degrading it.

Land from the proposed mine slopes toward two key environmental features: Powell Spring to the west, and Dakin Creek to the north. We observed that the unnamed spring originating a key part of Dakin Creek (a mile north of the mine site) and Powell Spring both dried up last fall, and both resumed flowing mid-winter at about the same time. This indicates that the mine site, Powell Spring, and the unnamed spring feeding Dakin Creek all share the same aquifer, which the mine risks disrupting.

(continued on next page)

3. The proposed mine will adversely affect residents and Green Lake visitors.
A mine disturbs the land by its nature. Of course we cannot speak for all nearby residents, but we each have a substantial investment in our home, especially including the well. We worry about the effect a nearby mine could have on our own well, and fear that we would have no legal recourse if it were disrupted. Other side-effects of mine operation (e.g. noise, dust, lights, trucking) would diminish enjoyment and use of our property. One purpose of zoning is to protect property owners and the investments they have made. Granting exceptions for a radical change in land use (which a mine would be) undermines zoning law.

Finally, it is fairly obvious that a gravel pit with extensive trucking will not enhance Green Lake's attractiveness as a tourist destination. The proposed mine site is on a major travel route into Green Lake.

Summing up
Many natural resources are suitable for extraction and are abundant, and damage to the natural environment can be repaired after extraction is complete. Clean water is not such a resource. It is irreplaceable, and damage is expensive to fix if possible at all. So clean water must be protected where it exists. That is especially important here, where clean water is critical for two economic pillars of this area: farming and tourism, not to mention the lives of people who live here. The products of mining are needed too, but this is simply the wrong place for a mine and the proposal to allow it should be rejected.

Our background
For the past 33½ years, we have been residents of property we own about a mile north of the site of the proposed quarry; so we know the area well. One of us (Eric) has collected water quality data on a key branch of Dakin Creek continuously since 2011 as part of the statewide Water Action Volunteers (WAV) community science program run by the DNR and UW-Extension. We feel it is important to offer our opinion on the project to help protect the value of our own property as well as to protect Green Lake, a vital natural resource important to our community and to Wisconsin.

Thank you for considering our viewpoint.

Sincerely yours,

Eric Godfrey Ann Marie Godfrey

Eric P. Godfrey
Ann Marie Godfrey
W14411 Prairie Road
Ripon, Wisconsin 54971

KOPPLIN & KINAS CO., INC.

GREEN LAKE, WISCONSIN

May 24th, 2024

Green Lake County Land Use Planning & Zoning Committee

We submit the attached documents for your consideration regarding our application for a conditional use permit for nonmetallic mineral extraction on the Retzlaff parcels in Section 36 of the Town of Brooklyn, Green Lake County, Wisconsin.

The first document is an executive summary of our application submittal.

The second document is an explanation/suggested findings of how our proposed operation conforms to both the ordinance stating the standards for granting a conditional use permit and the ordinance stating the standards for nonmetallic mineral extraction in the A-1 Farmland Preservation District.

The third document is the report and geochemical testing results from the test drilling at the proposed Skunk Hollow Quarry property.

The fourth document is a report from Scott L. MacWilliams, a certified and highly experienced real estate appraisal expert, containing sales analysis for homes in close proximity to several mineral extraction sites in Wisconsin including an analysis from Green Lake County, showing that the K Quarry will not cause a reduction in neighboring property values (see p.61 of S. L. MacWilliams Company Report-Summary of Conclusions).

We have engaged in a dialog with the Green Lake Sanitary District to try to find a middle ground with them and their partners that facilitates both opening a quarry at the proposed location and ensures acceptable protections are in place for the watershed and area groundwater. We believe that discussion with the entities tasked with protecting the watershed is a proactive means to address the concerns of the community and make this a successful venture. They have taken it upon themselves to have a hydrogeologist review and investigate our submittal and have submitted a report with recommended conditions. We did not receive the final draft of the report in time to comment on it in this submittal, but based on conversations we've had we may not be opposed to adopting Dr. Gaffield's recommendations as they may be a commonsense approach to giving the community peace of mind that necessary monitoring is in place. We would appreciate the opportunity to give our input on his report at the June 14th hearing.

We appreciate your time and consideration on this application and look forward to answering any questions you may have about our operation.

Executive Summary

of the K Quarry Application Submittal

Kopplin & Kinas Co., Inc. (KKCI) is a producer of construction aggregate based in Green Lake, Wisconsin. KKCI has been operating pits & Quarries in Green Lake County for almost 100 years.

- KKCI would like to expand their network of construction aggregate sites and believes there is a viable market for construction aggregate and agricultural lime in east central Green Lake County.
- The Retzlaff property offers an accessible, quality limestone deposit with direct access to the county trunk highway system, which makes it an excellent location for a new aggregate source.
- The Retzlaff property consists of 80 acres, approximately 60 acres of which will be used for mineral extraction. Approximately 20 acres will consist of screening berms and a stormwater management pond.
- The floor of the quarry will terminate above groundwater and maintain a minimum five-foot buffer from the underlying sulfide cement horizon which occurs at the top of the St. Peter Sandstone below the limestone deposit. Terminal elevations will be determined by observations from groundwater monitoring wells and test drilling.
- Nonmetallic mineral extraction is an allowed conditional use in 3 zoning districts – A-1 Farmland Preservation, A-2 General Agriculture, and M-1 Mineral Extraction.
- The Retzlaff property is zoned A-1 Farmland Preservation District. Nonmetallic mineral extraction is an allowed conditional use in the A-1 zoning district.
- The A-1 Farmland Preservation District is the only zoning district with lands available for a new nonmetallic mineral extraction site. The A-2 district is comprised mostly of small irregularly shaped parcels containing rural residences & small-scale agriculture. The M-1 district is comprised of parcels that were already active extraction sites before the creation of the district and parcels that have been re-zoned from agricultural districts to M-1.
- Both the Comprehensive Plan and the Farmland Preservation Plan of Green Lake County state the need for adequate roads and infrastructure. The materials that the K Quarry will produce are essential to both as well as providing another source for agricultural lime in Green Lake County.
- Reports stating that mineral extraction sites result in a loss of property value for properties in the vicinity of the mine almost universally rely on the same unproven, theoretical regression model taken from an eight-page working paper, and not from any peer reviewed studies.

- There are numerous studies from the federal government, academic institutions, and the private sector that all conclude that there is no tie between properly developed extraction sites and loss in property value.
- Mineral extraction operations throughout the region have not resulted in a loss of property value.
- Modern quarry blasting is a highly engineered process that utilizes millisecond delay electronic detonation and ANFO based emulsions to control ground vibration, airblast, and prevent nitrates from leaching out of the blasting agent.
- Blasting operations are required by law to keep ground vibration at the nearest structure to the blast under the velocities set forth in the "Z-Curve" which prevents damage to structures near the blasting operation.
- Seismographs are placed at structures near the blast area to ensure compliance with ground vibration and airblast limits.
- Screening berms and strategic placement of stockpiles dampen noise generated by quarry operations.
- Adequate screening berms reduce sound levels leaving an extraction site to decibel readings below that of normal conversation.
- Dust emissions at mineral extraction sites are regulated and enforced by both the Mine Safety and Health Administration and the Wisconsin Department of Natural Resources. Unsafe levels of fugitive dust are not permitted and failure to adequately control dust can result in a forced shut-down of the extraction site.
- Water quality testing of the surface water at two local quarries shows that the water collected inside the active mining area at the sites is as clean if not cleaner than the water sampled from three tributaries to Big Green Lake.
- Acid mine drainage is commonly treated with limestone. Limestone is a carbonate rock which neutralizes the acid. The acid that is created by oxidizing sulfides dissolves and mobilizes metals found in the mineralization.
- The sulfide source of concern in Green Lake County is the sulfide cement horizon which occurs at the top of the St. Peter Sandstone formation in some areas of Wisconsin.
- Maintaining separation from the sulfide layer prevents the release of any metals which may be present in the sulfide cement horizon.
- The depth of the sulfide cement horizon is easily identifiable and avoidable through test drilling at the extraction site.
- Test results from rock sampled at the proposed Skunk Hollow Quarry show that the limestone formation has a sulfide content under 0.2% with a very low acid producing potential. If all the sulfide mineralization on the site were converted to acid, it would take less than 1% of the available calcium carbonate at the site to neutralize it.

- Reclamation is the process of restoring mined land back into land that can be used for purposes other than mining.
- Mine sites can be reclaimed to a variety of different land uses including ponds, agricultural land, golf courses, parks, and residential developments.
- Wisconsin State Legislature Chapter NR 135 requires all mine operators to develop a reclamation plan and that plan must conform to standards set forth in the legislation.
- Mine operators are required to post a form of financial assurance that covers the current estimated cost of reclamation at any given point in the mine's lifecycle. The County holds the financial assurance and is authorized to use those funds in the event that the mine operator defaults on performing the required reclamation work or goes out of business before reclamation is completed.
- Financial assurance is reviewed periodically to ensure that the amount reflects current estimated reclamation costs.
- Kopplin & Kinas Co., Inc. has reclaimed many extraction sites throughout its history, including some sites that were mined before reclamation was required by law.

§350-56 B. Standards:

(2) No conditional use shall be approved or approved with conditions by the Land Use Planning and Zoning Committee unless it shall find the conditional use:

(a) Will not have a negative effect upon the health, safety, and general welfare of occupants of surrounding lands;

- **The K Quarry will be operated adhering to all federal, state, and local regulations which ensures the health safety and general welfare of occupants of surrounding lands as well as the health, safety, and general welfare of the employees and customers at the site.**
- **Maintaining separation from the floor of the K Quarry to the sulfide mineralization and groundwater at the site, and groundwater quality monitoring are additional safety precautions above and beyond what is required by mining regulation and provide a high level of protection for the surrounding occupants.**

(b) Will be designed, constructed, operated, and maintained so as to be harmonious and be appropriate in appearance with the existing or intended character of the general vicinity and that such a use will not change the essential character of the same area;

- **A berm will be constructed surrounding the K Quarry site and planted with native grasses and wildflowers with two rows of Norway Spruce trees towards the top of the berm. The berm will keep the mining operation out of view and the plantings will give the site a natural aesthetic that is in character with the surrounding area which is rural/open space and agricultural in appearance.**
- **Most of the aggregate sites in Wisconsin are located in rural areas adjacent to the population centers that they serve, and through the utilization of screening berms and plantings, many are not easily distinguishable from the other rural properties that surround them.**

(c) Will not be hazardous or disturbing to existing or future neighboring uses;

- **As stated under sub.(a), K Quarry operations will adhere to all applicable regulations plus additional measures to prevent hazards to adjacent properties and land uses.**
- **The K Quarry will not be disturbing to existing or future neighboring uses. Operations at the site will be shielded from neighboring properties by the site perimeter screening berm which dampens the sounds from daily work at the site and dust control measures prevent any disturbances from fugitive dust.**
- **Production operations at the K Quarry will be intermittent and the set work hours are similar to industry and agriculture in the immediate area.**

(d) Will not be detrimental to property in the immediate vicinity or to the community as a whole;

- **As stated under sub.(a), K Quarry operations will adhere to all applicable regulations plus additional measures to protect the surrounding area from detriment.**
- **Multiple studies have shown that there is no link between properly developed mines and a reduction in property value. The K quarry has a clear plan of operation and reclamation, and will adhere to all applicable federal, state, and local regulations, meaning it will be a properly developed mine and will not result in a reduction in property values for properties in the immediate vicinity of the quarry.**
- **The proposed stormwater basin at the K Quarry will provide sediment and nutrient reduction for the surface water that flows onto the site from the neighboring agricultural lands, which means less sediment and nutrients flowing into Big Green Lake and an improvement to the surface water quality.**
- **The K Quarry will be a benefit to the community as a whole. It will have a positive effect on the community, contributing both directly and indirectly to construction, infrastructure, agriculture, employment, and the local economy.**

(e) Will be served adequately by essential public facilities and services, such as highways, streets, police and fire protection, drainage structures, and schools, and that the persons or agencies responsible for the establishment of the proposed use shall be able to provide adequately any such service; and

- **The K Quarry will be accessed from the county trunk highway system which allows adequate service by any needed public facilities and services.**

(f) Will have vehicular approaches to the property which shall be so designed as not to create an interference with traffic on surrounding public or private streets or roads.

- **The K Quarry will have an adequately sized approach to facilitate trucking operations. The approach has long sight distances in each direction from the driveway ensuring traffic entering and leaving the site will not interfere with traffic on the county highway.**
- **The K Quarry will have an average of two trucks an hour coming and going from the site which will not drastically increase or impede the traffic on CTH K.**

§350-27 A-1 Farmland Preservation District

A. (2) Conditional Uses

Nonmetallic mineral extraction, if all of the following apply:

[1] The operation complies with Subchapter I of Chapter 295, Wisconsin Statutes, and rules promulgated under that subchapter, with applicable provisions of local ordinances under § 295.14, Wis. Stats. (including all applicable provisions of this chapter), and with any applicable requirements of the Wisconsin Department of Natural Resources concerning the restoration of nonmetallic mining sites.

- **A nonmetallic mining reclamation permit has been applied for and a reclamation plan has been submitted to the Green Lake County Land Use Planning & Zoning Department which is the regulatory authority that administers the reclamation program.**
- **Green Lake County's reclamation program complies with Sub. 1 of ch.295, Wis. Stats.**
- **Financial assurance will be posted before mineral extraction commences at the site.**

[2] The operation and its location in the farmland preservation zoning district are consistent with the purposes of the farmland preservation zoning district.

- **The Farmland Preservation Plan of Green Lake County clearly states the importance of agricultural and transportation infrastructure. The K Quarry will provide the key ingredient for both – construction aggregates.**
- **The Farmland Preservation Plan of Green Lake County acknowledges that Mining will have an impact on farmland loss. However, the materials derived from mining such as crushed stone and gravel are important materials in supporting local economic development, agricultural infrastructure included.**
- **Agricultural lime will be produced at the K Quarry. Agricultural lime is a very important, high demand commodity used to improve soil health. There is currently only one quarry in Green Lake County producing and selling agricultural lime and can not keep up with the demand for the product.**
- **Nonmetallic mineral extraction is an allowed use in the farmland preservation zoning district through a conditional use permit.**
- **The K Quarry will be producing products that directly support agricultural operations making it consistent with the purposes of the farmland preservation zoning district.**

[3] The operation and its location in the farmland preservation zoning district are reasonable and appropriate, considering alternative locations outside the farmland preservation zoning district, or are specifically approved under state or federal law.

- **The farmland preservation zoning district is the only zoning district in which lands for a new mineral extraction operation are available in the zoned townships of Green Lake County.**
- **The only alternative lands outside of the farmland preservation district would be in the un-zoned townships of Green Lake County. Opening a quarry in one of the un-zoned townships would still place the quarry on agricultural land that would most likely be classified as farmland preservation district if the township adopted zoning.**
- **Locating the quarry in an un-zoned township places it far enough outside the intended market area of the K Quarry that it would serve no purpose for that market. Transportation costs would negate any benefit to the community.**
- **The parcels the K Quarry will be located on contain a mix of tillable and non-tillable acreage. Compared to the Skunk Hollow Quarry parcel, which is 100% tillable land, or other lands on the limestone ridge to the south of the K Quarry location, which are large contiguous tracts of tillable land, the K Quarry location is both reasonable and appropriate.**

[4] The operation is reasonably designed to minimize the conversion of land around the extraction site from agricultural use or open space use.

- **Agriculture will continue at the K Quarry as long as practicable as extraction progresses across the site. Reclamation operations will commence once 20ac.-30ac. of extraction is completed. Agricultural operations will then commence on the reclaimed acreage as soon as practicable and expand with site reclamation through the lifecycle of the quarry, minimizing the amount of acreage on the property that is converted from agricultural or open space at any given point time.**

[5] The operation does not substantially impair or limit the current or future agricultural use of surrounding parcels of land that are zoned for or legally restricted to agricultural use.

- **The operation will be completely contained on the permitted parcels. Agriculture on surrounding parcels will not be impaired or limited. Agriculture on surrounding parcels will benefit from having a source of aggregate and agricultural lime neighboring their parcels.**

[6] The owner agrees to restore the land to agricultural use, consistent with any required reclamation plan, when extraction is completed.

- **The land at the K Quarry will be restored back to the existing ratio of agricultural and non-agricultural use per DATCP requirements in the farmland preservation zoning district and the reclamation plan for the K Quarry.**

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Known for excellence.
Built on trust.

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Ecological
Water
Construction Management

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April 12, 2023
File No. 20.0158031.00

Mr. Michael McConnell, Project Manager
Kopplin & Kinas Co., Inc.
W1266 North Lawson Drive
Green Lake, Wisconsin 54941

Re: Amendment Report to Hydrogeologic Summary
Skunk Hollow Quarry
Town of Brooklyn, Green Lake County, Wisconsin

Dear Mr. McConnell,

GZA GeoEnvironmental, Inc. (GZA) prepared this Amendment Report to our December 8, 2022 Hydrogeologic Summary[1] prepared for Kopplin & Kinas Co., Inc. ("Client") for the proposed Skunk Hollow Quarry located in the town of Brooklyn, Green Lake County, Wisconsin ("Site"). The work was performed in accordance with our September 30, 2022 Proposal for Services, GZA File No. 20.P000400.23, and discussions and correspondence with Mr. Dave Johnson, Hydrogeologist with the Wisconsin Department of Natural Resources (WDNR).

This amendment specifically addresses Condition 16 set forth by the Green Lake County Land Use Planning & Zoning Committee ("Committee") during its meeting on July 7, 2022, in regards to the proposed Skunk Hollow Quarry aggregate mine Conditional Use Permit (CUP).

> Condition 16. *"A site-specific study to be provided to the Land Use Planning & Zoning Department, performed by a qualified professional and reviewed and approved by the WDNR's hydrogeologist Dave Johnson, to study the site for sulfides. If the study indicates the site contains unsafe levels of sulfide minerals, and will be environmentally adverse to the nearby springs or groundwater the CUP shall be deemed void."*

The Hydrogeologic Summary reported on the drilling and rock sample collection at the Site in November 2022. Fifteen bedrock borings were drilled to depths ranging from 65 to 120 feet below ground surface (bgs). Composite bedrock samples were compiled for each quadrant (northeast, northwest, southeast, southwest) of the Site, as shown on **Figure 1**. First, composite samples of each boring were compiled by subsampling equal volumes from each depth interval in a clean, stainless-steel bowl and mixed until evenly composited. Each boring-specific composite sample was collected in labeled, gallon-size, plastic bags. Equal volumes were then collected from each boring-specific composite sample to generate representative composite samples for each quadrant of the Site.

Samples were submitted to ALS Laboratories (ALS) in Reno, Nevada for direct analysis of sulfide concentrations (ALS analysis S-IR06a) and the Modified Sobek Test, which determines a net neutralization potential (NNP) indicating the potential ability of the Site bedrock to produce acid rock drainage.

The analytical results from ALS are summarized below.

- Sulfide was detected in the bedrock samples at 0.12% to 0.19%.
- The NNP ranged from 858 to 926 tons (t) of $CaCO_3$/1 Kilotons (Kt).

---

[1] *Hydrogeologic Summary, Skunk Hollow Quarry, Town of Brooklyn, Green Lake County, Wisconsin*, dated December 8, 2022, GZA File No. 20.0158031.00.

Sulfide Results

The analytical results indicate low amounts of sulfide within Site carbonate bedrock, 2.4 to 3.8 pounds of sulfide per ton of bedrock, or 1.2 to 1.9 tons of sulfide per kiloton of carbonate bedrock (t/Kt). Based on reported densities, the 2.4 to 3.8 pounds of common sulfides found in Wisconsin is equivalent to about 0.008 to 0.012 cubic feet or 0.8 to 1.4 cups; or about 1 cup of sulfide per ton of bedrock. Using the oxidation half-reaction of the sulfide type mineral, pyrite, Equation 1 below indicates that pyrite oxidation/dissolution results in acid (in the form of free hydrogen ions, H^+) produced at a ratio of 2 parts acid per one part sulfide:

$$FeS_{2\,(s)} + \frac{7}{2}O_{2\,(aq)} + H_2O_{(l)} = Fe^{2+}{}_{(aq)} + 2SO_4{}^{2-}{}_{(aq)} + 2H^+{}_{(aq)} \qquad [Equation\ 1]$$

Based on Equation 1, the molar mass of pyrite, and the amount of sulfide present, the amount of acid (H^+) produced by sulfide oxidation/dissolution in the bedrock at the Site would, therefore, range from 0.02 to 0.03 t/Kt.

Net Neutralization Potential (NNP) Results

Additionally, analytical data report the NNP of the carbonate bedrock at the Site ranges from 858 to 926 tCaCO3/Kt. Per Equation 2 below, $CaCO_3$ neutralizes acid (shown here in the form of hydrochloric acid [HCl]) in a one-to-one ratio:

$$CaCO_{3\,(s)} + HCl_{(aq)} = CaCl_{2\,(aq)} + CO_{2\,(aq)} + H_2O_{(l)} \qquad [Equation\ 2]$$

2.0 to 3.2 $tCaCO_3$/Kt will neutralize any acids that may be produced by the 1.2 to 1.9 t/Kt sulfide present in the bedrock. This value is less than 1% of the amount of $CaCO_3$ per Kt of bedrock available to neutralize acid at the Site.

In summary, the ratio of sulfides measured within the carbonate bedrock at the Site are not sufficient to generate acidic leachate. Leachate produced by exposed bedrock wall or floor, crushed bedrock aggregate, or concentrated tailings from aggregate washing at the proposed quarry would be basic to neutral and not result in conditions conducive to acid mine drainage.

CONCLUSIONS

The following conclusions are based on field observations:

1. No visual evidence of the presence of sulfide minerals was observed during drilling activities.
2. The analytical data indicated low proportions of sulfides within the bedrock coupled with a high NNP. The concentration of sulfide measured within the bedrock is not sufficient to produce the acidic leachate needed to develop acid mine drainage.

Thank you for the opportunity to be of service. Please contact the undersigned if you have any questions.

Best regards,

GZA GeoEnvironmental, Inc.

Aubrey Dunshee, GIT
Project Hydrogeochemist
(612) 532-6854/aubrey.dunshee@gza.com

Mark Krumenacher, PG
Senior Principal/Senior Vice President
(262) 424-2046/mark.krumenacher@gza.com

J:\158000to158099\158031 Skunk Hollow\Sulfide Eval\Amendment Report\FINAL 20.0158031.00 Amendment Rpt to Hydrogeologic Summary_Skunk Hollow Quarry 4-12-23.docx

Attachments: Figure 1
Attachment 1 - ALS Report

FIGURES

0 100 200 400
SCALE IN FEET

HYDRO CONSULTING SERVICES
PROPOSED SKUNK HOLLOW QUARRY
BROOKLYN, GREEN LAKE COUNTY, WISCONSIN

BORING LOCATIONS

PREPARED BY: GZA GeoEnvironmental, Inc. Engineers and Scientists www.gza.com

PREPARED FOR: Kopplin and Kinas Co., Inc.

PROJ MGR	HAW	REVIEWED BY	HAW	CHECKED BY	AJD	FIG
DESIGNED BY	AJD	DRAWN BY	AJD	SCALE	SEE ABOVE	1
DATE	12/07/2022	PROJECT NO	20.0158031.00	REVISION NO	OF	SHEET NO

ATTACHMENT 1

ALS Report

ALS USA Inc.
4977 Energy Way
Reno NV 89502
Phone: +1 775 356 5395 Fax: +1 775 355 0179
www.alsglobal.com/geochemistry

To: GZA GEOENVIRONMENTAL
17495 WEST SARAH LANE SUITE 100
BROOKFIELD WI 53045

Finalized Date: 23-MAR-2023
Account: GEOZAG

CERTIFICATE RE22367616

Project: Skunk Hollow Quarry
P.O. No.: 20.0158031.00
This report is for 4 samples of Rock submitted to our lab in Reno, NV, USA on 21-DEC-2022.
The following have access to data associated with this certificate:

AUBREY DUNSHEE	MARK KRUMENACHER	MICHAEL MCCONNELL

SAMPLE PREPARATION

ALS CODE	DESCRIPTION
WEI-21	Received Sample Weight
SND-ALS	Send samples to internal laboratory
CRU-21	Crush entire sample
DISP-01	Disposal of all sample fractions
CRU-QC	Crushing QC Test
PUL-QC	Pulverizing QC Test
LOG-22	Sample login - Rcd w/o BarCode
CRU-31	Fine crushing - 70% <2mm
SPL-21	Split sample - riffle splitter
PUL-31	Pulverize up to 250g 85% <75 um

ANALYTICAL PROCEDURES

ALS CODE	DESCRIPTION	INSTRUMENT
S-IR06a	Sulphide Sulphur by HCl Leach	LECO
OA-VOL08m	Modified NP	
S-IR08	Total Sulphur (IR Spectroscopy)	LECO
OA-ELE07	Paste pH	

The results of this assay were based solely upon the content of the sample submitted. Any decision to invest should be made only after the potential investment value of the claim or deposit has been determined based on the results of assays of multiple samples of geological materials collected by the prospective investor or by a qualified person selected by him/her and based on an evaluation of all engineering data which is available concerning any proposed project. Statement required by Nevada State Law NRS 519

This is the Final Report and supersedes any preliminary report with this certificate number.Results apply to samples as submitted.All pages of this report have been checked and approved for release.
***** See Appendix Page for comments regarding this certificate *****

Signature: Hanach

Hanachi Bouhenchir, Lab Manager

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Project: Skunk Hollow Quarry

CERTIFICATE OF ANALYSIS RE22367616

Sample Description	Method / Analyte / Units / LOD	WEI-21 Recvd Wt. kg 0.02	OA-VOL08m NP tCaCO3/1Kt 1	OA-ELE07 pH Unity 0.1	OA-VOL08m NNP tCaCO3/1Kt 1	OA-VOL08m MPA tCaCO3/1Kt 0.3	OA-VOL08m Ratio (N Unity 0.01	S-IR08 S % 0.01	OA-VOL08m FIZZ RAT Unity 1	S-IR06a Sulphide % 0.01
SH-NE-Composite		0.74	861	8.3	858	3.1	275.52	0.10	4	0.12
SH-NW-Composite		0.86	902	8.2	899	3.4	262.40	0.11	4	0.13
SH-SE-Composite		0.62	932	8.4	926	5.9	156.97	0.19	4	0.19
SH-SW-Composite		0.60	874	8.3	869	4.7	186.45	0.15	4	0.17

***** See Appendix Page for comments regarding this certificate *****

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CERTIFICATE OF ANALYSIS RE22367616

CERTIFICATE COMMENTS

LABORATORY ADDRESSES

Processed at ALS Reno located at 4977 Energy Way, Reno, NV, USA.

Applies to Method:	CRU-21	CRU-31	CRU-QC	DISP-01
	LOG-22	PUL-31	PUL-QC	S-IR06a
	SND-ALS	SPL-21	WEI-21	

Processed at ALS Vancouver located at 2103 Dollarton Hwy, North Vancouver, BC, Canada.

Applies to Method:	OA-ELE07	OA-VOL08m	S-IR08

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Signature: Hanach

Hanachi Bouhenchir, Lab Manager

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STANDARDS								
Buffer pH6		6.1						
Buffer pH6		6.1						
Target Range - Lower Bound		5.3						
Upper Bound		6.7						
CDN-GS-15B								1.22
Target Range - Lower Bound								1.04
Upper Bound								1.30
DS-1								1.88
Target Range - Lower Bound								1.76
Upper Bound								2.17
GS310-10						0.28		
Target Range - Lower Bound						0.25		
Upper Bound						0.29		
GS313-8								0.83
Target Range - Lower Bound								0.64
Upper Bound								0.80
KZK-1	57		32	25.0	2.28		2	
KZK-1	56		31	25.0	2.24		2	
Target Range - Lower Bound	54		30	22.9	2.18		<1	
Upper Bound	64		38	27.1	2.53		>4	
MA-1b						1.19		
Target Range - Lower Bound						1.12		
Upper Bound						1.22		
NCSDC60120								2.05
Target Range - Lower Bound								1.70
Upper Bound								2.10
BLANKS								
BLANK		6.0						
Target Range - Lower Bound		5.5						
Upper Bound		6.9						
BLANK								<0.01
BLANK								<0.01
Target Range - Lower Bound								<0.01
Upper Bound								0.02
BLANK						<0.01		
Target Range - Lower Bound						<0.01		
Upper Bound						0.02		

***** See Appendix Page for comments regarding this certificate *****

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DUPLICATES									
SH-SW-Composite									0.17
DUP									0.18
Target Range - Lower Bound									0.16
Upper Bound									0.20
ORIGINAL			7.6						
DUP			7.8						
Target Range - Lower Bound			7.2						
Upper Bound			8.2						
ORIGINAL		13		11	2.2	5.94		1	
DUP		12		10	2.2	5.49		1	
Target Range - Lower Bound		11		9	1.8	5.42		<1	
Upper Bound		14		12	2.6	6.01		2	
ORIGINAL							14.55		
DUP							14.55		
Target Range - Lower Bound							14.20		
Upper Bound							[illegible]		

***** See Appendix Page for comments regarding this certificate *****

ALS USA Inc.
4977 Energy Way
Reno NV 89502
Phone: +1 775 356 5395 Fax: +1 775 355 0179
www.alsglobal.com/geochemistry

To: GZA GEOENVIRONMENTAL
17495 WEST SARAH LANE SUITE 100
BROOKFIELD WI 53045

Finalized Date: 23-MAR-2023
Account: GEOZAG

Project: Skunk Hollow Quarry

QC CERTIFICATE OF ANALYSIS RE22367616

CERTIFICATE COMMENTS

LABORATORY ADDRESSES

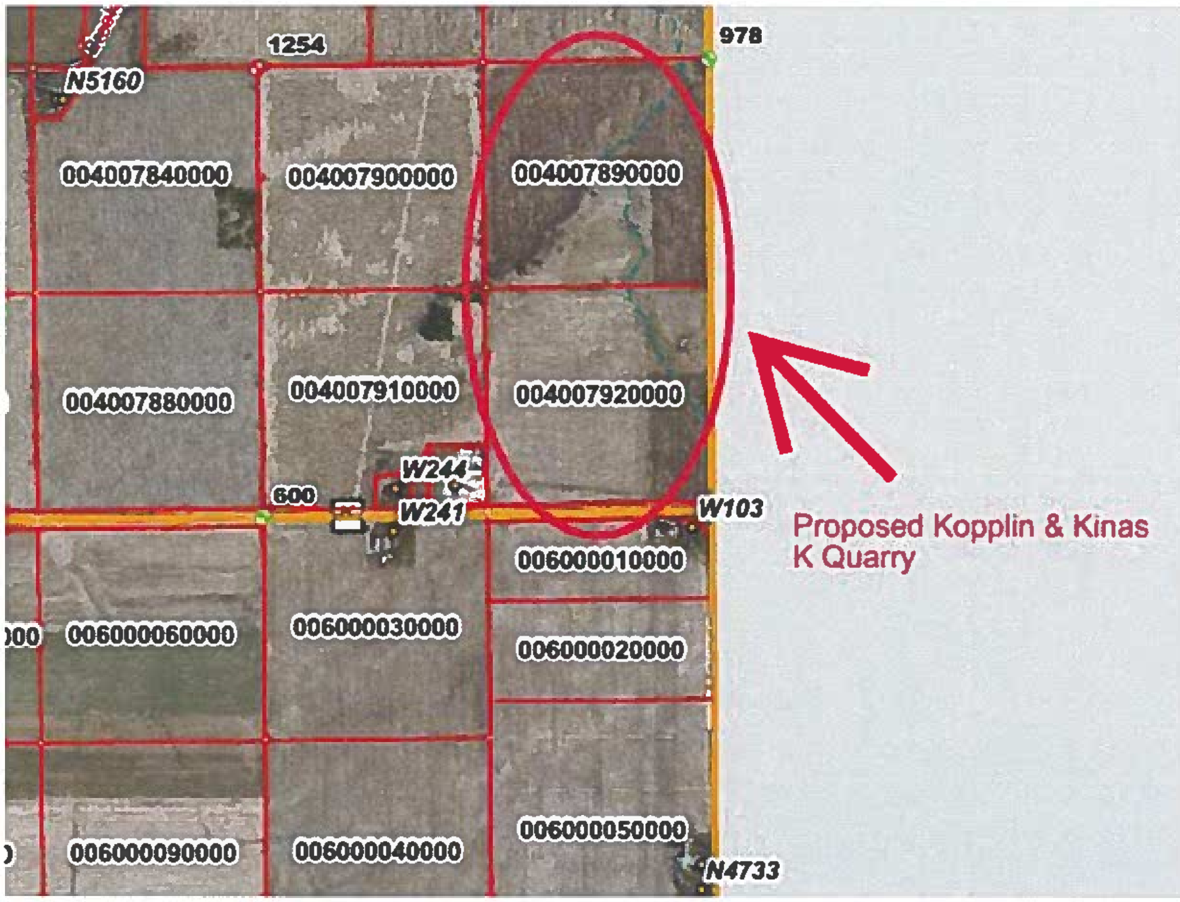
Processed at ALS Reno located at 4977 Energy Way, Reno, NV, USA.

Applies to Method:	CRU-21	CRU-31	CRU-QC	DISP-01
	LOG-22	PUL-31	PUL-QC	S-IR06a
	SND-ALS	SPL-21	WEI-21	

Processed at ALS Vancouver located at 2103 Dollarton Hwy, North Vancouver, BC, Canada.

Applies to Method:	OA-ELE07	OA-VOL08m	S-IR08

Consultation Report Kopplin & Kinas Company, Inc.



Review of Impacts to Residential Property Values Adjacent the Proposed Non-Metallic Mineral Extraction Site (K Quarry)

completed by

Scott L. MacWilliams Certified General Appraiser No. 91

S.L. MacWilliams Company

107 S. Main Street

Oregon, Wisconsin 53575

S.L. Mac Williams Company
107 South Main Street Oregon, WI 53575

May 29, 2024

Kathryn Sawyer-Gutenkunst
AXLEY ATTORNEYS
N17W24222 Riverwood Dr. Ste 250 | Waukesha, WI 53188

Mike McConnell
Kopplin & Kinas
W1266 N Lawson Dr, Green Lake, WI 54941

Mr. McConnelll:

Kopplin & Kinas Company, Inc. has made an application for a conditional use permit to open a non-metallic mineral extraction operation, in the Town of Brooklyn in Green Lake County Wisconsin. The site consists of two separate tax parcel (Tax Parcels 004007920000 and 004007890000). The proposes site is identified in this report as the **"K Quarry."**

I have been retained by your firm to address concerns regarding the impact if any of the proposed opening of the K Quarry on neighboring residential property values.

Based upon the information contained in this report, I have found no market-supported evidence that the opening and operation of the K Quarry for nonmetallic mining will adversely impact the neighboring residential property values.

I appreciate the opportunity to be of service.

Scott L. MacWilliams
State of Wisconsin Certified General Appraiser #91
Appraiser Qualifications Board USPAP Instructor 10635

Uniform Standards of Professional Appraisal Practice USPAP

The accepted measure of principles and practices is the *Uniform Standards of Professional Appraisal Practice* ("USPAP"). The purpose of the USPAP is to promote and maintain a high level of public trust in appraisal practice by establishing requirements for appraisers. It is essential that appraisers develop and communicate their analyses, opinions, and conclusions to intended users of their services in a manner that is meaningful and not misleading. The Appraisal Standards Board promulgates USPAP for both appraisers and users of appraisal services. The appraiser's responsibility is to protect the overall public trust and it is the importance of the role of the appraiser that places ethical obligations on those who serve in this capacity. USPAP reflects the current standards of the appraisal profession. USPAP does not establish who or which assignments must comply. Neither The Appraisal Foundation nor its Appraisal Standards Board is a government entity with the power to make, judge, or enforce law. Compliance with USPAP is required when either the service or the appraiser is obligated to comply by law or regulation, or by agreement with the client or intended users. When not obligated, individuals may still choose to comply. USPAP addresses the ethical and performance obligations of appraisers through Definitions, Rules, Standards, Standards Rules, and Statements on each of the Appraisal Standards. USPAP consists of 10 Standards and Standards Rules which are summarized below:

STANDARD 1: REAL PROPERTY APPRAISAL, DEVELOPMENT

STANDARD 2: REAL PROPERTY APPRAISAL, REPORTING

STANDARD 3: APPRAISAL REVIEW, DEVELOPMENT AND REPORTING

STANDARD 4: REAL PROPERTY APPRAISAL CONSULTING, DEVELOPMENT

STANDARD 5: REAL PROPERTY APPRAISAL CONSULTING, REPORTING

STANDARD 6: MASS APPRAISAL, DEVELOPMENT AND REPORTING

STANDARD 7: PERSONAL PROPERTY APPRAISAL, DEVELOPMENT

STANDARD 8: PERSONAL PROPERTY APPRAISAL, REPORTING

STANDARD 9: BUSINESS APPRAISAL, DEVELOPMENT

STANDARD 10: BUSINESS APPRAISAL, REPORTING

Standards Rules 1 and 2 relate to Real Property Appraisal Development and Reporting and are the applicable Standards for this review.

Statement of Purpose

Kinas and Kopplin has made an application for a conditional use permit and rezone application to open a non-metallic mineral extraction operation which is identified in this report as the "K Quarry". I have been retained to address concerns regarding the impact if any of the proposed opening of the K Quarry on neighboring residential property values.

Scope of Work and Methodology

The purpose of this report is to opine as to the impact on neighboring residential property values of the proposed expansion. External Obsolescence (Environmental Obsolescence) is the loss in value as a result of impairment in utility and desirability caused by factors external to the property (outside of the property's boundaries) and is generally deemed to be incurable.

Evidence of External Obsolescence is impacting a residential neighborhood Includes:

1. **Protracted marketing times** for properties offered for sale in close proximity to the incompatible land use.
    a. This factor is based upon the principal of substitution. Purchasers of homes have alternatives, if a home is located proximate to a negative incompatible use buyer will normally simply choose not to consider the property and will look elsewhere.
2. **Lower sales prices** for home sold proximate to the incompatible use versus homes not impacted;
    a. If a purchaser considers a property located proximate to a negative or incompatible use, they will normally offer less money than a property not similarly impacted.
3. **Difficulty in obtaining mortgage financing**:
4. **A Lack of development** activity proximate to the incompatible use.
    a. The lack of residential development proximate to an incompatible use is based upon the principal of substitution. A person interested in buying a lot and building a new home will avoid purchasing a land use proximate and incompatible use if they feel it will negatively impact the value. They will simply purchase an alternative lot. If a use is impacting residential property values, it will be evidenced by a lack of new home development in the area.

Impacts as a result of external obsolescence are more pronounced for higher valued properties.

The existing residential development in the immediate area of the proposed mine consists primarily of agricultural use with scattered rural residential development.

In order to assess impact of the proposed mining operation, I have completed the following analyses:

1. Analysis No. 1 Reviewed 5 sales of residential properties in close proximity to existing active mineral extraction sites in the Green Lake County Wisconsin.
2. Analysis No. 2: Reviewed nine residential sales of homes located in the Winfield Estates Subdivision. The Winfield Estates is a upscale 59 lot residential subdivision located on the east side of Mile Road directly east of the existing Windsor Quarry in the Town of Windsor Dane County Wisconsin.
3. Analysis No. 3: Reviewed recent home construction and reviewed eight residential sales which occurred between July of 2012 and June of 2017, located within 1.5 miles of the sand and gravel quarry owned by Rocky Rights LLC, located at 2294 USH 12&18 in the Town of Cottage Grove, Dane County Wisconsin.
4. Analysis NO. 4 Reviewed 3 sales of residential home located in close proximity to the Mann Sand and Gravel located in Elkhorn Wisconsin.
5. Analysis No. 5 Reviewed 4 sales or residential property located proximate the Aggrecon and Kiel Sand and Gravel in Town of Kiel Sheboygan County Wisconsin.

Analysis No. 1 Sales Proximate to Existing Mineral Extraction Sites in Green Lake County

I have reviewed sales information from the South-Central Wisconsin Multiple Listing Service (SCWMLS) for residential sales (Proximate Homes) located in close proximity to existing surfaces mining operations in Green Lake County. I was able to locate 5 sales of homes which were located in close proximity which occurred between 2021-2023 . The sales were examined for proximity (feet) from the existing mining operations of the existing quarry the list to sales price ratio (percentage of sales price to list price); marketing time (DOM): and average sales price/SF. The averages for the proximate sales are highlighted in yellow in the chart below:

Proximate Sales /Summary

No	MLS No.	Address	Sale Date	List Price	Sale Price	Bldg SF	Price/SF	% Sale/List	Distance	DOM
1	1918659	W5706 Oxbow Trail	Sep-21	$280,000	$270,000	700	$385.71	96%	195	3
2	1919184	W5674 Oxbow	Sep-21	$350,000	$375,000	1,040	$360.58	107%	365	4
3	1864000	W5694 Oxbow	Sep-21	$280,000	$280,000	720	$388.89	100%	220	4
4	1822914	N4982 Sugar Loaf Road	Nov-23	$620,000	$620,000	1,727	$359.00	100%	965	4
5	1931455	W4827 Cradle Road	May-23	$249,500	$249,500	1,500	$166.33	100%	445	21
		Average Proximate		$296,583	$299,083	948	$276.75	101%	438	7

CMA Summary Report

Single Family Summary Statistics

High	Low	Average	Median
LP:$470,000	$249,900	$324,783	$304,500
SP:$470,000	$246,000	$323,150	$307,500

Single Family - Sold

Number of Properties: 6

Num	MLS #	Address	Location	Beds	TotBth	AbvGrdSqFt	FinSqFt	DOM	LP	LP/FinSqFt	SP	SP/FinSqFt
1	1837902	510 Center Rd	RUTLAND - T	3	1.0	1,040	1,040	2	$249,900	$240.29	$246,000	$236.54
2	1796864	490 Game Ridge Tr	RUTLAND - T	3	2.5	1,707	2,295	116	$284,900	$124.14	$273,000	$118.95
3	1864000	444 Meander Wood Rd	RUTLAND - T	4	2.0	1,397	2,590	55	$299,000	$115.44	$305,000	$117.76
4	1822914	508 MEANDER WOOD RD	RUTLAND - T	3	2.0	1,414	2,139	3	$310,000	$144.93	$310,000	$144.93
5	1851912	427 Game Ridge Tr	RUTLAND - T	3	3.0	1,568	2,438	21	$334,900	$137.37	$334,900	$137.37
6	1870747	645 Center Rd	RUTLAND - T	3	3.0	1,491	2,647	0	$470,000	$177.56	$470,000	$177.56
Avg				3	2.25	1436	2191	32	$324,783	$156.62	$323,150	$155.52
Min				3	1.00	1040	1040	0	$249,900	$115.44	$246,000	$117.76
Max				4	3.00	1707	2647	116	$470,000	$240.29	$470,000	$236.54
Med				3	2.25	1452	2366	12	$304,500	$141.15	$307,500	$141.15

Search Results SCWMLS for Proximate Sales 195 feet to 995 feet from existing mineral extraction sites.

MLS : 1918659 **Sold** **Single Family** **Price: $280,000**

W5706 Oxbow Tr		**Town**	Princeton
Princeton		**County:**	Green Lake
WI 54968		**Subdivision:**	
Bedrooms:	3	**Est Fin Above Grade SqFt:**	700
Full Baths:	1	**Est Fin Below Grd Exp SF:**	700
Half Baths:	1	**Est Total Finished SqFt:**	1,400 *Assessor/Pi*
Year Built:	1975 *Assessor/Pi*	**Open House:**	
Full Garage Stalls:	2		
Schedule a Showing		**Show Date:**	

Data From: South Central WI MLS

Hwy 23 to T to R on Oxbow

Living Rm	L	12x20	**Primary BedRm**	U	10x15	**Laundry**	L		**Baths**			**School Info**
Great Rm			**2nd BedRm**	U	10x12	**Three-Seas**	M	10x19		**Full**	**Half**	**(D)** Princeton
Kitchen	L	9x22	**3rd BedRm**	U	9x9				**Upper:**	1	0	**(E)** Princeton
Dining Rm			**4th BedRm**						**Main:**	0	0	**(M)** Princeton
Dining Area			**5th BedRm**						**Lower:**	0	1	**(H)** Princeton
Family Rm			**Den/Office**			**Rec Rm**						

Acres:	1.3000 *Assessor/PubRec*	**Zoning:**	UNZ	**Parcel #:**	016-01373-0000
LotSize:	1.3	**HOA Dues/Yr:**		**Land Assess:**	$ 45,700
WaterFrontage:	240 *Plat Map/Survey*			**Improvements:**	$ 105,300
Lake/River:	Fox & Puckaway	**Owner:**		**Total Assess:**	$ 151,000 / 2020
Lake Size:	**Lake Depth:**	**Builder:**		**Net Taxes:**	$ 2,173 / 2020

Type 2 story, Multi-level
Architecture Bi-level
Primary Bed Bath None
Kitchen Features Pantry, Range/Oven, Refrigerator, Dishwasher, Microwave
Basement Full, Full Size Windows/Exposed, Walkout to yard, Total finished, Poured Concrete Foundatn
Exterior Vinyl, Brick/Stone
Garage 2 car, Attached, Opener
Driveway Paved
Lot Description Wooded, Rural-not in subdivision

Fuel Natural gas
Heating /Cooling Forced air, Central air
Water/Waste Private Well, Non-Municipal/Prvt dispos
Waterfront Has actual water frontage, River, Dock/Pier, Water ski lake
Barrier free Open floor plan, Level drive, Level lot, Width of hallways 36"+, Door openings 29+, Low pile or no carpeting

Interior Features Wood or sim. wood floor, Walk-in closet(s), Vaulted ceiling, Water softener inc, Cable available, High Speed Internet
Exterior Features Deck, Patio

Included: Stove/Oven, Refrigerator, Dishwasher, Microwave, Water Softener, Electric Pet Fencing system

Excluded: Sellers Personal Property

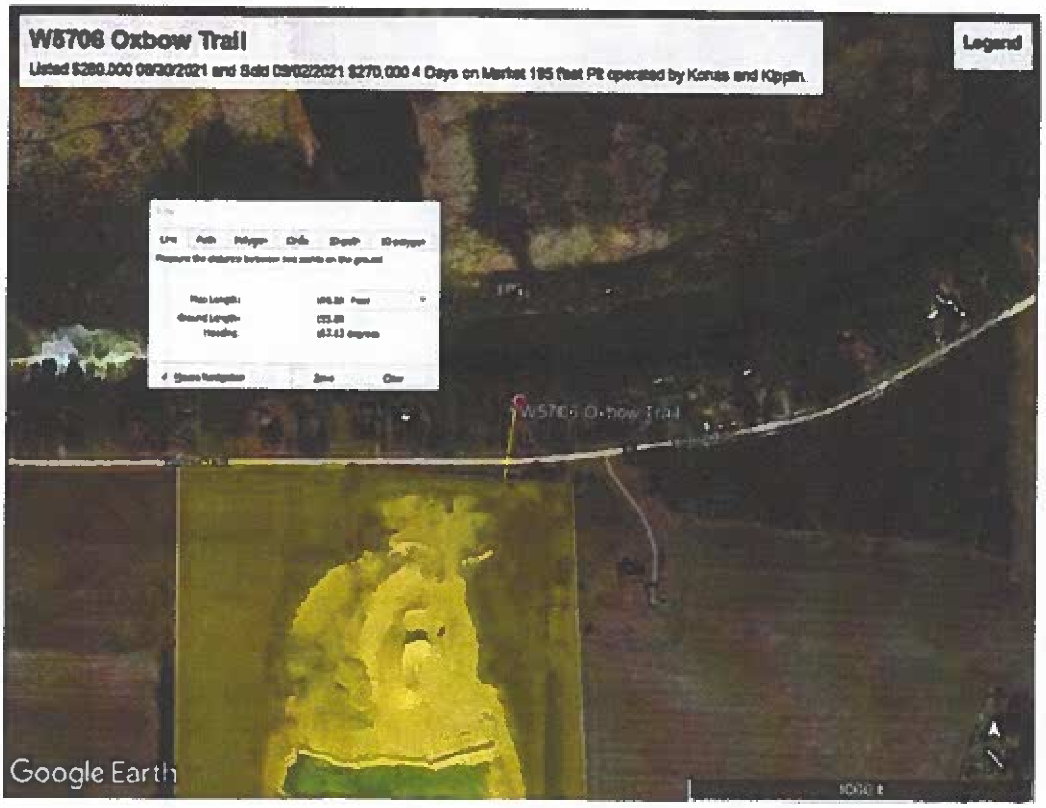
240 feet of frontage on the Fox River. The Fox River has access to the 5500 acre Lake Puckaway. This 3 bedroom home has water views from nearly every room in the house. New roof with vaulted ceilings, all new interior drywall, updated electrical and plumbing. Open concept kitchen has concrete counter tops, rustic ceramic tile, hickory cabinets, and stainless steel appliances. The newly remodeled bathroom has tiled shower, glass door and double shower heads. Large lot with mature trees and million dollar views of the River. Attached garage and four seasons room offers heat and ac in garage. Enjoy as a vacation retreat or year round home. Wildlife galore and sunsets of serenity. Live in paradise!

Sale Agent: Danielle Fralish, Beiser Realty

Rochelle Ford - 920-807-4560
rochelleinspires@gmail.com 53773-90
Wisconsin Special Properties
920-948-4910 Fax#
631 W Water St
PRINCETON WI 54968-9144
Sale Agent: SCWMLS Non-Member
South Central Non-Member - Off: 608-240-2800

Sold Price: $270,000
Concessions: 0
Financing: Conventional

List Date:	8/30/2021	**Electronic Consent:**	Yes
Expire Date:		**Exclusive Agency:**	No
Subagent Comm:	2.4	**Licensee Interest:**	No
BuyerAgent Comm:	2.0	**Limited Service:**	No
Days On Market:	3	**Multiple Rep:**	Yes
AO Date:	9/2/2021	**Named Exceptions:**	No
Closing Date:	10/14/2021	**Policy Letter:**	No
Sale Factors:	Arms Length	**Variable Comm:**	No


W5706 Oxbow Trail
Listed $280,000 08/30/2021 and Sold 09/02/2021 $270,000 4 Days on Market 185 feet Pit operated by Konas and Kipplin.
Legend
W5706 Oxbow Trail
Google Earth

8

MLS : 1919184 **Sold** **Single Family** **Price: $350,000**

W5674 Oxbow Tr		**Town**	Princeton
Princeton		**County:**	Green Lake
WI 54968		**Subdivision:**	
Bedrooms:	2	**Est Fin Above Grade SqFt:**	1,040
Full Baths:	1	**Est Fin Below Grd Exp SF:**	700
Half Baths:	1	**Est Total Finished SqFt:**	1,740 *Seller*
Year Built:	1978 *Other*	**Open House:**	
Full Garage Stalls:	2		
Schedule a Showing		**Show Date:**	

Data From: South Central WI MLS

Oxbow Trail Just south of Princeton

Living Rm	M	20x12	**Primary BedRm**	M	16x12	**Laundry**	L		**Baths**		**School Info**
Great Rm			**2nd BedRm**	L	14x12				**Full**	**Half**	**(D)** Princeton
Kitchen	M	14x13	**3rd BedRm**					**Upper:**	0	0	**(E)** Princeton
Dining Rm			**4th BedRm**					**Main:**	1	1	**(M)** Princeton
Dining Area			**5th BedRm**					**Lower:**	0	0	**(H)** Princeton
Family Rm	L	12x18	**Den/Office**	L	18x14	**Rec Rm**					

Acres:	0.3700 *Assessor/PubRec*	**Zoning:**	UZN	**Parcel #:**	016-01426-0000
LotSize:	0.37	**HOA Dues/Yr:**		**Land Assess:**	$ 36,900
WaterFrontage:	80 *Other*			**Improvements:**	$ 108,500
Lake/River:	Fox	**Owner:**	Ford	**Total Assess:**	$ 145,400 / 2020
Lake Size:	**Lake Depth:**	**Builder:**		**Net Taxes:**	$ 2,230 / 2020

Type	1 story	**Fuel**	Natural gas
Architecture	Ranch	**Heating /Cooling**	Forced air, Central air
Primary Bed Bath	Full, Yes, Walk-in Shower, Separate Tub, Tub/Shower Combo	**Water /Waste**	Joint well, Non-Municipal/Prvt dispos
Kitchen Features	Breakfast bar, Kitchen Island, Range/Oven, Refrigerator, Dishwasher, Microwave	**Waterfront**	Has actual water frontage, River, Dock/Pier, Water ski lake, Boat Slip
Fireplace	Gas burning, Electric, 2+ Fireplaces	**Barrier free**	Open floor plan, First floor bedroom, First floor full bath, Level drive, Level lot, Door openings 29+, Low pile or no carpeting
Basement	Full, Full Size Windows/Exposed, Walkout to yard, Partially finished, Sump pump, 8'+ Ceiling, Block Foundation		
Exterior	Vinyl		
Garage	2 car, Attached, Opener		
Driveway	Paved		

Interior Features Wood or sim. wood floor, Walk-in closet(s), Washer, Dryer, Water softener inc, Security system, Jetted bathtub, Cable available, High Speed Internet, At least 1 tub, Tankless Water Heater

Exterior Features Deck, Patio, Fenced Yard, Storage building

Included: Stove, Refrigerator, Washer, Dryer, Dishwasher, Pier, Water Softener, Microwave.

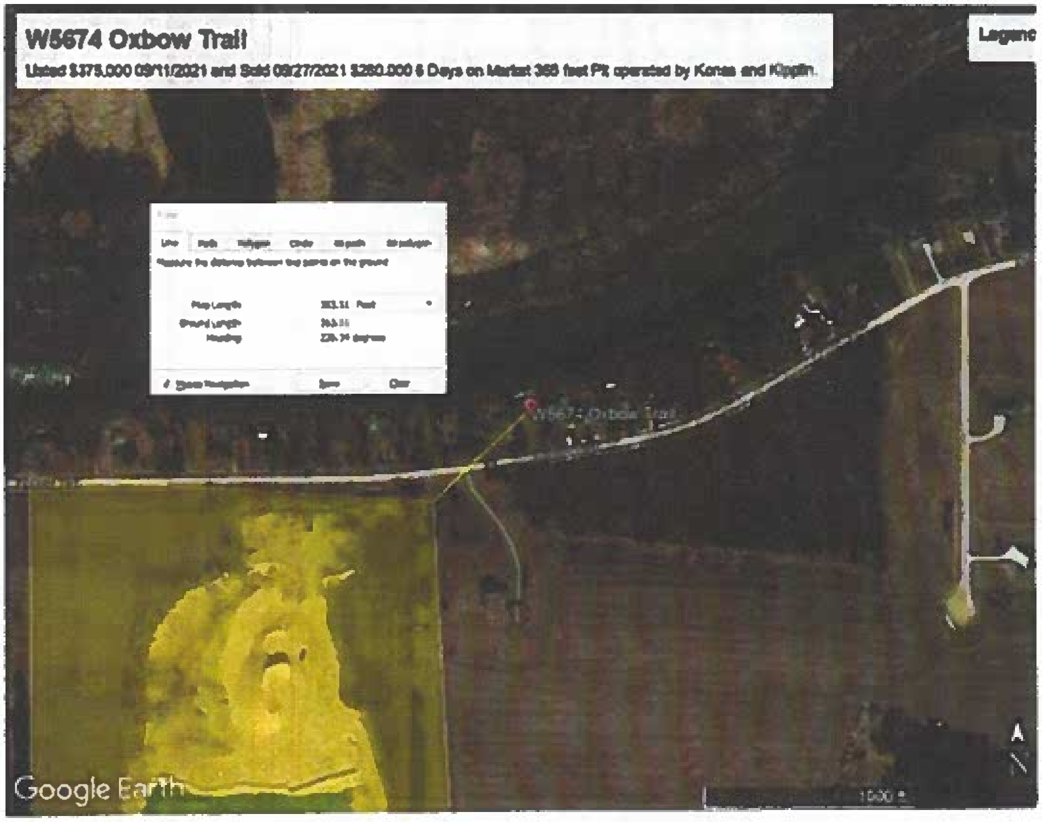
Excluded:

OPEN HOUSE SAT 10-11am Ranch home w/walk out makes you feel on vacation every day wildlife everywhere Custom 2 Bed/1.5 Bath Elite Premium Clad Dbl Hung windows & doors, white diamond quartz countertops, Appliances incl. custom espresso cabinets w/crown molding, triple head custom shower, jetted tub, Grohe faucets, Master En suite w/Allen Roth custom walk in closet, Floor to ceiling zilges fireplace, Custom Bar, Klearvue cabinets, Bar refrigerator, Guest bed w/walk thru closet electric fireplace, turn-key home open concept living, four patio doors off extra-large trex deck with amazing views river access to 5,500 Lake Puckaway. Rinnai on demand water heating system, Boss Water Softener, lower level family room, In home office and workout room. Furnishings negotiable. Move in ready

Seller is a licensed wisconsin real estate broker.

Rochelle Ford - 920-807-4560		**List Date:**	9/7/2021	**Electronic Consent:**	Yes
rochelleinspires@gmail.com	53773-90	**Expire Date:**		**Exclusive Agency:**	No
Wisconsin Special Properties		**Subagent Comm:**	2.4	**Licensee Interest:**	Yes
920-948-4910 Fax#		**BuyerAgent Comm:**	2.0	**Limited Service:**	No
631 W Water St		**Days On Market:**	4	**Multiple Rep:**	No
PRINCETON WI 54968-9144	**Sold Price:** $375,000	**AO Date:**	9/11/2021	**Named Exceptions:**	No
Sale Oleg Kizimenko - 608-448-9288	**Concessions:** 0	**Closing Date:**	9/17/2021	**Policy Letter:**	No
Agent: Madison Realty Group - 608-212-8629	**Financing:** Cash	**Sale Factors:**	Arms Length	**Variable Comm:**	No

W5674 Oxbow Tr $350,000 1919184 *Printed By:Scott MarWilliams* *05/24/2024 11:33 AM* *Not for Public Distribution*


W5674 Oxbow Trail
Listed $375,000 09/11/2021 and Sold 09/27/2021 $260,000 6 Days on Market 368 feet Pit operated by Kones and Kipplin.
Google Earth

MLS : 1962281 **Sold** **Single Family** **Price: $620,000**

N4982 Sugar Loaf Road
Green Lake
WI 54941

Town Brooklyn
County: Green Lake
Subdivision: Norwegian Oaks Estate

Bedrooms: 3
Full Baths: 3
Half Baths: 1
Year Built: 2017 *Assessor/P*
Full Garage Stalls: 3

Est Fin Above Grade SqFt: 1,727
Est Fin Below Grd Exp SF: 1,360
Est Total Finished SqFt: 3,087 *Blue Print*
Open House:

Schedule a Showing

Show Date:

Data From: South Central WI MLS

State Rd 23 to County Rd T. T to Sugar Loaf to address

Room	Lvl	Size	Room	Lvl	Size	Room	Lvl	Size
Living Rm	M	22x18	**Primary BedRm**	M	15x14	**Laundry**	M	8x7
Great Rm			**2nd BedRm**	M	13x10	**Exercise R**	L	28x20
Kitchen	M	17x12	**3rd BedRm**	L	13x10			
Dining Rm			**4th BedRm**					
Dining Area	M	17x8	**5th BedRm**					
Family Rm	L	22x14	**Den/Office**			**Rec Rm**		

Baths	**Full**	**Half**
Upper:	0	0
Main:	2	1
Lower:	1	0

School Info
(D) Green Lake
(E) Green Lake
(M) Green Lake
(H) Green Lake

Acres: 0.6900 *Assessor/PubRec*
LotSize: 0.69
WaterFrontage:
Lake/River: Big Green
Lake Size: **Lake Depth:**

Zoning: R1
HOA Dues/Yr:
Owner:
Builder: Quade

Parcel #: 004016290000
Land Assess: $ 39,500
Improvements: $ 251,500
Total Assess: $ 291,000 / 2022
Net Taxes: $ 4,213 / 2022

Type	1 story
Architecture	Ranch
Primary Bed Bath	Full, Yes, Walk-in Shower
Kitchen Features	Kitchen Island, Range/Oven, Refrigerator, Dishwasher
Fireplace	Wood burning
Basement	Full, Partially finished, Poured Concrete Foundatn
Exterior	Brick/Stone, Fiber cement
Garage	3 car, Attached, Opener
Driveway	Unpaved, Paved
Lot Description	Wooded, Rural-in subdivision
Fuel	Liquid propane
Heating/Cooling	Forced air, Central air
Water/Waste	Private Well
Waterfront	Deeded access, Other type of water, Channel, Boat Ramp/Lift
Barrier free	Open floor plan, First floor bedroom, First floor full bath, Level drive, Level lot

Interior Features Wood or sim. wood floor, Walk-in closet(s), Vaulted ceiling, Washer, Dryer, Water softener inc
Exterior Features Patio

Included: Stove, Refrigerator, Dishwasher, Washer, Dryer, Water Softener, Curtain Rods. 3 sided shed for wood

Excluded: Sellers Personal Property, Curtains, LP Tank Leased

"Immaculate Top To Bottom" is an understatement! This home is so well built and attractive that it is hard to explain. Open concept between the living room, kitchen and dining area. Exquisite kitchen with movable island, trayed ceiling above the dining table, vaulted ceiling and gorgeous fireplace in the living room, master suite with trayed ceiling, huge walk-in closet and tiled shower. The lower level has the tubing for in-floor heat egress windows in the bedroom and family room and a huge workout/2nd family room/office or for whatever your needs are. The oversized garage has room for 3 vehicles. Enjoy nature on the back patio. All this and access to Big Green Lake via a boat launch. Don't Wait! Call Today!

Tony Dolgner - 920-570-2143
tonydd@charter.net 49247-90
Century 21 Properties Unlimited
920-748-2865 Fax# 920-748-5858
1194 W Fond Du Lac St
RIPON WI 54971-9210
Sale Agent: Robert Schmidt - 608-843-7627
Century 21 Properties Unlimited - 920-748-2865

Sold Price: $620,000
Concessions: 0
Financing: Conventional

List Date: 8/17/2023
Expire Date:
Subagent Comm: 1.8%
BuyerAgent Comm: 1.8%
Days On Market: 4
AO Date: 8/21/2023
Closing Date: 11/28/2023
Sale Factors: Arms Length

Electronic Consent: Yes
Exclusive Agency: Yes
Licensee Interest: No
Limited Service: No
Multiple Rep: DA
Named Exceptions: No
Policy Letter:
Variable Comm: Yes


N4982 Sugar Loaf Road
Listed $820,000 08/17/2023 and Sold 08/21/2023 $820,000 4 Days on Market 990 feet from Kalpe Peterson Pit operated by Kor
Legend
Green Lake County
Untitled Polygon
Untitled Polygon
W4827 Cradle Rd
N4982 Sugar Loaf Rd
Google Earth
N

MLS : 1931455 **Sold** **Single Family** **Price: $249,500**

W4827 Cradle Rd
Princeton
WI 54968

Town Princeton
County: Green Lake
Subdivision:

Bedrooms:	3	**Est Fin Above Grade SqFt:**	1,500
Full Baths:	2	**Est Fin Below Grd Exp SF:**	70
Half Baths:	0	**Est Total Finished SqFt:**	1,570 *Seller*
Year Built:	1972 *Other*	**Open House:**	
Full Garage Stalls:	6		

Schedule a Showing **Show Date:**

Data From: *South Central WI MLS*

From Princeton take County Road D south, LEFT on Cradle Road. Property on left.

Living Rm	M 13x25	**Primary BedRm**	M 13x13	**Laundry**			
Great Rm		**2nd BedRm**	M 13x10				
Kitchen	M 13x18	**3rd BedRm**	M 13x8				
Dining Rm	M 13x10	**4th BedRm**					
Dining Area		**5th BedRm**					
Family Rm		**Den/Office**		**Rec Rm**			

Baths	**Full**	**Half**	**School Info**
			(D) Princeton
Upper:	0	0	**(E)** Call School District
Main:	1	0	**(M)** Call School District
Lower:	1	0	**(H)** Princeton

Acres:	0.5000 *Plat Map/Survey*	**Zoning:**	Unzoned	**Parcel #:**	016-01466-0000
LotSize:	0.5 100x225	**HOA Dues/Yr:**		**Land Assess:**	$ 0
WaterFrontage:				**Improvements:**	$ 0
Lake/River:		**Owner:**		**Total Assess:**	$ 0 / 2021
Lake Size:	**Lake Depth:**	**Builder:**		**Net Taxes:**	$ 1,318 / 2021

Type 1 story
Architecture Ranch
Primary Bed Bath None
Kitchen Features Range/Oven, Dishwasher, Microwave
Basement Full, Walkout to yard, Partially finished, Block Foundation
Exterior Vinyl
Garage Attached, Opener, 4+ car, Garage Stall > 26' Deep
Driveway Paved
Lot Description Wooded, Rural-not in subdivision

Fuel Natural gas
Heating/Cooling Forced air, Central air
Water/Waste Non-Municipal/Prvt dispos
Barrier free First floor bedroom, First floor full bath, Level drive, Level lot

Interior Features Wood or sim. wood floor, Cable available, High Speed Internet, At least 1 tub
Exterior Features Deck

Included: Stove, Microwave, Dishwasher

Excluded: Seller's Personal Property.

Beautiful newly updated home on nice lot with a HUGE garage. Almost everything is NEW...new roof, siding, windows. New custom maple cabinets and countertops, new luxury vinyl planking and carpeting throughout. New custom maple bathroom vanity and linen cabinet. Brand new furnace and central air, all new plumbing. Brand new wood deck. Brand new septic system. New privacy fence. This place has everything and is ready to move in. Attached garage 30x 70 feet. Seller is a licensed WI broker. Buyer to verify measurements if material.

Selling Agent Jill Coenen, C21-Ace

Derek Kavanaugh - 920-299-1091
DerekSellsWI@gmail.com 58958-90
Wisconsin Special Properties
920-948-4910 Fax #
631 W Water St
PRINCETON WI 54968-9144
Sale Agent: SCWMLS Non-Member
South Central Non-Member - Off: 608-240-2800

Sold Price: $249,500
Concessions: 0
Financing: Cash

List Date:	4/9/2022	**Electronic Consent:**	Yes
Expire Date:		**Exclusive Agency:**	Yes
Subagent Comm:	2%	**Licensee Interest:**	Yes
BuyerAgent Comm:	2%	**Limited Service:**	No
Days On Market:	23	**Multiple Rep:**	Yes
AO Date:	5/2/2022	**Named Exceptions:**	No
Closing Date:	5/20/2022	**Policy Letter:**	No
Sale Factors:	Arms Length	**Variable Comm:**	No

Conclusions Analysis No. 1 Sales Proximate to Existing Mineral Extraction Sites in Green Lake County

I have reviewed sales information from the South-Central Wisconsin Multiple Listing Service (SCWMLS) for residential sales (Proximate Homes) located in close proximity to existing surfaces mining operations in Green Lake County. I was able to locate 5 sales of homes which were located in close proximity which occurred between 2021-2023 . The sales were examined for proximity (feet) from the existing mining operations of the existing quarry the list to sales price ratio (percentage of sales price to list price); marketing time (DOM): and average sales price/SF. The sales ranged in between $249,500 to $620,000. Four of the sales were located adjacent Kinas and Kopplin operating mineral extraction sites. The sales were sold for 100% of asking price and the average days on market ranged between 3 and 21 days with an average of 7 days. The closest sale was 195 feet from the existing quarry operation with the greatest distance being 965 feet. Each of the properties sold between 96% to 107% of their asking price. There was no impact as to either price (101% of List Price) or Marketing Time (average less than 7 days)

Analysis No. 2 Review of 9 Residential Sales in Winfield Estates Proximate to Windsor Mile Road Quarry

Winfield Estates is an upscale residential subdivision which is located in the Town of Bristol which was developed in the late 1990's. The subdivision is located on the east side of Mile Road in close proximity to the Northwestern Stone Windsor Quarry located at 7281 Mile Road. The Windsor Quarry LLC owns a total of 132 acres on the south side of Mueller Road and the west side of Mile Road in the Village of Windsor. The current operations Windsor quarry is a Limestone Quarry which processes Crushed Stone-Sand-Boulders- and offers custom crushing. A commonly cited concern of homes owners located in close proximity to a mine will be a negative impact of mining operation on home values. The negative impact is evidenced by increased marketing time, and reduced sales prices. In this analysis we examine the sales of eight homes properties which were located in close proximity Windsor Quarry operations. The sales were examined for proximity (miles) from the existing mining operations of the Windsor Quarry; the list to sales price ratio (percentage of sales price to list price); and for marketing time (DOM). The sales details and their locations proximate to the operating pits are summarized below:

Proximate Sales Summary

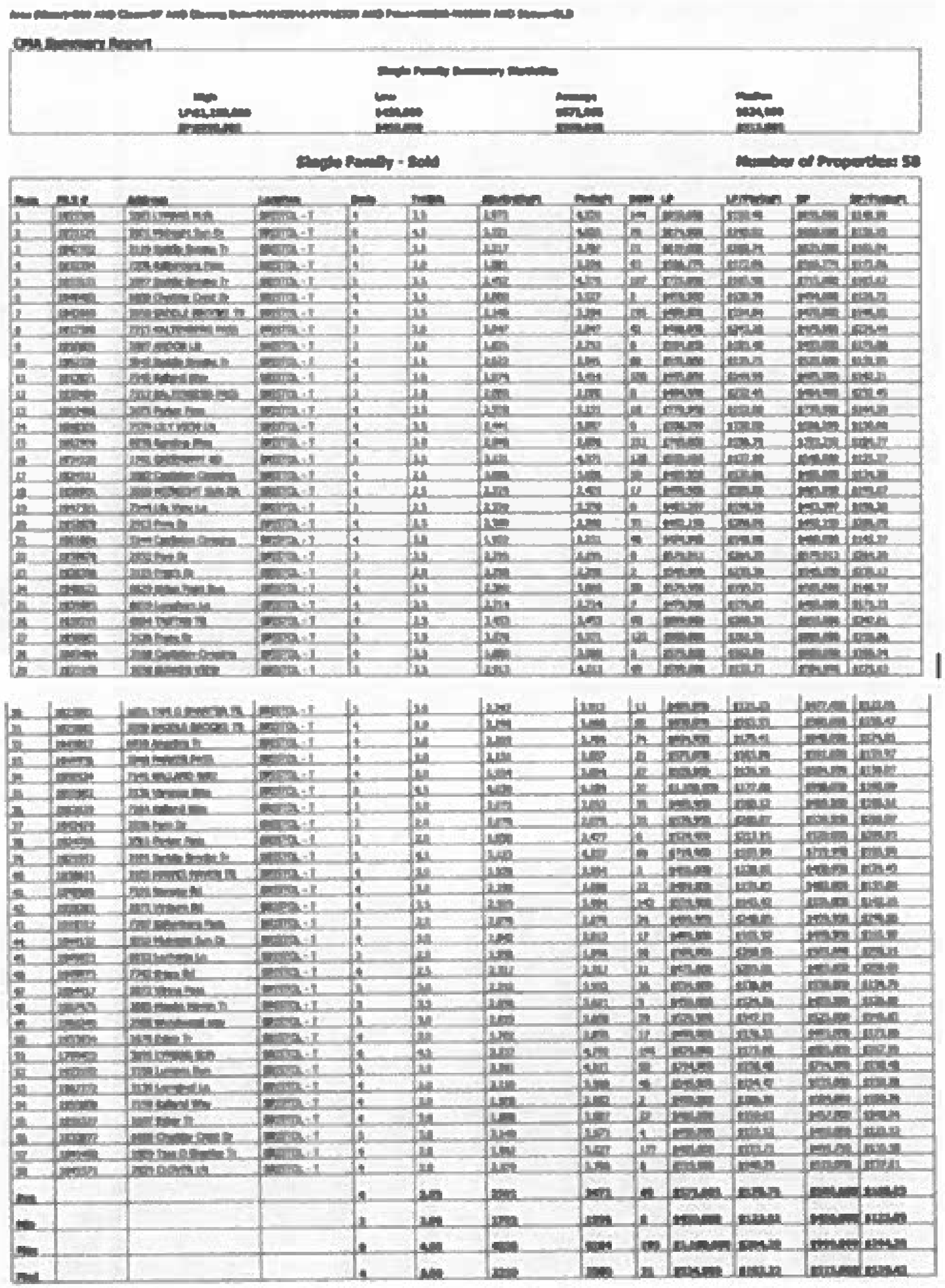
No	MLS No.	Address	Sale Date	List Price	Sale Price	Bldg SF	Price/SF	% Sale/List	Distance	DOM
1	1863464	3168 Castleton Crossing	Aug-19	$579,900	$600,000	3,560	$168.54	103%	0.29	5
2	1861804	3144 Castleton Crossing	Sep-19	$474,900	$460,000	3,231	$142.37	97%	0.36	46
3	1857475	3085 Hawks Haven Trail	Jun-19	$450,000	$459,500	3,621	$126.90	102%	0.45	9
4	1855808	7159 Kalland Way	Jun-19	$499,900	$504,900	2,682	$188.26	101%	0.53	2
5	1885165	7145 Mile Road	Jul-20	$899,900	$910,000	3,849	$236.43	101%	0.57	5
6	1813671	7145 Kalland Way	Apr-18	$495,000	$485,500	3,414	$142.21	98%	0.53	100
7	1739403	3198 Castleton Crossing	Jan-16	$850,000	$815,000	3,196	$255.01	96%	0.19	2
8	1867372	3130 Lorrabud Lane	Dec-19	$549,900	$535,000	3,560	$150.28	97%	0.61	246
9	1850534	7141 Kalland Way	Apr-19	$509,900	$504,500	3,654	$138.07	99%	0.53	27
		Average Proximate		$533,684	$586,044	3,419	$171.43	110%	0.39	49

It would be noted that in the past 3 years there have been only 8 residential sales recorded in the South Central Multiple Listing Service in the in the Village of Windsor and the Town of Bristol in excess of $800,000. Two of these sales (No 5 and No. 7) were reviewed proximate sales to the existing Windsor Quarry.

I have reviewed 9 sales which located an average of .39 miles from the existing Mile Road Quarry. The average sales price for the 9 reviewed proximate sales was $586,044 the average square footage was 3013 sf with this represented an average sales price per SF of $which represented a sales price of $171.43. The percentage of sales price to list price was 99%. The average sales price/Sf for the proximate sales was $171.43/SF.

Comparison to All Residential Sales

The residential sales in close proximity to the Windsor Quarry (Mile Road) were analyzed based upon the sales price to list price ration, average day on market (DOM), and sales price per SF. The 9 reviewed sales are in an area designated in the South-Central Wisconsin Multiple Listing Service as area D09. I have reviewed all of the sales in the years 2018 and 2019 between $450,000 and $1,000,000 located in area D09. The total number of sales was 58. The average days on market was 49 days which was the same as the proximate sales (49Days) . Average list price ($571,065) to sales price ($560,660) ratio (98%) compared to 99% for the reviewed proximate sales. The sales price per gross SF was the average sales price gross /Sf for the proximate sales was $175.93/SF compared to $171.43 for all sales in the area.



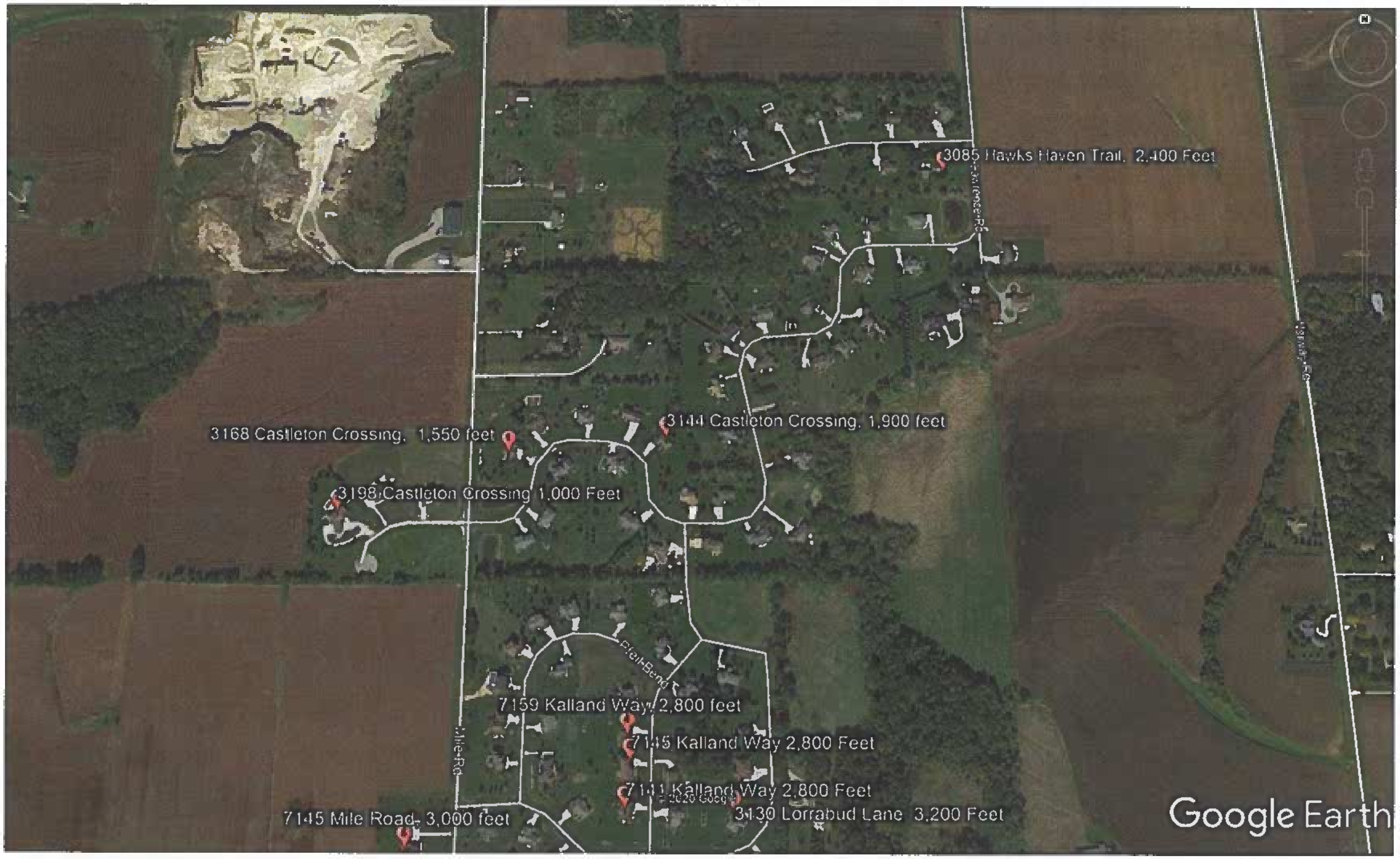
Proximate Sales Price/Assessment

The assessed value at the time of sale is compared to the sales prices for the 9 sales proximate to the Mile Road Quarry in the Chart below:

No	MLS No.	Address	Sale Date	Assessed	Sale Price	Assessed/Sales Price Ration
1	1863464	3168 Castleton Crossing	Aug-19	$427,100	$600,000	140%
2	1861804	3144 Castleton Crossing	Sep-19	$379,300	$460,000	121%
3	1857475	3085 Hawks Haven Trail	Jun-19	$374,300	$459,500	123%
4	1855808	7159 Kalland Way	Jun-19	$377,600	$504,900	134%
5	1885165	7145 Mile Road	Jul-20	$652,300	$910,000	140%
6	1813671	7145 Kalland Way	Apr-18	$376,100	$485,500	129%
7	1739403	3198 Castleton Crossing	Jan-16	$574,500	$815,000	142%
8	1867372	3130 Lorrabud Lane	Dec-19	$421,500	$535,000	127%
9	1850534	7141 Kalland Way	Apr-19	$376,100	$504,500	134%
		Average		$398,078	$529,989	133%

The average sales price of the 9 reviewed sales which occurred between 2018 and 2020 which averaged .39 miles from the existing Mile Road Quarry was $529, 989 the average assessment on these homes was $398,078. The sales prices were 133% of the assessments at the time of sale.

Sales Location Map



Proximate Sale No. 1

No	MLS No.	Address	Sale Date	List Price	Sale Price
1	1863464	3168 Castleton Crossing	Aug-19	$579,900	$600,000

MLS: 1863464 Single Family Sold 3168 Castleton Crossing LP: $579,900

Area: BRISTOL - T **Abv Grde SqFt:** 1,880 **Garage:** 3 car, Attached, Opener **Taxes:** 7,184

Bedrms: 6 **YrBuilt:** 2011 **Tot Fin SqFt:** 3,560 **Fireplace:** Wood, 1 fireplace **Acres:** 2.01

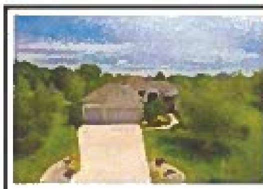
Rooms:	LR	DR	KIT	FAM	MBR	BR2	BR3	BR4	BR5	Lndry	Bedroom	BATHS	Full	Half
Level:	M		M	L	M	M	M	L	L	M	L	Up:	0	0
Dim:	18x17		17x14	35x17	14x14	10x12	10x12	10x11	10x11	8x8	13x20	Main:	2	1
MstrBdrmBath: Full, Walk-in Shower					Basement: Full, Full Size Windows/Exposed, Finished, Sump pump,							Lowr:	1	0

Luxurious custom built craftsman home by Dan Duren in the highly coveted Winfield Estates! Enjoy breathtaking sunsets from your spacious screened in porch. Enjoy fresh produce from your garden in your sleek and stylish kitchen with handmade knotty alder cabinetry and custom built kitchen table that expands for up to 12 people! Gleaming hand scraped walnut hardwood floors on the main level. Open & airy floor plan offering multiple entertaining spaces inside & out. Master Suite with an amazing walk-in closet & California Closets throughout. An entertainers dream on 2.01 acres, just waiting for you & your family! Check out the matterport video!

Listed By: *Inventure Realty Group, Inc* **Closing Date:** 8/23/2019 **Sale Price:** $600,000 **SellrConcess:**

Proximate Sale No. 2

No	MLS No.	Address	Sale Date	List Price	Sale Price
2	1861804	3144 Castleton Crossing	Sep-19	$474,900	$460,000

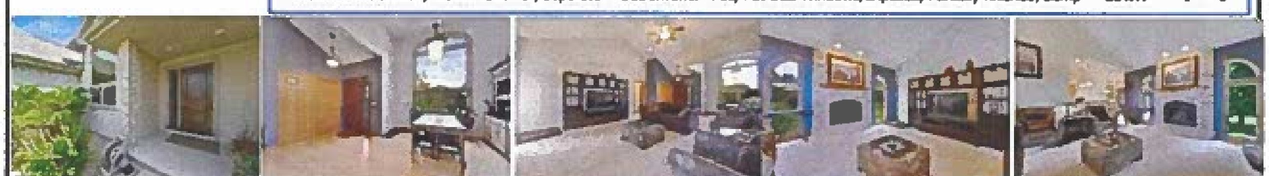


MLS: 1861804 Single Family Sold 3144 Castleton Crossing LP: $474,900

Area: BRISTOL - T **Abv Grde SqFt:** 1,932 **Garage:** 3 car, Attached, Opener **Taxes:** 6,348

Bedrms: 4 **YrBuilt:** 2004 **Tot Fin SqFt:** 3,231 **Fireplace:** Gas, 2 fireplaces **Acres:** 1.03

Rooms:	LR	DR	KIT	FAM	MBR	BR2	BR3	BR4	BR5	Lndry	Rec Room	BATHS	Full	Half
Level:	M		M		M	M	M	L		M	L	Up:	0	0
Dim:	17x20		13x21		13x17	10x12	10x12	13x13			16x32	Main:	2	0
MstrBdrmBath: Full, Walk-in Shower, Separate					Basement: Full, Full Size Windows/Exposed, Partially finished, Sump							Lowr:	1	0

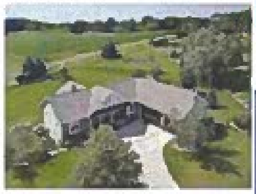


Sprawling ranch home in Winfield Estates! Welcoming entry opens to the spacious living room featuring a cozy gas fireplace & vaulted ceilings. ML boasts 3 sizable bedrooms including the master w/ensuite complete w/jetted soaking tub & walk in closet. The eat-in kitchen showcases beautiful granite countertops w/SS appliances & a breakfast bar. Amazing 3-season porch overlooks mature landscaping w/numerous fruit trees & patio area perfect for entertaining. Large, exposed LL offers even more living space w/ a rec room, add'l bed & bath w/large walk in shower & heated floors, wet bar & insulated wine room along with tons of add'l storage space!

Listed By: *MHB Real Estate* **Closing Date:** 9/9/2019 **Sale Price:** $460,000 **SellrConcess:**

Proximate Sale No. 3

No	MLS No.	Address	Sale Date	List Price	Sale Price
3	1857475	3085 Hawks Haven Trail	Jun-19	$450,000	$459,500



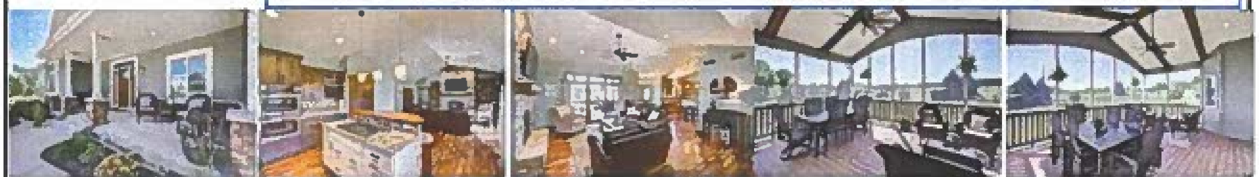
MLS: 1863464 Single Family Sold 3168 Castleton Crossing LP: $579,900

Area: BRISTOL - T Abv Grde SqFt: 1,880 Garage: 3 car, Attached, Opener Taxes: 7,184

Bedrms: 6 YrBuilt: 2011 Tot Fin SqFt: 3,560 Fireplace: Wood, 1 fireplace Acres: 2.01

Rooms:	LR	DR	KIT	FAM	MBR	BR2	BR3	BR4	BR5	Lndry	Bedroom	BATHS	Full	Half
Level:	M		M	L	M	M	M	L	L	M	L	Up:	0	0
Dim:	18x17		17x14	35x17	14x14	10x12	10x12	10x11	10x11	8x8	13x20	Main:	2	1

MstrBdrmBath: Full, Walk-in Shower Basement: Full, Full Size Windows/Exposed, Finished, Sump pump, Lowr: 1 0



Luxurious custom built craftsman home by Dan Duren in the highly coveted Winfield Estates! Enjoy breathtaking sunsets from your spacious screened in porch. Enjoy fresh produce from your garden in your sleek and stylish kitchen with handmade knotty alder cabinetry and custom built kitchen table that expands for up to 12 people! Gleaming hand scraped walnut hardwood floors on the main level. Open & airy floor plan offering multiple entertaining spaces inside & out. Master Suite with an amazing walk-in closet & California Closets throughout. An entertainers dream on 2.01 acres, just waiting for you & your family! Check out the matterport video!

Listed By: *Inventure Realty Group, Inc* Closing Date: 8/23/2019 Sale Price: $600,000 SellrConcess:

Proximate Sale No. 4

No	MLS No.	Address	Sale Date	List Price	Sale Price
4	1855808	7159 Kalland Way	Jun-19	$499,900	$504,900

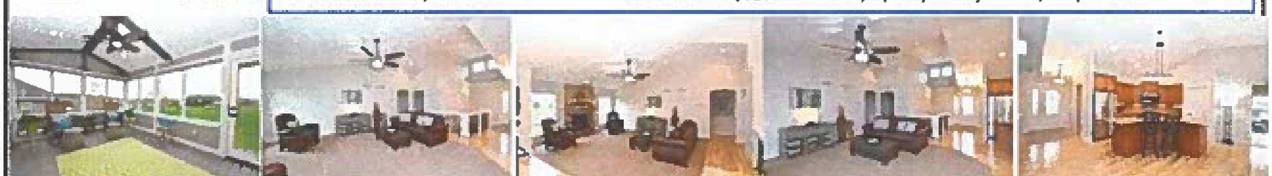
MLS: 1855808 Single Family Sold 7159 Kalland Way LP: $499,900

Area: BRISTOL - T Abv Grde SqFt: 1,900 Garage: 3 car, Attached, Opener, Access to Basement Taxes: 6,319

Bedrms: 4 YrBuilt: 2013 Tot Fin SqFt: 2,682 Fireplace: Gas, 2 fireplaces Acres: 0.76

Rooms:	LR	DR	KIT	FAM	MBR	BR2	BR3	BR4	BR5	Lndry	Three-Sea	BATHS	Full	Half
Level:	M		M	L	M	M	M	L		M	M	Up:	0	0
Dim:	19X16		13X12	26X18	15X14	13X10	13X10	12X11		07X06	16x12	Main:	2	0

MstrBdrmBath: Full, Walk-in Shower Basement: Full, Full Size Windows/Exposed, Partially finished, Sump Lowr: 1 0



BREATHTAKING...This home looks like it came from the pages of a magazine! Nearly 2,700 sq ft, 4 bedrooms, 3 bathrooms, open floor plan with split bedrooms, great room with fireplace, huge pantry, granite countertops, stainless steel appliances & expansive island, hardwood floors, main level laundry & mudroom, huge lower level family room with wetbar & fireplace + oversized 3 car garage with stairs to lower level, room for all your toys! Enjoy your perfectly manicured 3/4 acre lot from your new 3 season porch. This home is immaculate & ready for you to call home! Low Town of Bristol taxes. MRP $499,900-$509,900

Listed By: *First Weber Inc* Closing Date: 6/10/2019 Sale Price: $504,900 SellrConcess:

Proximate Sale No. 5

No	MLS No.	Address	Sale Date	List Price	Sale Price
5	1885165	7145 Mile Road	Jul-20	$899,900	$910,000

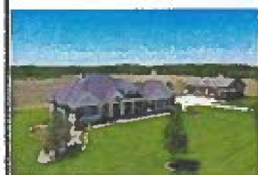
MLS: 1885165 **Single Family** **Sold** **7145 Mile Rd** **LP:** $899,900

Area: WINDSOR - V **Abv Grde SqFt:** 2,338 **Garage:** 3 car, Attached, Detached, Heated, 4+ car, Garage **Taxes:** 13,130

Bedrms: 4 **YrBuilt:** 2015 **Tot Fin SqFt:** 3,849 **Fireplace:** Gas, 2 fireplaces **Acres:** 3.69

Rooms:	LR	DR	KIT	FAM	MBR	BR2	BR3	BR4	BR5	Lndry	Sun Room	BATHS	Full	Half
Level:	M		M	L	M	M	L	L		M	M	Up:	0	0
Dim:	22x20		16x14	19x19	15x15	14x13	15x12	13x12		11x6	15x15	Main:	2	0

MstrBdrmBath: Full, Walk-in Shower, Separate **Basement:** Full, Full Size Windows/Exposed, Walkout to yard, **Lowr:** 1 0




VRP $899,900.00-$924,900.00 Parade quality 3850 sq. ft. 4 bedroom, 3 bath ranch home on 3.6 acres. High end home features open great room concept w/breathtaking views, post & beam construction, floor to ceiling tile showers, heated tile & walk in closets in the master suite & designer kitchen. Main level also features large mudroom, separate 1st floor laundry, covered deck & relaxing sun room. LL features 2 additional bedrooms, full bath & rec room w/wet bar & stone fireplace. Handymen will love the 3 car garage and the 30x55 pole shed. Both of which are heated, insulated & have water & floor drains. No expense spared here, custom window treatments, irrigated lawn & landscaping, concrete edging & the list never ends. Seller is willing to sell up to 35 additional acres adjoining the parcel.

Listed By: *RE/MAX Preferred* **Closing Date:** 7/15/2020 **Sale Price:** $910,000 **SellrConcess:**

Proximate Sale No. 6

No	MLS No.	Address	Sale Date	List Price	Sale Price
6	1813671	7145 Kalland Way	Apr-18	$495,000	$485,500

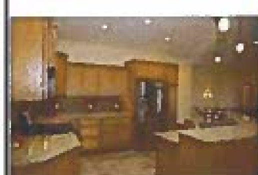
MLS: 1813671 **Single Family** **Sold** **7145 Kalland Way** **LP:** $495,000

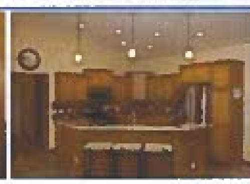
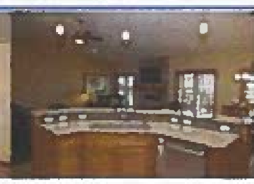
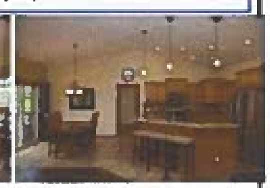
Area: BRISTOL - T **Abv Grde SqFt:** 1,974 **Garage:** Attached, Tandem, Heated, Opener, Access to **Taxes:** 6,185

Bedrms: 3 **YrBuilt:** 2008 **Tot Fin SqFt:** 3,414 **Fireplace:** Gas, 1 fireplace **Acres:** 0.76

Rooms:	LR	DR	KIT	FAM	MBR	BR2	BR3	BR4	BR5	Lndry	Den/Office	BATHS	Full	Half
Level:	M	M	M		M	M	M			M	M	Up:	0	0
Dim:	17X23	11X23	11X15		17X23	11X12	11X12			7X9	10X12	Main:	2	0

MstrBdrmBath: Full, Walk-in Shower, Separate **Basement:** Full, Full Size Windows/Exposed, Walkout to yard, **Lowr:** 1 0



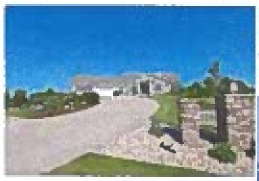




Wow! You won't find another house in this area w/ an attached 6+ car heated garage w/ trench drain & 3rd overhead garage door leading to large country lot. From your open view deck enjoy amazing sunsets. You could not rebuild this house for this asking price! Attention to detail shows in this 4+ bdrm (could be 5), 3 bath home. Custom master suite w/ original walk-thru closet organized with a closet system. Quality shows in spacious kitchen w/ solid countertops, upgraded appliances & smart home technology. Open concept LR with gas FP, walkout finished basement. Low Bristol taxes! Call Today!

Listed By: *Badger Realty Group* **Closing Date:** 4/20/2018 **Sale Price:** $485,500 **SellrConcess:**

Proximate Sale No. 7

No	MLS No.	Address	Sale Date	List Price	Sale Price
7	1739403	3198 Castleton Crossing	Jan-16	$850,000	$815,000



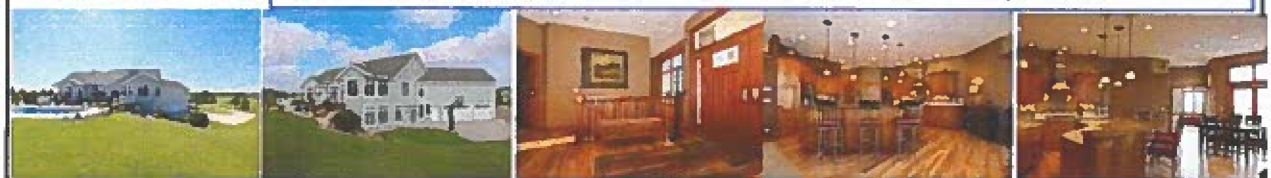
MLS: 1739403 **Single Family** **Sold** **3198 Castleton Crossing** **LP:** $850,000

Area: WINDSOR - V **Abv Grde SqFt:** 3,196 **Garage:** 3 car, Attached, Opener, 4+ car **Taxes:** 11,359

Bedrms: 4 **YrBuilt:** 2006 **Tot Fin SqFt:** 5,736 **Fireplace:** Gas, 2 fireplaces **Acres:** 1.83

Rooms:	LR	DR	KIT	FAM	MBR	BR2	BR3	BR4	BR5	Lndry	Den/Office	BATHS	Full	Half
Level:	M	M	M		M	M	L	L		M	M	Up:	0	0
Dim:	25X18	12X14	18X18		17X18	12X14	12X16	12X11		14X12	12X12	Main:	2	1
												Lowr:	1	0

MstrBdrmBath: Full, Walk-in Shower **Basement:** Full, Full Size Windows/Exposed, Walkout to yard,

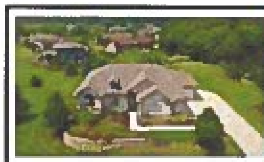


EXECUTIVE RANCH WITH 3200 SQ FT MAIN LEVEL ON A PRIVATE CUL-DE-SAC LOT. EXQUISITE TOUCHES THROUGHOUT! GOURMET KITCHEN WITH STAINLESS APPLIANCES, GRANITE ISLAND, CHERRY CABINETRY, TILE BACKSPLASH, OPEN GREAT ROOM CONCEPT WITH TRAY CEILINGS, CUSTOM CHERRY MILLWORK, HICKORY FLOORS, PRIVATE OWNERS SUITE W/TILE SHOWER, ZERO STEP ENTRYWAYS, WHEELCHAIR AND ADA FRIENDLY RANCH, CUSTOM AZEK DECK. WALK-OUT LOWER LEVEL SUITE WITH 2 BEDROOMS AND SECOND KITCHEN, PRIVATE ENTRANCE! 6 CAR GARAGE, AND EXTENSIVE LANDSCAPING!

Listed By: First Weber Inc **Closing Date:** 1/22/2016 **Sale Price:** $815,000 **SellrConcess:**

Proximate Sale No. 8

No	MLS No.	Address	Sale Date	List Price	Sale Price
8	1867372	3130 Lorrabud Lane	Dec-19	$549,900	$535,000



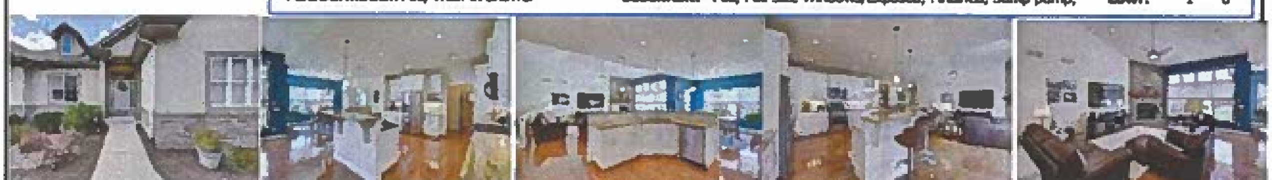
MLS: 1867372 **Single Family** **Sold** **3130 Lorrabud Ln** **LP:** $549,900

Area: BRISTOL - T **Abv Grde SqFt:** 2,110 **Garage:** 3 car, Attached, Opener, Access to Basement, Garage **Taxes:** 7,085

Bedrms: 4 **YrBuilt:** 2010 **Tot Fin SqFt:** 3,560 **Fireplace:** Gas, 1 fireplace **Acres:** 0.80

Rooms:	LR	DR	KIT	FAM	MBR	BR2	BR3	BR4	BR5	Lndry	Rec Room	BATHS	Full	Half
Level:	M		M		M	M	M	L		M	L	Up:	0	0
Dim:	16X17		15X12		17X14	12X10	11X13	18X13		8X9	34X26	Main:	2	0
												Lowr:	1	0

MstrBdrmBath: Full, Walk-in Shower **Basement:** Full, Full Size Windows/Exposed, Finished, Sump pump,



Luxury meets smart design in this over 3400 sq' home in desirable Winfield Estates! Click on the Virtual Tour above! Custom built by Duren Home Builders, this home is set on a beautifully landscaped lot with an in-ground sprinkler system. Open gourmet kitchen highlighted by gleaming floors, gorgeous granite counter tops & an expansive island. Floor to ceiling flagstone fireplace & wall of windows add another level of sophistication to this home. Serene Master Suite w/spacious walk-in closet & spa like bath w/Travertine tiled shower. Impeccable insulated 3 car garage w/access to the stunning finished LL where your custom built workshop awaits!

Listed By: Inventure Realty Group, Inc **Closing Date:** 12/5/2019 **Sale Price:** $535,000 **SellrConcess:**

Proximate Sale No. 9

No	MLS No.	Address	Sale Date	List Price	Sale Price
9	1850534	7141 Kalland Way	Apr-19	$509,900	$504,500

MLS: 1850534 Single Family Sold 7141 KALLAND WAY LP: $509,900

Area: BRISTOL - T Abv Grde SqFt: 1,954 Garage: 3 car, Attached, Opener, Access to Basement Taxes: 6,671
Bedrms: 4 YrBuilt: 2013 Tot Fin SqFt: 3,654 Fireplace: Gas, 2 fireplaces Acres: 0.77

Rooms:	LR	DR	KIT	FAM	MBR	BR2	BR3	BR4	BR5	Lndry	Theater	BATHS	Full	Half
Level:	M	M	M		M	M	M	L		M	L	Up:	0	0
Dim:	17x16	12x10	12x11		15x13	14x10	14x10	13x10		8x7	20x18	Main:	2	0
												Lowr:	1	0

MstrBdrmBath: Full, Walk-in Shower Basement: Full, Full Size Windows/Exposed, Walkout to yard,

Another fabulous listing in Winfield Estates! Gorgeous is the first word that comes to mind as you enter this spacious ranch nestled in this country setting. Quality built 4 bed, 3 bath home set on just over a 3/4 acre lot. Open concept kitchen for easy entertaining, granite counter-tops, custom hickory cabinets, inviting hickory hardwood floors, gleaming stainless steel appliances and multiple entertaining areas inside and out! Master suite offers a spacious walk-in closet. Finished LL offers wet bar, living room with 2nd fireplace, guest suite, bath and a theater room which could also be used a fifth bedroom!

Listed By: Inventure Realty Group, Inc Closing Date: 4/12/2019 Sale Price: $504,500 SellrConcess:

Conclusions Analysis No. 2 Reviewed Proximate Sales Windsor Quarry

The nine reviewed sales located in close proximity to the Windsor Quarry show no evidence of either protracted marketing times or decrease in sales price. With the exception of one sale these homes occurred in 2018 and 2019. The sales prices ranged between $460,000 to over $900,000 which is far in excess of the average sales prices for home in Dane County ($275,000). The reviewed sales were located on average .39 acres from an active Mile Road Quarry. . The average sales prices/gross SF of finished area averaged $175.93/SF. The average days on market was 49 days. The proximate sales sold for 99% of the list price.

As part of this report, I have reviewed the sales of all homes located in the area designated as D09 which were sold for $450,000 to $1,000,000 occurring between 2018 and 2019 South Central MLS records indicated a total of 58 home sales. The average sales prices/gross SF for the entire D09 area averaged $179.75/SF in comparison to $175.93 for the proximate sales. The DOM market for all sales 49 days which was equal to the proximate sales. The home sales for the entire D09 area sold for 98% of the list price.

There is a concern that the proximity of the homes to a quarry could result in lowering of assessed values. A review of the proximate sales indicates that the average sales price was 133% above the assessments at the time of sale.

I have also interviewed the listings brokers involved in 6 of the 9 reviewed proximate sales. All of the brokers indicated that the proximity of the listings to the existing Mile Road Quarry did not negatively impact either the list price or the sales price.

Based upon a review of this data it is my opinion that the existence of Mile Road Quarry did not negatively impact the sales price or marketing of the 9 reviewed proximate sales.

The Rocky Rights (Cattell) Quarry is a sand and gravel quarry which operates in the Town of Cottage Grove, Dane County, Wisconsin. There is a batch plant located in the quarry. The Cattell Quarry has been operating since the 1960s. Five single-family residences were developed directly south of the Cattell property. All of the homes were constructed with the quarry in full operation. Three of the residences are accessed by a private roadway owned by Rocky Rights LLC. This private roadway is used by Rocky Rights to haul material to and from the quarry.

The three properties accessed by the private roadway are located at 2292 USH 12&18; 2272 USH 12&18; and 2252 USH 12&18.

The home at 2272 USH 12&18 is a 1,615 SF ranch home which was constructed in 2002 on a two-acre RH-1 zoned site. This home is assessed for $204,600.

The home at 2252 USH 12&18 is a 1,620 SF 1.5-story home on a 2.12-acre site which was constructed in 2003. This home is assessed for $172,800.

There are two additional homes located directly south of the Cattell quarry. These homes are accessed directly from USH 12&18.

The home at 2236 USH 12&18 is a 1,472 SF home located on a 3.043-acre RH-1 zoned site. This property located at 2236 Hwy 18 was sold in June of 2017 for $243,900. This home is located 800 feet to the south of the location of the batch plant. This property was on the market for 147 days (consistent with a reasonable exposure time for a home in this price range), it was listed for $249,500, and the sales price of $243,900 represented 98% of list price which is consistent with the 5% to 10% price reductions experienced during negotiations. This sale was consistent with reviewed sales of comparable properties located in the Town of Cottage Grove.

All five of the existing residences were constructed with the quarry in operation. The sale of the home at 2236 USH 12&18 showed no evidence of any negative impact as a result of the proximity to the batch plant.

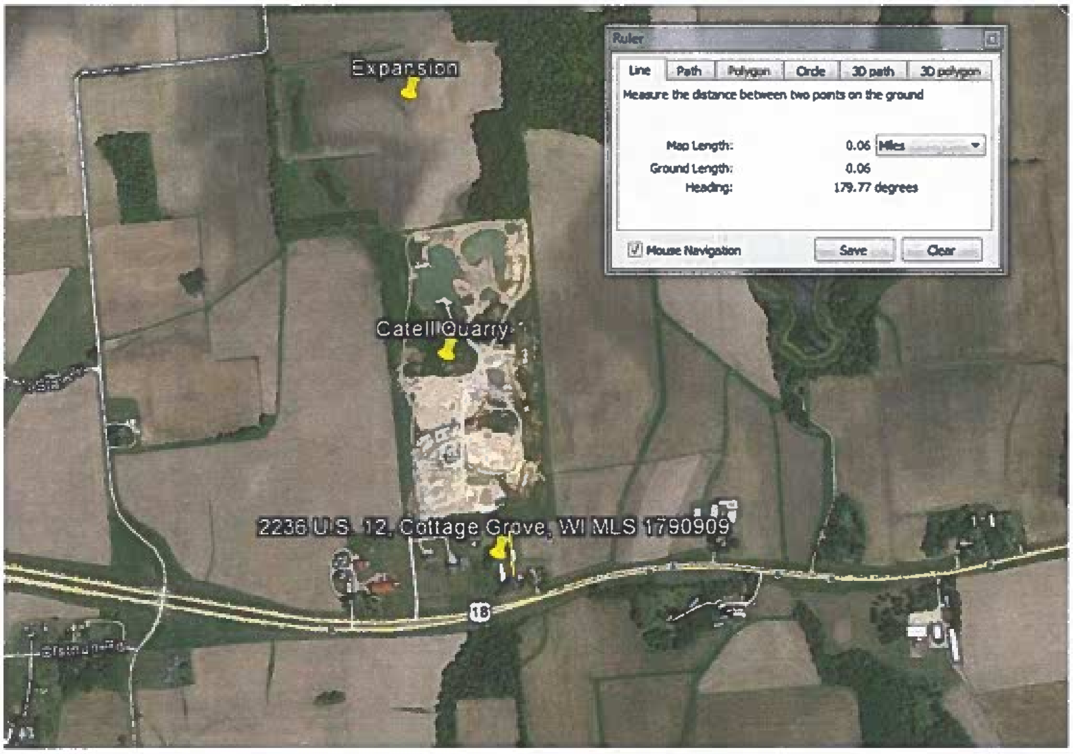
As part of my analysis for the Cattell quarry, I examined the sales of eight residential homes located within 1.5 miles of the quarry. Each sale was analyzed based upon its proximity to the quarry, percentage of sales price to list price, days on market (DOM), and percentage of sales price to assessed value. The analysis is summarized below.

MLS No.	Address	Sale Date	List Price	Sale Price	Assessed	Bldg SF	Price/SF	%	%Sale/Assed	Dist mi	DOM
1643916	3380 North Star Road	Jul-12	$224,900	$215,000	$247,200	2,500	$86.00	96%	87%	0.35	300
1790909	2236 USH 12	Jun-17	$249,500	$243,900	$208,400	1,248	$195.43	98%	117%	0.06	147
1781268	3290 North Star Road	Jul-16	$344,900	$338,100	$237,800	2,360	$143.26	98%	142%	0.35	42
1792058	3193 Kinney Road	Apr-17	$440,000	$430,000	$390,200	2,085	$206.24	98%	110%	0.59	23
1795330	3208 Kinney Road	Jun-17	$465,000	$447,500	$425,800	2,032	$220.23	96%	105%	0.56	31
1759067	3325 Field View Ln	Jul-16	$349,900	$336,000	$322,300	1,916	$175.37	96%	104%	1.25	202
1657553	3520 Natvig Rd	Sep-12	$238,000	$228,000	$243,000	1,892	$120.51	96%	94%	1.08	31
1639338	2337 Schadel	Mar-12	$325,000	$300,000	$292,300	2,143	$139.99	92%	103%	0.45	91

3380 North Star Road, Cottage Grove, WI MLS 1643916

MLS No.	Address	Sale Date	List Price	Sale Price	Assessed	Bldg SF	Price/ SF	% Sale/ List	%Sale/ Assed	Dist mi	DOM
1643916	3380 North Star Road	Jul-12	$224,900	$215,000	$247,200	2,500	$86.00	96%	87%	0.35	300

2236 USH 12/18, Cottage Grove, WI MLS 1790909

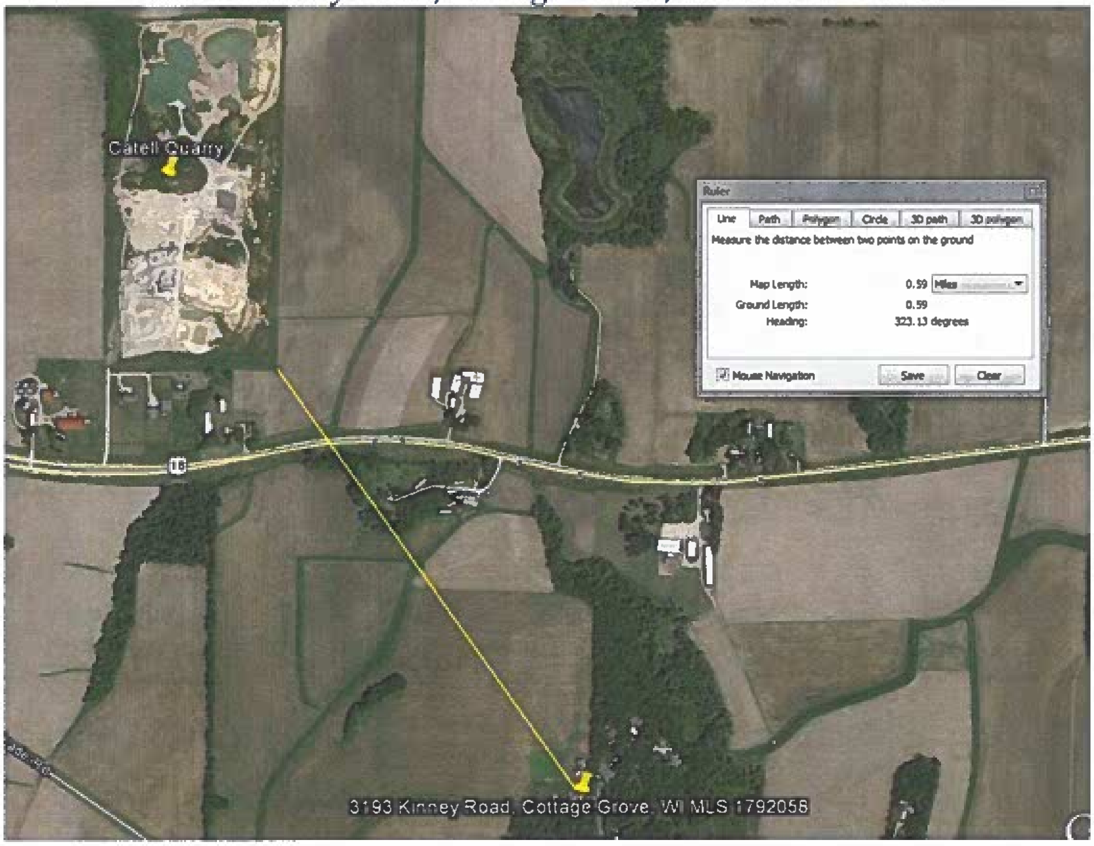


MLS No.	Address	Sale Date	List Price	Sale Price	Assessed	Bldg SF	Price/ SF	% Sale/	%Sale/Assed	Dist mi	DOM
1790909	2236 USH 12	Jun-17	$249,500	$243,900	$208,400	1,248	$195.43	98%	117%	0.06	147

3290 North Star Road, Cottage Grove, WI MLS 1781268

MLS No.	Address	Sale Date	List Price	Sale Price	Assessed	Bldg SF	Price/ SF	% Sale/ List	%Sale/A ssed	Dist mi	DOM
1781268	3290 North Star Road	Jul-16	$344,900	$338,100	$237,800	2,360	$143.26	98%	142%	0.35	42

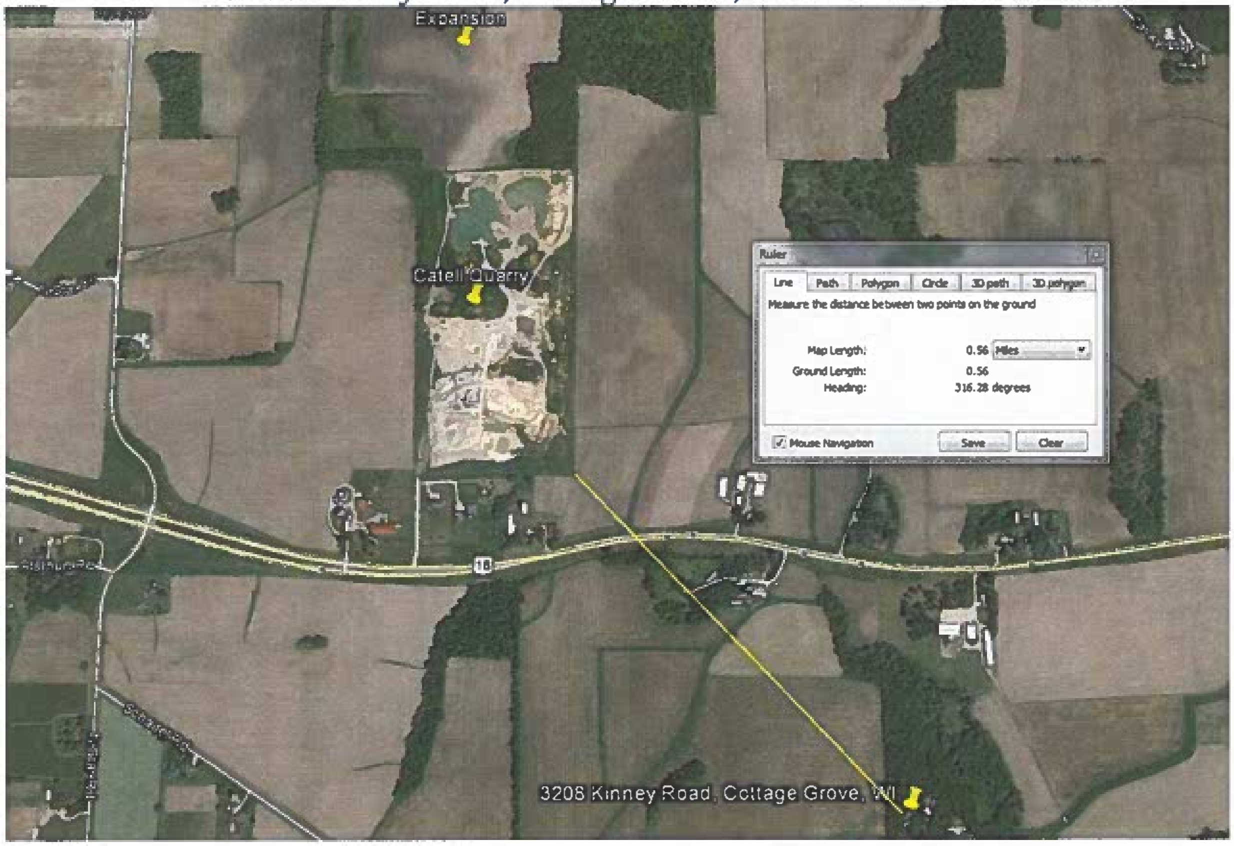
3193 Kinney Road, Cottage Grove, WI MLS 1792058



MLS No.	Address	Sale Date	List Price	Sale Price	Assessed	Bldg SF	Price/ SF	% Sale/ List	%Sale/Assed	Dist mi	DOM
1792058	3193 Kinney Road	Apr-17	$440,000	$430,000	$390,200	2,085	$206.24	98%	110%	0.59	23

29

3208 Kinney Road, Cottage Grove, WI MLS 1795330



MLS No.	Address	Sale Date	List Price	Sale Price	Assessed	Bldg SF	Price/ SF	% Sale/ List	%Sale/Assed	Dist mi	DOM
1795330	3208 Kinney Road	Jun-17	$465,000	$447,500	$425,800	2,032	$220.23	96%	105%	0.56	31

3325 Field View Ln, Cottage Grove, WI MLS 1759067

MLS No.	Address	Sale Date	List Price	Sale Price	Assessed	Bldg SF	Price/ SF	% Sale/ List	%Sale/A ssed	Dist mi	DOM
1759067	3325 Field View Ln	Jul-16	$349,900	$336,000	$322,300	1,916	$175.37	96%	104%	1.25	202

3520 Natvig Rd, Cottage Grove, WI MLS 1657553

MLS No.	Address	Sale Date	List Price	Sale Price	Assessed	Bldg SF	Price/ SF	% Sale/ List	%Sale/Assed	Dist mi	DOM
1657553	3520 Natvig Rd	Sep-12	$238,000	$228,000	$243,000	1,892	$120.51	96%	94%	1.08	31

2337 Schadel Road , Cottage Grove, WI MLS 1639338

MLS No.	Address	Sale Date	List Price	Sale Price	Assessed	Bldg SF	Price/ SF	% Sale/ List	%Sale/Assed	Dist mi	DOM
1639338	2337 Schadel	Mar-12	$325,000	$300,000	$292,300	2,143	$139.99	92%	103%	0.45	91

Conclusion of Sales Analysis Cattell Quarry

The review of the eight reviewed sales within 1.5 miles of the Cattell Quarry show no indication of negative market impact as a result of the proximity to the quarry and batch plant. The sales price per square foot; average days on market; and the percentage of list price to sales price were consistent with sales of other reviewed homes in the Town of Cottage Grove as of the date of sale. There is no indication that the proximity to the mineral extraction site or the batch plant adversely impacted the sales price or marketing time of the reviewed sales.

Analysis No. 4 Residential Sales in Adjacent Lauderdale Lake Estates Adjacent Mann Sand and Gravel

Lauderdale Lake Estates is a upscale residential subdivision which was developed adjacent the Unilock Plant and Mann Sand & Gravel in Elkhorn Wisconsin. The most recent addition abuts the Mann Sand and Gravel LLC operations. Homes sell for between $350,000 and $450,000. The methodology is to locate proximate sales and compare the sales prices and marketing times to sales of similar properties not located near a mining operation. In this analysis we examine the sales of 3 properties which were located in close proximity Unilock and Mann Sand and Gravel operations located at). The sales details and their location proximate to the operating pits are summarized below:

Proximate Sales Summary

MLS No.	Address	Sale Date	List Price	Sale Price	Bldg SF	Price/SF	% Sale/List	Distance	DOM
761468	N7156 Lakeshore Drive	Oct-06	$324,900	$310,000	2,256	$137.41	95%	1,350	128
763939	W5059 Clearwater Ln	Sep-05	$319,000	$315,000	1,793	$175.68	99%	500	83
1841676	N6920 Northwood Dr	May-18	$349,900	$349,900	2,497	$140.13	100%	1,400	143

Proximate Sales

MLS: 761468	Condo	Sold	N7156 Lakeshore Dr	#	Price: $324,900

Town Sugar Creek | Bedrms: 4 | Age: Other | Tot SqFt: | Condo Fee: 275

Parking: 3+ car Garage, Attached | Units in Bldg: 1 | Floor: 1

Rooms:	LR	DR	KIT	F/Rec	MBR	BR2	BR3	BR4	Lndry	Off/Den	Baths	Full	Half
Level:	M	M	M		M	M	L	L			Upper:		
Dim:	13x22	12x12	22x26		13x17	12x14	14x15	14x15			Main:	x	x
MstrBdrmBath: Yes			Common Amenities:								Lower:	x	x

Located on the big pond in Lauderdale Lake Estates is where you'll find this 4 BR, 2/2 BA ranch with walk-out lower level. Enjoy expanded water views from every window, lrge eat-in ktchn w/ breakfast island & deck access. FR, formal DR, double-sided FP in LR & kitchen, rec-room walk-out, MBR w/ two walk-in closets, whirlpool & separate shower. 3 car garage.

Directions: Hwy 12/67 North to Middle Lake Dr. Right to Lakeshore Dr. Left to house on right.

Information provided courtesy of: Keefe Real Estate-Commerce Ctr METRO **Closing Date:** 9/16/2005 **Sale Price:** $310,000 **Pts/CR:**

MLS: 763939	Condo	Sold	W5059 Clearwater Ln	#	Price: $319,000

Town Sugar Creek | Bedrms: 3 | Age: 6-10 Year | Tot SqFt: | Condo Fee: 275

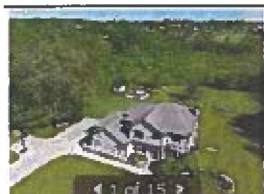
Parking: 3+ car Garage, Attached | Units in Bldg: 1 | Floor: 1

Rooms:	LR	DR	KIT	F/Rec	MBR	BR2	BR3	BR4	Lndry	Off/Den	Baths	Full	Half
Level:	M	M	M	L	M	M	M			L	Upper:		
Dim:	18x16	10x11	11x22	28x22	13x16	11x11	10x12			10x10	Main:	x	
MstrBdrmBath: Yes			Common Amenities:								Lower:	x	

Sits high on a hill with beautiful views of one of three ponds in Lauderdale Lakes Estates. This 3 bedroom, 3 bath 3-car garage home boasts over 2,600 square feet of country living. Master suite with whirlpool, 2 gas fireplaces, fenced yard, sprinkler system and an excellent location awaits you! Fish off your own pier or relax on your deck - enjoy!

Directions:

Information provided courtesy of: Shorewest Realtors, Inc. METRO **Closing Date:** 9/28/2005 **Sale Price:** $315,000 **Pts/CR:**



MLS: 1841676	Condo	Sold	N6920 Northwood Dr	#	Price: $349,900

Town Sugar Creek | Bedrms: 4 | Age: 11-20 Yea | Tot SqFt: 2,850 | Condo Fee: 29

Parking: Attached | Units in Bldg: 1 | Floor: 1

Rooms:	LR	DR	KIT	F/Rec	MBR	BR2	BR3	BR4	Lndry	Off/Den	Baths	Full	Half
Level:	M		M		U	U	U	U			Upper:	2	0
Dim:	18x15		25x24		18x18	13x12	12x12	12x11			Main:	0	1
MstrBdrmBath: Full, Yes			Common Amenities:								Lower:	0	0

Custom Built 4 bedroom, 2-1/2 bath, large eat- kitchen, sunken living room, main floor laundry room, first floor office plus a 3-1/2 + car garage w/entry to basement. All cement drive. In house security system. Iron Filter. Revers Osmosis Water. Beautiful master bedroom suite with walk in closet and whirlpool tub. Exposed lower level with 8 foot ceiling plumbed for full bath. Semi wrap around deck overlooking the spacious, beautiful backyard. Spectacular views as the property butts up to the State Conservancy. Outdoor shed and more. Set your showing up today. immediate Occupancy...

Directions:

Information provided courtesy of: RE/MAX Realty Center SCWMLS **Closing Date:** 5/18/2018 **Sale Price:** $349,900 **Pts/CR:** 0

Non-Proximate Comparison Sales N7156 Lakeshore and W 5058 Clearwater

MLS No.	Address	Sale Date	List Price	Sale Price	Bldg SF	Price/SF	% Sale/List	Distance	DOM
811178	813 Eagleton	May-06	$300,236	$300,236	1,994	$150.57	100%	N/A	90
811160	827 Eagleton	Apr-06	$352,467	$352,467	1,994	$176.76	100%	N/A	83
791913	817 Eagleton	Jul-06	$360,000	$360,000	2,260	$159.29	100%	N/A	596
811643	1065 National Ave	Apr-06	$379,900	$365,000	1,900	$192.11	96%	N/A	40
	Average				2,032	$169.68	99%	N/A	202

MLS: 811643 **Condo** **Sold** **1065 Geneva National Ave N #** **Price: $379,900**

Town Geneva **Bedrms:** 4 **Age:** 11-20 Yea **Tot SqFt:** 1,900 **Condo Fee:** 217

Parking: 2 car Garage, Attached, Outside **Units in Bldg:** 1 **Floor:** 1

Rooms:	LR	DR	KIT	F/Rec	MBR	BR2	BR3	BR4	Lndry	Off/Den
Level:	M	M	M	M	M	M	M	M		
Dim:	18x20	14x12	11x14	12x20	13x16	14x12	10x12	10x11		

Baths	Full	Half
Upper:		
Main:	x	
Lower:		

MstrBdrmBath: Yes **Common Amenities:** Playground equipment, Security system

Ideal as a vacation or retirement home this open & spacious 4 BD ranch overlooks Palmer #7 green and is near the Swim & Racquet Club. Features include volume ceilings throughout, large great rm w/F.P., glass doors open to paver brick patio, large kitchen w/snack bar & loads of courter space and an add'l family rm for recreational activities/home theatre.

Directions: Hwy 50 - 4 miles west of Lake Geneva to Sales Center at front entrance.

Information provided courtesy of: *Keefe Real Estate, Inc.* METRO **Closing Date:** 4/18/2006 **Sale Price:** $365,000 **Pts/CR:**

MLS: 811178 | **Condo** | **Sold** | **813 Eagleton Dr** | **# 47-27** | **Price: $300,236**

Town Geneva **Bedrms:** 3 **Age:** 0-5 Years **Tot SqFt:** 1,994 **Condo Fee:** 375

Parking: 2 car Garage, Attached, Outside **Units in Bldg:** 2 **Floor:** 1

Rooms:	LR	DR	KIT	F/Rec	MBR	BR2	BR3	BR4	Lndry	Off/Den	Baths	Full	Half
Level:	M	M	M		M	U	U			M	Upper:	x	
Dim:	17x16	12x9	13x12		19x14	14x12	13x10			11x10	Main:		x
											Lower:		

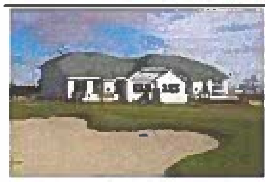
MstrBdrmBath: Yes **Common Amenities:** Clubhouse, Swimming Pool, Security system

New construction Camlin II duplex townhome. Southern exposure with golf course view. The Camlin I model boasts a main floor master bedroom, full basement, 2 car garage, granite counters, wood floors, limestone fireplace, screen porch & patio in a gated community. Resort style amenities, golf and social memberships.

Directions: Hwy 50 - 4 miles west of Lake Geneva at Geneva National Golf Club.

Information provided courtesy of: Keefe Real Estate, Inc. *METRO* **Closing Date:** 5/17/2006 **Sale Price:** $300,236 **Pts/CR:**

MLS: 811160 | **Condo** | **Sold** | **827 Eagleton Dr** | **# 47-29** | **Price: $352,467**



Town Geneva **Bedrms:** 3 **Age:** 0-5 Years **Tot SqFt:** 1,994 **Condo Fee:** 375

Parking: 2 car Garage, Attached, Outside **Units in Bldg:** 2 **Floor:** 1

Rooms:	LR	DR	KIT	F/Rec	MBR	BR2	BR3	BR4	Lndry	Off/Den	Baths	Full	Half
Level:	M	M	M		M	U	U			M	Upper:	x	
Dim:	17x16	12x9	13x12		19x14	14x12	13x10			11x10	Main:		x
											Lower:		

MstrBdrmBath: Yes **Common Amenities:** Clubhouse, Swimming Pool, Security system

New construction Camlin I duplex townhome. Southern exposure with golf course view. The Camlin I model boasts a main floor master bedroom, full basement, 2 car garage, stainless appliances, granite counters, wood floors, large deck in a gated community. Resort style amenities, golf and social memberships.

Directions: Hwy 50 - 4 miles west of Lake Geneva to Geneva National front entrance.

Information provided courtesy of: Keefe Real Estate, Inc. *METRO* **Closing Date:** 4/14/2006 **Sale Price:** $352,467 **Pts/CR:**

MLS: 791913 | **Condo** | **Sold** | **817 Eagleton Dr** | **# 47-28** | **Price: $360,000**

Town Geneva **Bedrms:** 3 **Age:** 0-5 Years **Tot SqFt:** 2,260 **Condo Fee:** 360

Parking: 2 car Garage, Attached, Outside **Units in Bldg:** 2 **Floor:** 1

Rooms:	LR	DR	KIT	F/Rec	MBR	BR2	BR3	BR4	Lndry	Off/Den	Baths	Full	Half
Level:	M	M	M		M	U	U			M	Upper:	x	
Dim:	17x16	12x0	13x12		20x13	13x10	14x12			11x10	Main:	x	x
											Lower:		

MstrBdrmBath: Yes **Common Amenities:** Clubhouse, Swimming Pool, Security system

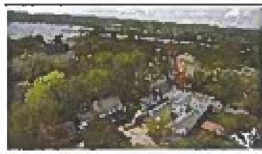
Camlin II model with main level master suite. Approx. 2200 sq.ft. with 1000 sq. ft. lower level ready to finish.

Directions: Hwy 50 West of Lake Geneva 4 miles to Geneva National Golf Club. Sales center at front entrance.

Information provided courtesy of: Keefe Real Estate, Inc. *METRO* **Closing Date:** 7/19/2006 **Sale Price:** $360,000 **Pts/CR:**

Non-Proximate Comparison Sales N6920 Northwood Drive

MLS No.	Address	Sale Date	List Price	Sale Price	Bldg SF	Price/SF	% Sale/List	Distance	DOM
1561493	505 Rolling Green Drive	Feb-18	$399,000	$390,000	1,800	$216.67	98%	N/A	5
1568224	416 Baker Street	Oct-18	$320,000	$300,000	2,448	$122.55	94%	N/A	220
1543127	1364 Royal Toon Ct	May-18	$374,000	$357,500	3,712	$96.31	96%	N/A	250
1559270	507 Campbell Street	Jun-18	$379,000	$360,000	2,359	$152.61	95%	N/A	207
	Average				2,579	$147.03		N/A	170



MLS: 1568224 **Condo** **Sold** **416 Baker St** **#** **Price: $320,000**

City Lake Geneva **Bedrms:** 3 **Age:** 21+ Years **Tot SqFt:** 2,448 **Condo Fee:** 0

Parking: 1 car Garage, Attached, Outside, Opener inc **Units in Bldg:** 2 **Floor:** 1

Rooms:	LR	DR	KIT	F/Rec	MBR	BR2	BR3	BR4	Lndry	Off/Den	Baths	Full	Half
Level:	M	M	M		U	U	L				Upper:	1	
Dim:	23x14	13x11	10x10		13x13	13x13	10x12				Main:	1	0
											Lower:	1	

MstrBdrmBath: Walk-in Shower **Common Amenities:** Common Green Space

This residential condo is in the business district of popular downtown Lake Geneva. It has the potential to use as a short term rental or to use it for yourself..or both! Just 2 blocks from the lake, restaurants, coffee shops, festivals, the boat launch, and more, it's the perfect getaway. Surprisingly spacious with 3 bedrooms, 3 baths, and over 2400 square feet, there is plenty of room for family and friends. Recently updated, it's adorable! Located in a building of two condos (the other is close to a mirror image), both are for sale. Be sure to see the drone video!

Directions:

Information provided courtesy of: @properties METRO **Closing Date:** 10/8/2018 **Sale Price:** $300,000 **Pts/CR:** Yes

MLS: 1543127 **Condo** **Sold** **1364 Royal Troon Ct** **#** **Price: $374,000**

Town Geneva **Bedrms:** 5 **Age:** 11-20 Yea **Tot SqFt:** 3,712 **Condo Fee:** 332

Parking: 2 car Garage, Attached, Outside **Units in Bldg:** 1 **Floor:** 1

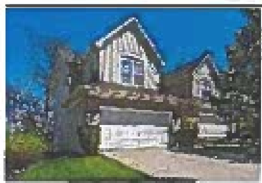
Rooms:	LR	DR	KIT	F/Rec	MBR	BR2	BR3	BR4	Lndry	Off/Den	Baths	Full	Half
Level:	M	M	M		M	M	U	U			Upper:	1	
Dim:	24x16	13x12	16x12		17x14	13x13	12x12	12x12			Main:	2	0
											Lower:		

MstrBdrmBath: Yes, Walk-in... **Common Amenities:** Swimming Pool, Tennis court, Playground equipment

Prime cul de sac location, over 1/2 acre with fantastic golf views of Palmer 9 green! Beautiful 5 bedroom 3 bath home has wonderful open floor plan and nice entertainment rooms. Includes tile and hardwood floors, vaulted ceiling great room with stone fireplace opening to large four season sun room, light eat-in kitchen with counter seating and nice formal dining room. Main level master suite has double vanity bath with soak tub and separate shower. Freshly painted exterior and new deck. 2.5 car garage.

Directions:

Information provided courtesy of: Keefe Real Estate, Inc. METRO **Closing Date:** 5/17/2018 **Sale Price:** $357,500 **Pts/CR:** No



1 of 14

MLS: 1559270	Condo	Sold	507 Campbell St	#	Price: $379,000

City: Lake Geneva | Bedrms: 3 | Age: 21+ Years | Tot SqFt: 2,359 | Condo Fee: 150

Parking: 2 car Garage, Attached, Opener inc | Units in Bldg: 4 | Floor: 1

Rooms:	LR	DR	KIT	F/Rec	MBR	BR2	BR3	BR4	Lndry	Off/Den
Level:	U	M	M	L	U	U	U			
Dim:	16x15	11x11	16x14	27x17	16x13	13x10	12x10			

Baths	Full	Half
Upper:		
Main:	3	1
Lower:		

MstrBdrmBath: Yes, Walk-in... Common Amenities:

3 bedroom townhouse located just a block from the beautiful waters of Lake Geneva. End unit with additional windows provide seasonal lake views. Three levels of living space offers plenty of space for entertaining family and guests. Open concept floor-plan with vaulted ceilings and gas fireplace. Master suite with whirlpool tub and separate shower. 3 Full bathrooms and powder room. Large family room with walkout to outside. Spacious deck off dining room. Walk to town and enjoy the fun of coming to Lake Geneva including restaurants, shops, boat tours and much more.

Directions:

Information provided courtesy of: Lake Geneva Area Realty, Inc. METRO **Closing Date:** 6/15/2018 **Sale Price:** $363,000 **Pts/CR:** No

1 of 16

MLS: 1561493	Condo	Sold	505 Rolling Green Dr	#	Price: $399,000

Village: Fontana | Bedrms: 2 | Age: 21+ Years | Tot SqFt: 1,800 | Condo Fee: 632

Parking: Outside | Units in Bldg: 1 | Floor: 1

Rooms:	LR	DR	KIT	F/Rec	MBR	BR2	BR3	BR4	Lndry	Off/Den
Level:	U		U	M	U	U			M	
Dim:	12x21		7x11	22x28	11x12	11x11				

Baths	Full	Half
Upper:	1	
Main:	1	0
Lower:		

MstrBdrmBath: Common Amenities: Clubhouse, Swimming Pool, Tennis court, Exercise rc

Make the move into this special stand alone condo at Abbey Springs. All the additions and changes add up to something else! This great space includes: a screened porch, new solid core doors throughout, Italian porcelain floors, renovated bathrooms, paint and trim and window treatments. Winter is a great time to snuggle up to the fireplaces and watch the season from you private, upper deck. Newer appliances including the washer, dryer. Wonderful location with an easy walk to the clubhouse or take the golf cart to the beach, marina. Dining opportunities and social events that cater to all ages.

Directions:

Information provided courtesy of: @properties METRO **Closing Date:** 2/22/2018 **Sale Price:** $390,000 **Pts/CR:** No

2015 Sale of Vacant Lot (Unit 20) and Subsequent Development

In April of 2015 a vacant 1.27-acre site (Unit 20) was sold for $86,500. This site is located approximately 500 feet from the Mann Sand and Gravel operations. The site had previously sold in September of 2011 for $81,000. Subsequent to the purchase the owners constructed a 2,555 SF ranch style detached home on the property. The assessed value of the residence is $469,500 improvements ($390,100) site ($79,400). Between the 2011 sale and 2015 sale the site increased in value by $5,500 which represented an overall appreciation for the four-year period of 8%.

Conclusions Analysis No. 4

The three reviewed sales located in close proximity to Mann Sand and Gravel quarry were compared to sales of similar homes located in Lake Geneva and the Town of Fontana. The non-proximate homes were of similar age and condition. The sales were analyzed based upon their percentage of list price to sales price; days on market and sales price per square foot. Based upon this analysis I found no market evidence of either reduced sales prices or increased marketing time for the four reviewed proximate sales. The purchase and development of the vacant site (Unit 20) with a home assessed at $469,500 in close proximity to an existing concrete operation and quarry shows no evidence of a negative impact as a result of proximity.

Analysis No. 5 Residential Sales in Close Proximity to the Aggrecon and Kiel Sand and Gravel

The methodology is to locate proximate sales and compare the sales prices and marketing times to sales of similar properties not located near a mining operation. Due to the small number of residences located in the area proximate to the Aggrecon site it was difficult to locate proximate sales. Based upon a review of MLS records, we were able to locate four sales which had occurred within close proximity to both the Aggrecon site and the Kiel Sand and Gravel site (Zimmerman Pit). The sales details and their location proximate to the operating pits are summarized below.

Proximate Sales Summary

MLS No.	Address	Sale Date	List Price	Sale Price	Bldg SF	Price/SF	% Sale/List	Distance	DOM
1448819	19826 State Rd 57	Oct-16	$175,000	$170,000	2,058	$82.60	97%	Adjacent	292
1337684	19940 State Rd 57	Dec-14	$157,900	$141,000	1,683	$83.78	89%	Adjacent	407
913838	16217 Little Elkhart Lake Road	Aug-07	$164,900	$155,000	1,008	$153.77	94%	570 feet	16
50133652	16226 Lax Chapel Road	Jun-16	$259,900	$254,900	1,990	$128.09	98%	230 Feet	179

Sales Details 16217 Little Elkhart Lake Road

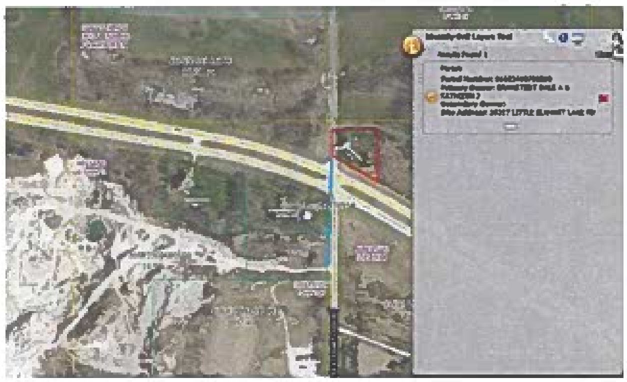


Figure 1 16217 Little Elkhart Lake Road 570 feet from entry into Kiel Sand and Gravel

MLS : 913838 **Sold** **Single Family** **Price: $164,900**
16217 Little Elkhart Lake Rd **Town Kiel**
County: Manitowoc **Mailing City:** KIEL
Subdivision: WI 53042

Bedrooms: 3 **Est Fin Above Grade SqFt:**
Full Baths: 0 **Est Fin Below Grd Exp SF:**
Half Baths: 0 **Est Total Finished SqFt:** 1,008

Est Age: 42
Year Built: 1965 ***Open House:***
Schedule a Showing ***Show Date:***
Data From: *METRO Milwaukee MLS*

Highway 32/57 N. Right on Little Elkhart Lake Rd.

Living Rm	M	12x16	**Mstr BedRm**	M	11x12	**Laundry**			**Baths**	**School Info**
Great Rm			**2nd BedRm**	M	9x12	**Other Room**	M	10x23	**Full Half**	(D) Kiel Area
Kitchen	M	12x22	**3rd BedRm**	M	8x10			**Upper:**		(E) Kiel Eschool
Dining Rm			**4th BedRm**					**Main:**	x	(M):Kiel
Dining Area			**5th BedRm**					**Lower:**		(H) Kiel
Family Rm			**Den/Office**			**Rec Rm**				

Acres: **Zoning:** A-1 **Parcel #:** 01603400700500
LotSize: 1.06 Acres **HOA Dues/Yr:** **Land Assess:** $
WaterFrontage: **Improvements:** $
Lake/River: **Owner:** **Total Assess:** $ /
Lake Size: **Lake Depth:** **Builder:** **Net Taxes:** $ 1,978 / 2006

Type	1 story	**Fuel**	Liquid propane
Architecture	Ranch	**Heating/Cooling**	Forced air, Central air
Master Bedrm Bath	Yes	**Water/Waste**	Private Well, Non-Municipal/Prvt dispos
Basement	Full, Block Foundation	**Roof**	Compstn/Fiberglass
Exterior	Vinyl		
Garage	2 car, Attached, Opener		
Driveway	Paved		
Lot Description	Sidewalk		

Interior Features Walk-in closet(s), Water softener inc, Jetted bathtub
Exterior Features Patio, Storage building

Included:
Excluded:

VIP--Very Impressive Property! Rare find on 1.06 Acres. Same owner 42 years. Spotless well-cared for. Bath w/whirlpool tub plus H-U-G-E country kitchen. Newer central air, furnace & water heater. Hardwood floors under carpeting. Vinyl exterior w/aluminum trim. Enclosed breezeway, 2.5 car garage built in 1976, 2 sheds, patio. NEW septic system included. A real treasure!

Contact listing broker.

Jean Arnel

Realty Executives Premier Properties
920-459-9000 **Fax#** 920-459-9050
617 North 8TH
SHEBOYGAN WI 53081
Sale Agent: Jean Arnel, Realty Executives Premier Properties -

Sold Price: $155,000
Concessions:

List Date: 5/8/2007
Expire Date: 11/8/2007
Subagent Comm: 2.4000%
BuyerAgent Comm: 2.4000%
Days On Market: 16
Pending Date: 5/23/2007
Closing Date: 8/17/2007
Financing:

Electronic Consent:
Exclusive Agency: No
Licensee Interest: No
Limited Service: No
Multiple Rep:
Named Exceptions: No
Policy Letter:
Variable Comm: No


06.11.2019

Sales Details 19940 STH 57

Figure 2 19940 STH 57 Adjacent Kiel Sand & Gravel

MLS : 1337684	**Sold**	**Single Family**	**Price: $157,900**
19940 State Rd 57		**Town Kiel**	
County: Manitowoc		**Mailing City:** KIEL	
Subdivision:		WI 53042	

Bedrooms: 3 — **Est Fin Above Grade SqFt:** 1,683
Full Baths: 2 — **Est Fin Below Grd Exp SF:**
Half Baths: 0 — **Est Total Finished SqFt:** 1,683 *Assessor*

Est Age: 24
Year Built: 1989 *Assessor* — *Open House:*
Schedule a Showing — **Show Date:**
Data From: METRO Milwaukee MLS — *Virtual Tour*

Hwy 57 North of Plymouth to Millhome House on East side of Rd. before Kiel

Living Rm	M	28x16	**Mstr BedRm**	U	19x16	**Laundry**	M		**Baths**			**School Info**
Great Rm			**2nd BedRm**	U	13x13				**Full**	**Half**	(D)	Kiel Area
Kitchen	M	16x13	**3rd BedRm**	U	15x11			**Upper:**	1		(E)	
Dining Rm			**4th BedRm**					**Main:**	1	0	(M)	
Dining Area			**5th BedRm**					**Lower:**			(H)	
Family Rm			**Den/Office**			**Rec Rm**						

Acres:	1.0000 *Assessor*	**Zoning:**	Res	**Parcel #:**	01651500002204
LotSize:	1.0 1 Acre	**HOA Dues/Yr:**		**Land Assess:**	$
WaterFrontage:				**Improvements:**	$
Lake/River:		**Owner:**		**Total Assess:**	$ /
Lake Size:	**Lake Depth:**	**Builder:**		**Net Taxes:**	$ 3,214 / 2012

Type	2 story, Farm	**Fuel**	Liquid propane
Architecture	Contemporary	**Heating/Cooling**	Forced air
Kitchen Features	Range/Oven, Dishwasher	**Water/Waste**	Private Well, Non-Municipal/Prvt dispos
Basement	Partial	**Roof**	Composition/Fiberglass
Exterior	Wood	**Waterfront**	Waterview
Garage	Detached, Opener	**Farm Features**	Barn(s)

Exterior Features Deck, Fenced Yard

Included:

Excluded:

If you are looking for unique, this round 3 bedroom 2 bath ECO-friendly home is what you're looking for. Rural living on 1 acre overlooking Sheboygan River. Very open concept on main level with kitchen, dining area, living room, 1st flr laundry & full bath. Patio door to large deck to private backyard. Upper level has 3 bedrooms & light filled family room with windows & patio doors to wrap around deck. 4 car garage has a barn area that leads out to 2 fenced areas for animals. Very low utility bills Must See

Could be commercial use zoned hobby farm. Priced well below assessment value of 182,000. Motivated seller.

Call 855-746-9300 to set up showings.

Jane M Meyer - 920-207-6602		**List Date:**	10/31/2013	**Electronic Consent:**	No
jane.meyer@cbexchange.com 43488-94		**Expire Date:**	2/28/2015	**Exclusive Agency:**	No
Coldwell Banker Residential Brokerage		**Subagent Comm:**	2.4000%	**Licensee Interest:**	No
262-375-1500 Fax# 262-375-0346		**BuyerAgent Comm:**	2.4000%	**Limited Service:**	No
W61 N517 Washington Ave		**Days On Market:**	407	**Multiple Rep:**	
CEDARBURG WI 53012		**Pending Date:**	12/11/2014	**Named Exceptions:**	No
Sale Agent: Jean Arnel - 920-980-6222	**Sold Price:** $141,000	**Closing Date:**	12/31/2014	**Policy Letter:**	
Premier Properties Realty, LLC - 920-980-6222	**Concessions:** No	**Financing:**	Cash	**Variable Comm:**	No

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19940
06.11.2019

Proximate Sale 19826 STH 57

Figure 3 19826 STH 57 Adjacent Kiel Sand and Gravel

MLS : 1448819 | Sold | Single Family | Price: $175,000

19826 State Rd 57 | Town Kiel

County: Manitowoc | Mailing City: KIEL

Subdivision: | WI 53042

Bedrooms:	4	Est Fin Above Grade SqFt:	
Full Baths:	2	Est Fin Below Grd Exp SF:	
Half Baths:	0	Est Total Finished SqFt:	2,058 Assessor

Est Age: 105
Year Built: 1910 Assessor

Schedule a Showing

Open House:
Show Date:

Data From: METRO Milwaukee MLS | Virtual Tour

Near Millhome on North side of Hwy 57

Living Rm	M	14x14	Mstr BedRm	M	14x12	Laundry	M			Baths		School Info
Great Rm			2nd BedRm	U	13x11	Other Room	M	14x8		Full	Half	(D) Kiel Area
Kitchen	M	15x13	3rd BedRm	U	12x12				Upper:	1	0	(E)
Dining Rm	M	13x14	4th BedRm	U	16x11				Main:	1	0	(M)
Dining Area			5th BedRm						Lower:	0	0	(H)
Family Rm			Den/Office	M		Rec Rm						

Acres:	11.0300 Assessor	Zoning:	A1 & C1	Parcel #:	01651500002101
LotSize:	11.03 11.03	HOA Dues/Yr:		Land Assess:	$
WaterFrontage:				Improvements:	$
Lake/River:		Owner:	home age unveri	Total Assess:	$ /
Lake Size:	Lake Depth:	Builder:		Net Taxes:	$ 3,117 / 2014

Type	2 story, Farm	Fuel	Liquid propane
Architecture	Bungalow	Water/Waste	Private Well, Non-Municipal/Prvt dspos
Kitchen Features	Pantry, Range/Oven, Refrigerator, Dishwasher, Microwave	Roof	Compstn/Fiberglass
Basement	Full, Block Foundation	Terms/Misc.	Other
Exterior	Vinyl	Waterfront	On a river
Garage	Detached, Opener, 4+ car		

Interior Features Water softener inc
Exterior Features Storage building

Included:

Excluded:

11 Acres of Beautiful Land! MAKE US A OFFER!!!If your looking for a perfect country home here it is! 11acres of woods for hiking and a yard perfect for gardens. Home has 4 bedrooms beautiful wood floors and a large open floor plan. Large kitchen with big island. 1st floor laundry Tons of storage and a newer foundation. Out buildings are a bonus including a shop that would also make a great Man cave. New water heater and softener. Newer roof and AC. Out building to west fully insulated and has water. This home is Ready to move right in.

Shed west of home can only be shown with owners and agent present. Not at first showing. Serious inquiries only for animal protection.home age unverified.LP tank is not owned- It is a lease

24 hr notice. Please Use Showing Time

Amy Gutschow - 920-377-1948		List Date:	10/27/2015	Electronic Consent:	No
SOLD@AmyGutschow.com	54074-90	Expire Date:	10/27/2016	Exclusive Agency:	No
RE/MAX Universal		Subagent Comm:	2.4000%	Licensee Interest:	No
920-208-9500 Fax# 920-208-9516		BuyerAgent Comm:	2.4000%	Limited Service:	No
614 BROADWAY		Days On Market:	292	Multiple Rep:	
SHEBOYGAN FALLS WI 53085		Pending Date:	8/13/2016	Named Exceptions:	No
Sale Agent: Janine Rogge	Sold Price: $170,000	Closing Date:	10/4/2016	Policy Letter:	
Northern Exposure Real Estate - 608-208-0546	Concessions: No	Financing:	Conventional	Variable Comm:	No


19826
06.11.2019

Proximate Sale MLS 50133652 16226 Lax Chapel Road

MLS : 50133652 **Sold** **Single Family** **Price: $259,900**
16226 LAX CHAPEL RD **Town Schleswig**
County: Manitowoc **Mailing City:** KIEL
Subdivision: WI 53042

Bedrooms: 3 **Est Fin Above Grade SqFt:** 1,990
Full Baths: 1 **Est Fin Below Grd Exp SF:** 0
Half Baths: 0 **Est Total Finished SqFt:** 1,990 *Assessor*

Est Age: 75+ YEARS
Year Built: *Builder* ***Open House:***
Schedule a Showing **Show Date:**
Data From: *Northeast WI MLS*

From Kiel-south on Hwy 57 approx 4 miles to Lax Chapel Road-go north 1/8 of a mile. 1st home on west

Living Rm	M	23x15	**Mstr BedRm**	M	11x13	**Laundry**	M		**Baths**		**School Info**
Great Rm			**2nd BedRm**	U	15x12	**Bonus Room**	M	27x30	**Full**	**Half**	(D) Kiel Area
Kitchen	M	21x19	**3rd BedRm**	U	12x13	**Foyer/Vest**	M	15x9	**Upper:**		(E)
Dining Rm			**4th BedRm**			**Mud Room**	M	19x9	**Main:** x		(M)
Dining Area			**5th BedRm**			**Other**	U	10x19	**Lower:**		(H) Kiel Hs - Kiel
Family Rm			**Den/Office**			**Rec Rm**					

Acres: 12.0500 *Assessor* **Zoning:** Residential **Parcel #:** 016-034-003-001.06
LotSize: 12.05 **HOA Dues/Yr:** $0.00 **Land Assess:** $
WaterFrontage: 278 *Plat Map/Survey* **Improvements:** $
Lake/River: Sheboygan River **Owner:** **Total Assess:** $ /
Lake Size: **Lake Depth:** **Builder:** **Net Taxes:** $ /

Type	2 story
Architecture	National Folk/Farm
Master Bedrm Bath	None
Kitchen Features	Range/Oven, Refrigerator, Dishwasher
Fireplace	Free standing STOVE, None
Basement	Full, Walkout to yard, Crawl space
Exterior	Vinyl, Aluminum/Steel
Garage	2 car, Attached
Driveway	Concrete, Unpaved
Lot Description	Wooded
Fuel	Liquid propane, Wood
Heating/Cooling	Zoned Heating
Water/Waste	Private Well, Non-Municipal/Prvt dispos
Waterfront	Has actual water frontage, 200-300 feet, On a river
Farm Features	Barn(s), Pole Building

Interior Features Skylight(s), Air cleaner
Exterior Features Deck, Storage building, Pool - above ground

Included:

Excluded:

Heating and Cooling = Hot Water. 12 ac farmette w/278' rvr frontage, hunting&fishing outside your back dr! A 3BR home, huge kit, lrg LR, dwnstrs mstr, 1st flr lndry, att 2+ car gar, w/htd 30x27 rec rm, list goes on! Lucrative business opportunities: Amish made horse stalls, strg&xtra shd, outside wd boiler& 1.5 ac woods! True peace mins from twn&famous Road America! Come look, you'll be glad you did & won't be disappointed!

Call listing agent to schedule all showings @ (920)203-9166. Sellers require 24 hr notice-Pets. Agent has pertinent docs related to property & acreage, plat map

Lot lines marked with painted posts-approximate.

Jim Hooyman - 920-203-9166
jimhooyman@gmail.com 94-72959
Berkshire Hathaway HomeServices
920-203-9166 **Fax#** 920-439-1036
W4210 Moore Rd
HILBERT WI 54129
Sale Agent: Sally Swick - 920-322-8877, First Weber, Inc. - 920-322-8877
Sold Price: $254,900
Concessions: 0

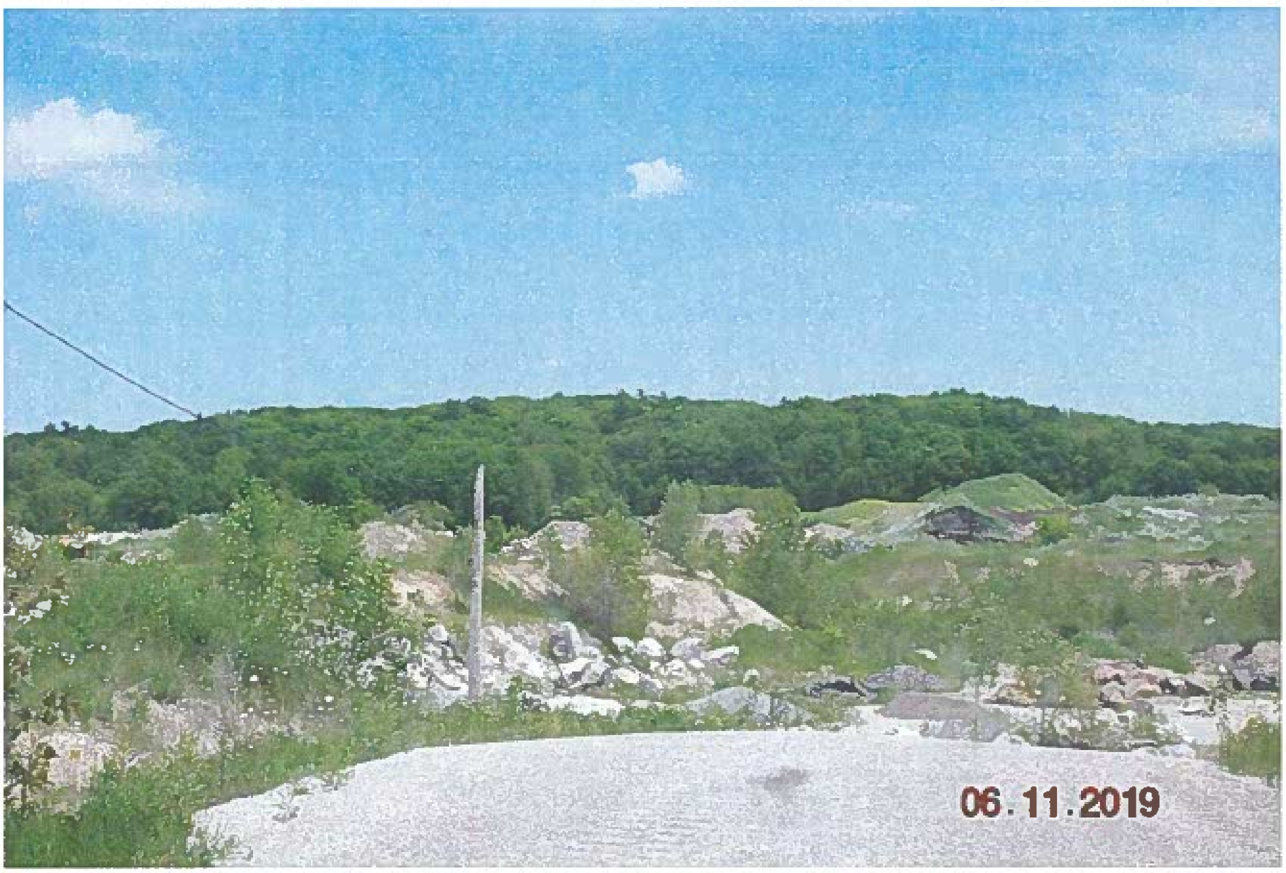
List Date: 12/1/2015
Expire Date: 8/31/2016
Subagent Comm: 2.0%
BuyerAgent Comm: 2.0%
Days On Market: 179
Pending Date: 5/27/2016
Closing Date: 6/30/2016
Financing:

Electronic Consent:
Exclusive Agency: No
Licensee Interest: No
Limited Service: No
Multiple Rep:
Named Exceptions: Yes
Policy Letter:
Variable Comm: No


06.11.2019


Line
Path
Polygon
Circle
3D path
3D polygon
Measure the distance between two points on the ground
Map Length:
227.17
Feet
Ground Length:
227.17
Heading:
304.08 degrees
Mouse Navigation
Save
Clear

Zimmerman Pit



Facing East from Entrance to Zimmerman Pit

Paired Sale No. 1 Aggrecon LTD

Proximate Sale

MLS 1337684 was a December 2014 sale of a 1,683 SF two-story home constructed in 1989. The home is located at 19940 STH 57, adjacent to property owned by Kiel Sand and Gravel. The home was listed for $157,900 and sold for $141,000 after being on the market for 407 days. The sales price of $141,000 represented a price/SF of $83.78.

Non-Proximate Sales

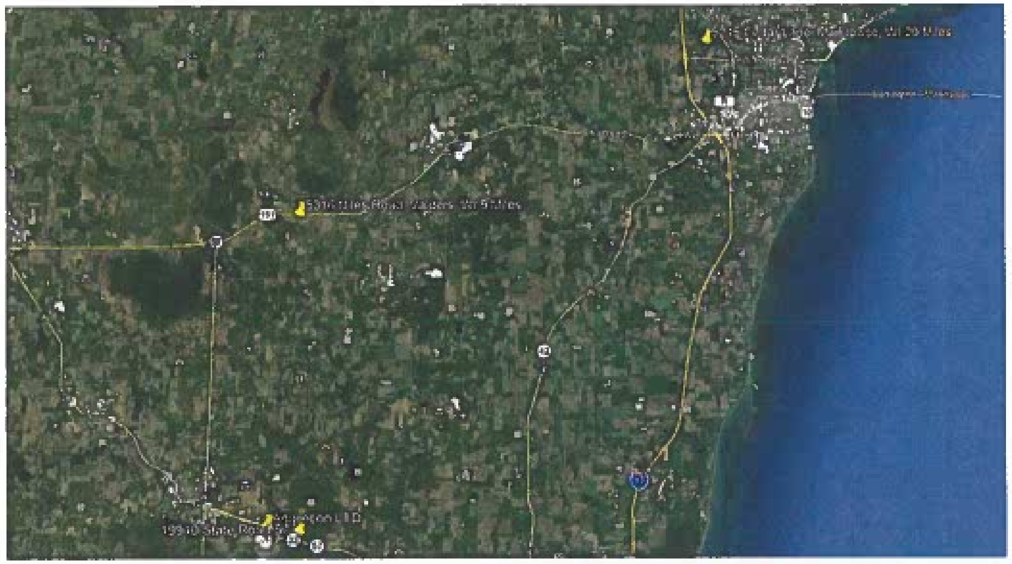
MLS 1330351 was an October 2014 sale of a 1,696 SF ranch home constructed in 1955. The home is located at 5245 Cedar Lane in the Town of Manitowoc Rapids. The home was described as a lovely ranch located on 2.2 acres. The property was listed for $189,000 and sold for $145,000 after being on the market for 374 days. The sales price of $145,000 represented a price/SF of $85.50.

MLS 1326772 was an April 2014 sale of an 1,855 SF 1.5-story home constructed in 1996. The home is located at 5316 Niles in the Town of Eaton. The home was described as a fantastic log home located on a four-acre wooded site. The property was listed for $169,900 and sold for $145,000 after being on the market for 197 days. The sales price of $145,000 represented a price/SF of $78.17.

	TOTAL		HIGH	LOW	AVG	MED
UNT:	3	DAYS ON MARKET:	406	196	278	232

	HIGH	LOW	AVERAGE	MEDIAN	TOTAL PRICE
LIST PRICE:	$189,000	$157,900	$172,266	$169,900	$516,800
SOLD PRICE:	$145,000	$141,000	$143,666	$145,000	$431,000

Photo	Original MLS	Status	Class	Address	Municipality	Price	Beds	Full Bath	1/2 Bath
	1337684	Sold	Single Family	19940 State Rd 57	Kiel	$141,000	3	2	0
	1326772	Sold	Single Family	5316 Niles	Eaton	$145,000	3	2	1
	1330351	Sold	Single Family	5245 Cedar LN	Manitowoc Rapids	$145,000	2	2	0



Comparison Grid Paired Sale No. 1 Proximate Sale to Non-Proximate Sales

MLS	Address	List Price	Sales Price	Sales date	% List/Sale	SF	Price/SF	Days on Mkt	Distance
1337684	19940 State Road 57	$157,900	$141,000	Dec-14	89.30%	1,683	$83.78	407	Adjacent
1330351	5245 Cedar Lane	$189,000	$145,000	Oct-14	76.72%	1,696	$85.50	374	N/A
1326772	5316 Niles	$169,900	$145,000	Apr-14	85.34%	1,855	$78.17	197	N/A

The sales price of the proximate sale was $141,000 and the property was on the market for 407 days. The sales price was consistent with both the average ($143,000), and median sales prices ($145,000) of the three reviewed non-proximate sales. The sales price per square foot of $83.78 was consistent with the reviewed non-proximate sales which ranged from $78.17/SF to $85.50/SF. The marketing time of 407 days was longer than both the average (278 days and the median 232 days). It should be noted that this sale was immediately adjacent STH 57, which would also represent a negative locational proximity.

Paired Sale No. 2 Aggrecon LTD

Proximate Sale

MLS 913838 was an August 2007 sale of a 1,008 SF single story ranch home constructed in 1965, located at 16217 Little Elkhart Lake an estimated 570 feet from the Aggrecon site. The home was listed for $164,900 and sold for $155,000 after being on the market for 16 days. The sales price of $155,000 represented a price/SF of $153.77.

Non-Proximate Sales

MLS 993029 was the April 2008 sale of a 1,460 SF bi-level ranch home constructed in 1973 located at 6815 Oakwood Lane in the Town of Whitelaw. This home was described as SUPREME COUNTRY LIVING located on a four-acre wooded site. The home had three bedrooms with a finished family room in the lower level. The home was listed for $164,900 and sold for $159,900 after being on the market for 23 days. The sales price of $159,900 represented a sales price of $109.52/SF.

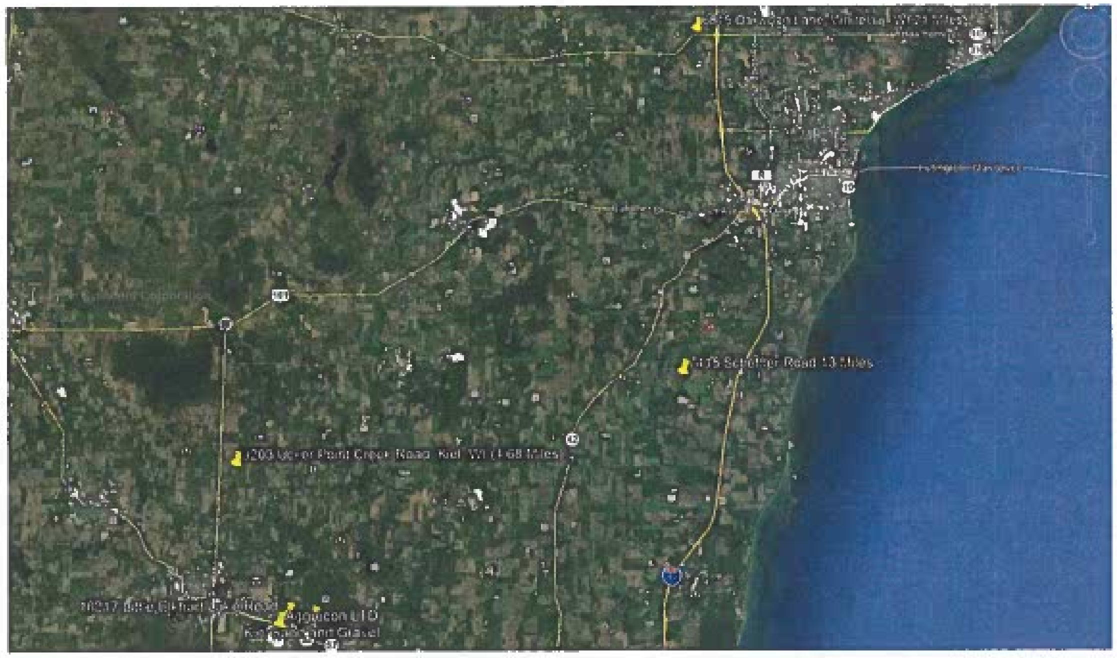
MLS 972703 was the December 2007 sale of a 1,488 SF 1.5-story home constructed in 1955 located at 19203 Ucker Point Creek Road in the Town of Kiel. This home was described as a completely renovated three-bedroom two-bath home located on 1.4 acres. The home was listed for $162,500 and sold for $150,000 after being on the market for 37 days. The sales price of $150,000 represented a sales price of $100.81/SF.

MLS 914837 was the June 2007 sale of a 1,536 SF single-story ranch home constructed in 1978 located at 7415 Scheffler Road in the Town of Newton. This home was described as a one-owner exposed-basement ranch located on a 2.58-acre wooded site. The lower level was finished with a family room and bedroom. The home was listed for $149,900 and sold for $152,000 after being on the market for 5 days. The sales price of $152,000 represented a sales price of $98.96/SF.

TOTAL		HIGH	LOW	AVG	MED
OUNT: 4	DAYS ON MARKET:	36	4	19	18

	HIGH	LOW	AVERAGE	MEDIAN	TOTAL PRICE
LIST PRICE:	$164,900	$149,900	$160,550	$163,700	$642,200
SOLD PRICE:	$159,900	$150,000	$154,225	$153,500	$616,900

Photo	Original MLS	Status	Class	Address	Municipality	Price	Beds	Full Bath	1/2 Bath
	972703	Sold	Single Family	19203 Ucker Point Creek	Kiel	$150,000	3	2	0
	914837	Sold	Single Family	7415 Scheffler Rd	Newton	$152,000	3	1	1
	913838	Sold	Single Family	16217 Little Elkhart Lake Rd	Kiel	$155,000	3	0	0
	993029	Sold	Single Family	6815 Oakwood Ln	Whitelaw	$159,900	3	0	0



Comparison Grid Paired Sale No. 2 Proximate Sale to Non-Proximate Sales

MLS	Address	List Price	Sales Price	Sales date	% List/Sale	SF	Price/SF	Days on Mkt	Distance
913838	16217 Little Elkhart Lake Rd	$164,900	$155,000	Aug-07	94.00%	1,008	$153.77	16	570 Feet
993029	6815 Oakwood Lane	$164,900	$159,900	Apr-08	96.97%	1,460	$109.52	37	N/A
872703	19203 Ucker Point Creek	$162,500	$150,000	Dec-14	92.31%	1,488	$100.81	37	N/A
914837	7415 Scheffler Road	$149,900	$152,000	Jun-07	101.40%	1,536	$98.96	5	N/A

The sales price of the proximate sale was $155,000 and the property was on the market for 16 days. The sales price was consistent with both the average ($154,000), and median sales prices ($152,000) of the three reviewed non-proximate sales. The sales price per SF of $153.77 was higher than the reviewed non-proximate sales, which ranged from $98.96/SF to $109.52/SF. The marketing time of 16 days was longer than both the average (19 days) and Median (18 days).

Paired Sale No. 3 Aggrecon LTD

Proximate Sale

MLS 1448819 was an October 2016 sale of a 2,058 SF two-story farmhouse which was constructed in 1910. The property is located at 19826 State Road 57. The home was on a lot totaling 11 acres and was adjacent to property owned by Kiel Sand and Gravel. The home was listed for $175,000 and sold for $170,000 after being on the market for 292 days. The sales price of $170,000 represented a price/SF of $82.60.

Non-Proximate Sales

MLS 1461263 was the September 2016 sale of a 1,975 SF two-story farmhouse constructed in 1900. The property is located at 3701 Biebahn Street in the Town of Newton. This home was described as a beautifully renovated farmhouse on the edge of town. The home was listed for $174,900 and sold for $170,000 after being on the market for 179 days. The sales price of $170,000 represented a sales price of $86.08/SF.

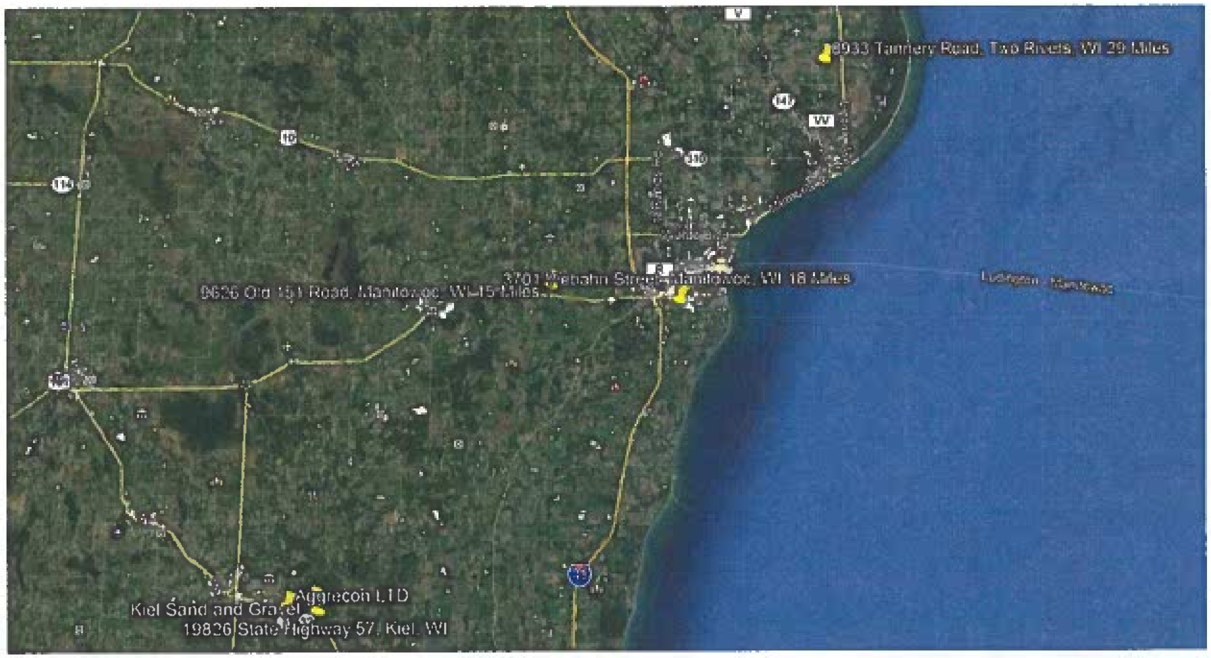
MLS 1470246 was the June 2016 sale of a 2,048 SF two-story home constructed in 1900. The property is located at 9629 Old 151 in the Town of Manitowoc Rapids. This home was described as a renovated National Folk farmhouse. The home was listed for $169,900 and sold for $171,000 after being on the market for 9 days. The sales price of $171,000 represented a sales price of $83.50/SF.

MLS 50163956 was the July 2017 sale of a 2,300 SF two-story farmhouse constructed in 1890. The property is located at 8933 Tannery Road in the Town of Rivers. This home was described as well-maintained with many updates completed in 2001. The home was listed for $195,000 and sold for $174,000 after being on the market for 56 days. The sales price of $174,000 represented a sales price of $75.65/SF.

	TOTAL		HIGH	LOW	AVG	MED
ɹUNT:	5	DAYS ON MARKET:	291	8	133	55

	HIGH	LOW	AVERAGE	MEDIAN	TOTAL PRICE
LIST PRICE:	$339,900	$169,900	$210,940	$175,000	$1,054,700
SOLD PRICE:	$174,000	$170,000	$171,250	$170,500	$685,000

Photo	Original MLS	Status	Class	Address	Municipality	Price	Beds	Full Bath	1/2 Bath
	1448819	Sold	Single Family	19826 State Rd 57	Kiel	$170,000	4	2	0
	1461263	Sold	Single Family	3701 Viebahn St	Newton	$170,000	4	2	0
	1470246	Sold	Single Family	9629 Old 151 Rd	Manitowoc Rapids	$171,000	4	2	0
	50163956	Sold	Single Family	8933 TANNERY ROAD	Two Rivers	$174,000	5	2	0



Comparison Grid Paired Sale No. 3 Proximate Sale to Non-Proximate Sales

MLS	Address	List Price	Sales Price	Sales date	% List/Sale	SF	Price/SF	Days on Mkt	Distance
1448819	19826 State Road 57	$175,000	$170,000	Oct-16	97.14%	2,058	$82.60	292	Adjacent
1461263	3701 Viebahn Street	$174,900	$170,000	Sep-16	97.20%	1,975	$86.08	179	N/A
1470246	9626 Old 151	$169,900	$171,000	Jun-16	100.65%	2,048	$83.50	9	N/A
50163956	8933 Tannery Road	$195,000	$174,000	Jul-17	89.23%	2,300	$75.65	56	N/A

The sales price of the proximate sale was $170,000 and the property was on the market for 292 days. The sales price was consistent with both the average and median sales prices of the three reviewed non-proximate sales. The sales price per square foot of $82.60 was consistent with the reviewed non-proximate sales which ranged from $75.65/SF to $86.08/SF. The marketing time of 291 days was longer than both the average (81 days) and median (56 days). It should be noted that this sale was immediately adjacent to STH 57, which would also represent a negative locational proximity.

Paired Sale No. 4 Aggrecon LTD

Proximate Sale

MLS 16226 was an June 2016 sale of a 1990 SF two-story farmhouse which was constructed in 1900. The property is located at 16226 Lax Chapel Road. The home was on a lot totaling 12 acres and was across the road from the 68-acre Zimmerman Pit (sand and gravel) operated by Kiel Sand and Gravel. The home was listed for $259,900 and sold for $254,900 after being on the market for 179 days. The sales price of $254,900 represented a price/SF of $128.09.

Non-Proximate Sale

MLS 1518208 was the May 2017 sale of a 1,884 SF two-story farmhouse constructed in 1893. The property is located at 9317 Reifs Mill Road in the Town of Kossuth. This home was described as a recently updated and included a large barn and newer 4,500 SF shop. The home was listed for $234,800 and sold for $220,000 after being on the market for 25 days. The sales price of $220,000 represented a sales price of $116.77/SF.

Comparison Grid Paired Sale No. 4 Proximate Sale to Non-Proximate Sale

MLS	Address	List Price	Sales Price	Sales date	% List/Sale	SF	Price/SF	Days on Mkt	Distance
50133652	16226 Lax Chapel Road	$259,900	$254,900	Jun-16	98.08%	1,990	$128.09	179	Adjacent
15118208	9317 Reifs Mill Road	$234,800	$220,000	May-17	93.70%	1,884	$116.77	25	N/A

The sales price of the proximate sale was $254,900 and the property was on the market for 179 days. The sales price was consistent the reviewed non-proximate sales.

Conclusion Reviewed Sales in Close Proximity Aggrecon and Keil Sand and Gravel

The four reviewed sales located in close proximity to the existing Aggrecon and Keil Sand and Gravel pits were compared to sales of similar homes located more than four miles away. The non-proximate homes were of similar age and condition. The sales were analyzed based upon their percentage of list price to sales price; days on market and sales price per square foot. Based upon this analysis I found no market evidence of either reduced sales prices or increased marketing time for the four reviewed proximate sales.

Summary of Conclusions

In order to assess impact of the proposed mining operation, I have completed the following five analysis:

1. Analysis No. 1 Reviewed 5 sales of residential properties in close proximity to existing active mineral extraction sites in the Green Lake County Wisconsin.
2. Analysis No. 2: Reviewed nine residential sales of homes located in the Winfield Estates Subdivision. The Winfield Estates is a upscale 59 lot residential subdivision located on the east side of Mile Road directly east of the existing Windsor Quarry in the Town of Windsor Dane County Wisconsin.
3. Analysis No. 3: Reviewed recent home construction and reviewed eight residential sales which occurred between July of 2012 and June of 2017, located within 1.5 miles of the sand and gravel quarry owned by Rocky Rights LLC, located at 2294 USH 12&18 in the Town of Cottage Grove, Dane County Wisconsin.
4. Analysis NO. 4 Reviewed 3 sales of residential home located in close proximity to the Mann Sand and Gravel located in Elkhorn Wisconsin.
5. Analysis No. 5 Reviewed 4 sales or residential property located proximate the Aggrecon and Kiel Sand and Gravel in Town of Kiel Sheboygan County Wisconsin.

Analysis No. 1 Sales in Close Proximity to existing Mines Green Lake County

I reviewed sales information from the South-Central Wisconsin Multiple Listing Service (SCWMLS) for residential sales (Proximate Homes) located in close proximity to existing surfaces mining operations in Green Lake County. I was able to locate 5 sales of homes which were located in close proximity which occurred between 2021-2023 . The sales were examined for proximity (feet) from the existing mining operations of the existing quarry the list to sales price ratio (percentage of sales price to list price); marketing time (DOM): and average sales price/SF. The sales ranged in between $249,500 to $620,000. Four of the sales were located adjacent Kopplin and Kinas operating mineral extraction sites. The sales were sold for 100% of asking price and the average days on market ranged between 3 and 21 days with an average of 7 days. The closest sale was 195 feet from the existing quarry operation with the greatest distance being 965 feet. Each of the properties sold between 96% to 107% of their asking price. There was no impact as to either price (101% of List Price) or Marketing Time (average less than 7 days).

Analysis No. 2: Reviewed nine residential sales of homes located in the Winfield Estates Subdivision Proximate to the Windsor Quarry.

The nine reviewed sales located in close proximity to the Windsor Quarry show no evidence of either protracted marketing times or decrease in sales price. With the exception of one sale these homes occurred in 2018 and 2019. The sales prices ranged between $460,000 to over $900,000 which is far in excess of the average sales prices for home in Dane County ($275,000). The reviewed sales were located on average .39 acres from an active Mile Road Quarry. . The average sales prices/gross SF of finished area averaged $175.93/SF. The average days on market was 49 days. The proximate sales sold for 99% of the list price.

As part of this report, I have reviewed the sales of all homes located in the area designated as D09 which were sold for $450,000 to $1,000,000 occurring between 2018 and 2019 South Central MLS records indicated a total of 58 home sales. The average sales prices/gross SF for the entire D09 area averaged $179.75/SF in comparison to $175.93 for the proximate sales. The DOM market for all sales 49 days which was equal to the proximate sales. The home sales for the entire D09 area sold for 98% of the list price.

There is a concern that the proximity of the homes to a quarry could result in lowering of assessed values. A review of the proximate sales indicates that the average sales price was 133% above the assessments at the time of sale.

I have also interviewed the listings brokers involved in 6 of the 9 reviewed proximate sales. All of the brokers indicated that the proximity of the listings to the existing Mile Road Quarry did not negatively impact either the list price or the sales price.

Based upon a review of this data it is my opinion that the existence of Mile Road Quarry did not negatively impact the sales price or marketing of the 9 reviewed proximate sales.

Analysis No. 3 eight residential sales which proximate to the Cattell sand and gravel quarry Town of Cottage Grove Dane County Wisconsin.

The review of the eight reviewed sales within 1.5 miles of the Cattell Quarry show no indication of negative market impact as a result of the proximity to the quarry and batch plant. The sales price per square foot; average days on market; and the percentage of list price to sales price were consistent with sales of other reviewed homes in the Town of Cottage Grove as of the date of sale. There is no indication that the proximity to the mineral extraction site or the batch plant adversely impacted the sales price or marketing time of the reviewed sales.

Analysis No. 4 Reviewed 3 sales of residential home located in close proximity to the Mann Sand and Gravel located in Elkhorn Wisconsin.

The three reviewed sales located in close proximity to Mann Sand and Gravel quarry were compared to sales of similar homes located in Lake Geneva and the Town of Fontana. The non-proximate homes were of similar age and condition. The sales were analyzed based upon their percentage of list price to sales price; days on market and sales price per square foot. Based upon this analysis I found no market evidence of either reduced sales prices or increased marketing time for the four reviewed proximate sales. The purchase and development of the vacant site (Unit 20) with a home assessed at $469,500 in close proximity to an existing concrete operation and quarry shows no evidence of a negative impact as a result of proximity.

Analysis No. 5 Reviewed 3 sales of residential home located in close proximity to the Mann Sand and Gravel located in Elkhorn Wisconsin

The four reviewed sales located in close proximity to the existing Aggrecon and Keil Sand and Gravel pits were compared to sales of similar homes located more than four miles away. The non-proximate homes were of similar age and condition. The sales were analyzed based upon their percentage of list price to sales price; days on market and sales price per square foot. Based upon this analysis I found no market evidence of either reduced sales prices or increased marketing time for the four reviewed proximate sales.

George A. Erickcek: An Assessment of the Economic Impact of the Proposed Stoneco Gravel Mine Operation on Richland Township

The most widely cited information claiming that nonmetallic mining operations have a consistent negative effect on property values is based on an August 2006 report entitled *An Assessment of the Economic Impact of the Proposed Stoneco Gravel Mine on Richland Township* prepared by George A. Erickcek, Senior Regional Analyst for W.E. Upjohn Institute for Employment Research. This report, which was completed at the request of the Richland Township Planning Commission, provides an estimation of the economic impact of the proposed Stoneco Gravel Mine Operation on Richland Township. This report was based upon an unpublished non-peer-reviewed pricing model by Diane Hite, an associate professor at Auburn University. Erickcek concluded that gravel mines create a one-time immediate loss of property value from that point forward, essentially lowering the value all at once. The price reductions were based upon a percentage loss in value based upon a property's distance from the mining operation. This was reflected on page 5 of the report which is detailed as follows:

> percent increase in home value, all else the same.[5] Conversely, the closer the house to the proximity to the mine, the greater the loss in house value.
>
> Figure 1 displays the estimated effects of distance from the gravel pit on house price. A residential property located a half mile from the gravel mine would experience an estimated 20 percent reduction in value; one mile from the mine, a 14.5 percent reduction; 2 miles from the mine, an 8.9 percent reduction; and 3 miles from the mine, a 4.9 percent reduction. These estimates are similar to estimates published in academic journals on the effects of landfills on nearby property values.

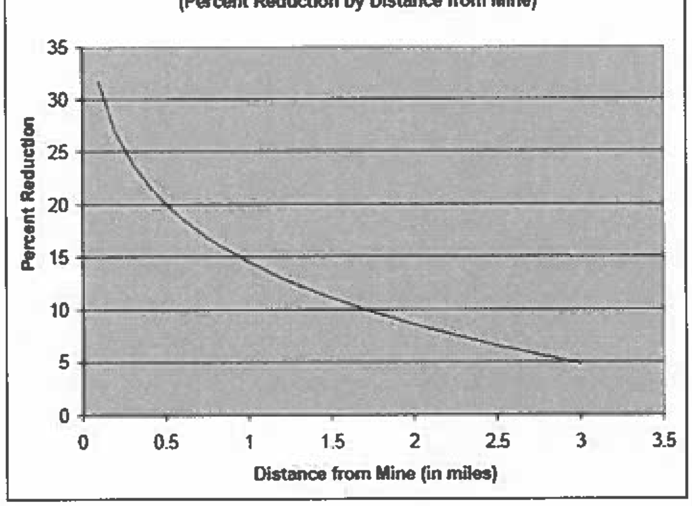


Figure 1: Impact of Gravel Pit on Residential Property Values:
(Percent Reduction by Distance from Mine)

The conclusion of the Erickcek Article indicates a 25 percent loss within ½ mile of a mine; a 20 percent loss in value of homes located within 1 mile and a 14.5% loss within 2 miles of a mine. This is clearly not supported or evidenced in the sales activity in the Winfield Estates subdivision; nor in the Rock Road

The five separate sales analyses detailed in this report indicate that the market activity does not support these conclusions. The comparison of proximate vs non proximate sales shows no indication of either reduced sales prices or protracted marketing times of properties located in close proximity to the reviewed quarry operations.

Based upon my review I find no market supported evidence to support a decrease in market value for the homes in the immediate area of the proposed mining operations.

Certification

I certify that, to the best of my knowledge and belief:

- The facts and data reported by the reviewer and used in the review process are true and correct.
- The analyses, opinions, and conclusions in this review report are limited only by the assumptions and limiting conditions stated in this review report and are my personal, impartial, and unbiased professional analyses, opinions, and conclusions.
- I have no present or prospective interest in the property that is the subject of the work under review and no personal interest with respect to the parties involved.
- I have no bias with respect to the property that is the subject of the work under review or to the parties involved with this assignment.
- My engagement in this assignment was not contingent upon developing or reporting predetermined results.
- My engagement in this assignment did **NOT** include my forming an opinion of value for the subject property.
- My compensation is not contingent on an action or event resulting from the analyses, opinions, or conclusions in this review or from its use.
- My analyses, opinions, and conclusions were developed, and this review report was prepared in conformity with the Uniform Standards of Professional Appraisal Practice.
- No one provided significant appraisal, appraisal review, or appraisal consulting assistance to the person signing this certification.

Scott L. MacWillliams
CGA No 91 State of Wisconsin
May 29, 2024

Scott L. Mac Williams
President and Appraiser, CGA #91

Education

University of Wisconsin, Whitewater: Graduated 1972 BBA

Completed Coursework:

SREA Courses 101, 201 and Narrative Report Writing Seminar

International Right of Way Association Courses Completed:

Appraisal of Partial Acquisitions

Easement Valuation

Relocation Assistance

Ethics and the Right of Way Profession

Communications

Credentials

Certified Instructor for Appraisal Courses:

International Right of Way Association – All appraisal courses

Madison Area Technical College – All appraisal courses

ACB Certified USPAP Instructor (10635) for Appraisal Foundation, Washington, D.C.

Wisconsin Certified General Appraiser No. 91 – State of Wisconsin Dept. Regulation and Licensing

Certified Commercial Real Estate Appraiser – CCRA National Association of Real Estate Appraisers

General Accredited Appraiser – National Association of Realtors

Affiliations

International Right of Way Association; past President

Community Development Association for Oregon, WI; Chairman

Clients Served

Wisconsin Department of Transportation

Wisconsin Department of Transportation – Bureau of Railroads and Harbors

Wisconsin Department of Aeronautics

Dane County Purchasing

USDA Farm Home Administration

City of Madison

Valley Bank

Bank One

M&I Bank

Guardian Pipeline

Specific references available upon request

Experience

S. L. MacWilliams Co. – President; 1991 – Present

D.L. Evans Company, Inc. – Vice President, Appraisal Division, Staff Appraiser; 1983 - 1991

Thirty-one years of real estate appraisal experience

Specific experience with commercial narrative reports on various types of properties, including Motels, Retail Shopping Centers, Office Buildings, Service Stations, Restaurants, and special purpose appraisal assignments such as Landfills, Grain Storage Facilities and enclosed Parking Lots.

PINES BACH

Pines Bach LLP
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Madison, WI 53703

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pinesbach.com

Attorney Christa O. Westerberg
cwesterberg@pinesbach.com

May 29, 2024

VIA E-MAIL
cbuss@greenlakecountywi.gov

Chuck Buss, Chair
Green Lake County Land Use Planning &
Zoning Committee
571 County Road A
Green Lake, WI 54941

Re: Land Use Planning & Zoning Committee Meeting, Friday, June 14
Public Hearing Agenda Item #7

Dear Chairman Buss:

This letter is submitted on behalf of Green Lake Association (GLA) and Green Lake Sanitary District (GLSD) for the Land Use Planning & Zoning Committee's review and inclusion in the record for the above-referenced agenda item regarding the Kopplin & Kinas mine CUP.

Enclosed with this letter is a memorandum from Dr. Steve Gaffield, who was permitted to speak to the Committee at its last meeting on May 2, 2024. At that meeting, and as further detailed in a memorandum submitted to the Committee at that time, Dr. Gaffield identified potential risks associated with the latest proposed Kopplin & Kinas mine in the Town of Brooklyn. Dr. Gaffield also identified potential risk management and mitigation strategies, and he has now refined that list with the benefit of further information. He has suggested these strategies as proposed conditions on any conditional use permit the County may consider granting for the Koppin & Kinas.

GLA and GLSD submit these proposed conditions only as they relate to protecting nearby water resources, which are relevant to the CUP standards in Green Lake County

Ordinance § 350-56(B)(2)(b), (c), and particularly (d). These proposed conditions are thus related to the purpose of the ordinance and are based on substantial evidence, as required by Ordinance § 350-56(B)(1)(a). While Dr. Gaffield has phrased his suggestions as things the applicant "should" do, if the Committee adopts these suggestions, it should change the phrasing to "shall" so the conditions are more clearly mandatory and enforceable against the applicant.

Dr. Gaffield also recommends that "the County regularly review details on the mining to confirm the conditions are being met." To accomplish this, GLA and GLSD suggest that Committee include as a condition a requirement that a qualified third-party hydrogeologist oversee the County's monitoring program, with expenses to be paid by Kopplin & Kinas. The requirement for an independent environmental monitor is common, in our experience, in complicated projects that are located near sensitive resources, as this one is. We'd also request that the monitor be required to submit periodic reports to the County that are available to the public. Similarly, we would suggest the County impose a permit term on the CUP of no more than 20 years, to provide for the review discussed in Dr. Gaffield's memo and to ensure any other conditions associated with the permit are adequately managing risk.

Please note that GLA and GLSD take no position on whether the CUP should be granted, or whether the applicants can meet the conditions on issues not related to water quality or quantity. Rather, if the Committee is inclined to grant the permit, we ask that it include the attached conditions to ensure the project can meet the County's standards and nearby water resources are protected. These proposed conditions address one aspect of the potential impact the mine could have on the surrounding area. Issues such as road safety, noise pollution, property values, and private well water access are other concerns that must be considered by the Committee to ensure the application satisfies all 13 standards outlined in Green Lake County code.

Finally, as you know, GLA and GLSD opposed the previous CUP for the Skunk Hollow Mine proposed by Kopplin & Kinas in 2022, because it was closer to Green Lake and trout streams these organizations have worked to protect and would have mined below the water table. That mine was projected to have greater impacts to these resources, and we suggest the County or Kopplin & Kinas take measures to ensure the property is not developed as a mine in the future. One suggestion is that the landowner enter into a land use restriction agreement providing the land cannot be used for mining or, even, other activities that would harm the lake and nearby streams. We encourage the Committee consider requiring this agreement as a condition to mitigate the overall impact of mining on resources in the area.

Thank you.

Sincerely,

PINES BACH LLP

Christa O. Westerberg

COW:hej

encl.
cc (via email):

Cate Wylie, County Administrator
cwylie@greenlakecountywi.gov

Matt Kirkman, Land Use Planning & Zoning Department Director
mkirkman@greenlakecountywi.gov

Jeff Mann, Corporation Counsel
jmann@greenlakecountywi.gov

technical memo

K QUARRY PERMIT APPLICATION REVIEW

Date	May 29, 2024
To / Contact info	Lisa Reas, GLSD
From / Contact info	Steve Gaffield PhD, PE (Wisconsin) & Stu Grubb, PG (Minnesota), EOR
Regarding	Additional / revised recommended conditions of approval

EOR prepared a technical memorandum dated April 30, 2024 identifying potential risks to groundwater and surface water resources in advance of the Green Lake County Land Use Planning & Zoning Committee meeting on May 2, 2024. To address the potential risks discussed in that memorandum, we recommend the following conditions be placed on any approval of the conditional use permit for the proposed K Quarry mine. We also recommend that the County, supported by qualified staff or contractors, regularly reviews details on the mining to confirm that the conditions are being met.

Recommended Conditions of Approval

Depth of Mining

- The depth to the water table at the site should be determined through the installation of monitoring wells in the 4 locations indicated in the application, and they should be constructed as water table observation wells compliant with Wisc. Admin. Code Chapter NR141 for use for water quality sampling. Drilling progress should be observed closely for evidence of saturated conditions to guide construction of the wells so that the screen intersects the water table, allowing accurate measurement of the depth to groundwater.

- The minimum separation between the bottom of the mine and groundwater (measured at the commencement of mining) should be 15 ft, because (1) groundwater levels have been measured to fluctuate by over 10 ft in a Dodge County bedrock well, (2) climate change is expected to raise groundwater levels in future decades (Hein and others, 2021), and (3) oxidation of sulfide minerals has been shown to be a source of arsenic and other metals where aquifers are shallow and exposed to oxygenated recharge.

- This 15-ft separation can be reviewed and, if appropriate, reduced after a minimum of 20 years under the following conditions:
    1. Groundwater levels are measured quarterly or with data loggers collecting daily water levels, to capture seasonal fluctuations;
    2. A hydrogeologist (as defined in Wisconsin Administrative Code Chapter NR712.03) reviews the data for the period of record (at least 20 years) to determine the adjustments to the separation between groundwater and the quarry floor;
    3. The highest recorded groundwater level is more than 5 ft below the quarry floor established with the original 15-ft separation;

4. The quarry floor elevation remains at least 5 ft above the highest recorded groundwater level; and
5. At the commencement of each new phase of mining defined on the Site Development Mining Sequence drawing (Sheet 25) in Kopplin & Kinas' application to the County, the quarry floor elevation is determined by the hydrogeologist and approved by the County based on the entire record of groundwater level measurements available at that time.

- Water levels in the monitoring wells should be measured annually. If the measured groundwater level is above the base of the mine, mining should be paused until the area below the water table has been backfilled above the water table elevation.

Groundwater monitoring

- The 4 groundwater monitoring wells proposed to be installed around the perimeter of the proposed mine should be sampled at least three times before mining begins to establish background water quality. Samples should be collected quarterly, unless that does not leave enough time to collect 3 samples. In that case, monthly sampling will be acceptable. Parameters should include pH, an unfiltered metals screen including arsenic and nickel, and nitrate. A summary of background sampling including all water level measurements, laboratory reports and results tables shall be provided to the County. This data can be used for comparison with samples collected during mining to detect changes in groundwater quality related to the mine.

- During active mining, the monitoring wells should be sampled annually for pH, an unfiltered metals screen that includes arsenic and nickel, and nitrate. A summary including water levels, laboratory reports and results tables shall be provided to the County each year.

- Groundwater sampling before and during mining should be conducted by a third-party hydrogeologist with expenses paid by Kopplin & Kinas, following the procedures described in Wisconsin Department of Natural Resources (DNR) Groundwater Sampling Desk Reference (PUBL-DG-037-96) and Groundwater Sampling Field Manual (PUBL-DG-038-96).

- If any parameter is detected in groundwater at concentration at or above its Preventive Action Limit defined in Wisconsin Administrative Code Chapter NR 140, the mine operator shall notify the Wisconsin Department of Natural Resources (DNR) as required by NR 140.24. The DNR will evaluate the information, including background water quality concentrations, to determine if an investigation and report on the cause and significance of the increased concentration, changes in the monitoring program, and/or a response action are required, as described in NR 140.24.

Water Supply Well

- Any water supply well that is constructed at the mine site shall be cased and cement-grouted at least as deep as the top of the Cambrian sandstone, following the DNR casing requirements for other northeast Wisconsin counties with naturally occurring arsenic in groundwater.
- A high-capacity well will not be constructed for the mine.

TOWN BOARD ACTION

Dear Land Use Planning and Zoning Committee:

Please be advised that the Town Board of Brooklyn, County of Green Lake, took the following action on –
(Date) April 9th 2023.

Owner/Applicant: Christopher Retzlaff **Applicant:** Michael McConnell (Kopplin & Kinas Co. Inc.)

Site Location: Highway K

General legal description: Parcels 004-00789-0000 & 004-00792-0000, NE ¼ of SE ¼ and SE ¼ of SE ¼ of Section 36, Town of Brooklyn, ±80 acres.

Request: Non-metallic Mining Permit for a limestone quarry to produce construction aggregates.

Planned public hearing date for the above requests: May 2, 2024

_____ **Town Does Not object to and Approves of request**

_X_ **No action taken**

_____ **Objects to and requests denial of request**

NOTE: If denial – please enclose Town Resolution of denial

- Reason(s) for objection:

______________________________ April 9th 2023

Town Representative **Date Signed**

NOTES: Due To Conflicts of interest The Town was Advise By our Legal Attorney Not Take Any Action

Please return this form to the Land Use Planning & Zoning Office by: April 19, 2024

DETERMINATION OF THE LAND USE PLANNING AND ZONING COMMITTEE

Public Hearing Date: June 14, 2024

Owner: Christopher D. & Ruth M. Retzlaff

Agent: Michael McConnell, Kopplin & Kinas Co. Inc.

Parcels: #004-00789-0000 & 004-00792-0000, Highway K & Searle Road, Town of Brooklyn.

Request: Conditional Use Permit for a limestone quarry.

Land Use Planning and Zoning Committee:

______________________ Chuck Buss, Chair	______________________ Harley Reabe
______________________ William Boutwell, Vice Chair	______________________ Curt Talma
______________________ Gene Thom	

Date signed: June 14, 2024

Committee vote: Ayes ____ Nays____ Abstain____ Absent____

☐ **Approve**

☐ **With the conditions (listed on page 2-3)**

☐ **Deny.**

☐ **Modify as follows:**

Conditions of Approval:

General Conditions:

1. No additional expansion or addition of structures, mined area, and/or uses related to this conditional use permit shall occur without review and approval through future conditional use permit(s).
2. The site shall obtain a fire number prior to the start of mining operations.
3. Any outdoor lighting shall comply with Section 350-23 of the County Zoning Ordinance.
4. Any restroom facilities/POWTS located on site must be compliant with Wisconsin Administrative code SPS 381-387 or SPS 391 as applicable.
5. Hours of Operation are Monday-Friday from 5:30am to 6:00pm and Saturday from 6:00am to 3:00pm. Blasting may only occur Monday through Friday 9:00am to 3:00pm.
6. All mining equipment must have mufflers (when applicable).
7. That the owners/applicants are responsible for obtaining permits and licenses from any other regulatory agency.
8. Owner must obtain and follow an Erosion Control and Storm Water Management Plan from the Wisconsin Department of Natural Resources.
9. Owner must receive and follow a Non-Metallic Mining Reclamation Permit from Green Lake County.
10. Owner must remain current with annual Non-Metallic Mining fees and Financial Assurance requirements.
11. No excavation or blasting of materials shall occur within a 100ft. buffer of all property lines, excluding the property line separating parcels 004-00792-0000 and 004-00789-0000. Construction, maintenance, or removal of the following features shall not be considered excavating or blasting for the purpose of this condition: quarry entrance, exterior berms, stormwater basin, and diversion of unnamed stream (WBIC 5027058).
12. The Green Lake County Land Use Planning and Zoning Department shall be contacted prior to the use of a wash plant on site. All byproducts of the wash process shall be disposed of in a manner following the current applicable regulations and so as not to contaminate ground or surface water quality.
13. Any well, constructed or abandoned on site, must be in compliance with NR 141, and done in a manner that prevents substantial contamination of groundwater quality.
14. The elevation of groundwater within the proposed mining site shall be determined. This shall be accomplished by installing four groundwater monitoring wells, two in the northern edge, one on the western edge, and the other in the southeast corner of the proposed site. Each well to be constructed into the groundwater table.
15. No material shall be removed below the aquifer or within 10 feet of the high groundwater elevation as determined in condition 14 of this permit.
16. No material extraction shall occur within five feet of any feature that could substantially harm human health, groundwater quality, surface water quality, or neighboring properties.
17. The Green Lake County Land Use Planning and Zoning Department must be contacted immediately if mining operations disturb a feature that could pose a serious risk to human health, groundwater, surface waters, or neighboring properties.

18. The Green Lake County Land Use Planning and Zoning Department shall be notified at least 24 hours prior to any blasting operations.
19. Information about blasting seismograph data as required by Wisconsin State Administrative Code SPS 307.31(4)(18) shall be made public upon request by a member of the public, or an employee of: Green Lake County, the State of Wisconsin, or the United States Federal Government.

Item #7: Owner: Christopher D. & Ruth M. Retzlaff, **Agent:** Michael McConnell, Kopplin & Kinas Co. Inc., **Location:** County Highway K and Searle Road, **Parcels:** 004-00789-0000 & 004-00792-0000. **Legal Description:** NE ¼ of SE ¼ and SE ¼ of SE ¼ , located in Section 36, T16N, R13E, Town of Brooklyn, ±80.0 acres. ***Purpose:** The owners have submitted a Non-metallic mining reclamation permit application.

The above public hearing item is required to obtain reclamation-related testimony for the purpose of Department review. In accordance with Chapter 295, Wis, Stats., NR135 Wis. Admin. Code and Section 323 Green Lake County Code of Ordinances, the Land Use Planning & Zoning Department is the Regulatory Authority that determines whether a Reclamation Permit is issued. The Land Use Planning & Zoning Committee has no approval authority.

Please type or use black ink

Return to: Green Lake County
Planning & Zoning Department
571 County Road A
Green Lake, WI 54941

GENERAL APPLICATION

Fee $450.00 (not refundable) Date 02/29/2024

Zone Change from ________ to ________

Conditional Use Permit for ________

Other NMM Reclamation Permit

PROPERTY OWNER / APPLICANT

Name Christopher D. & Ruth M. Retzlaff

Mailing Address W14445 Retzlaff Dr, Ripon, WI 54971

Phone Number (920) 229-2853

Signature Christopher D. Retzlaff Ruth M. Retzlaff Date 02/29/2024

AGENT IF OTHER THAN OWNER

Name Michael C McConnell, Kopplin & Kinas Co., Inc.

Mailing Address W1266 N Lawson Dr., Green Lake, WI 54941

Phone Number (920) 294-6451

Signature [signature] Date 02/29/2024

PROPERTY INFORMATION

Town of Brooklyn Parcel Number 004-00789-0000 004-00792-0000 Acres 80

Lot ___ Block ___ Subdivision ________

Section 36 Town 16 North Range 13 East

Location of Property CTH K & Searle Rd

Legal Description The Northeast Quarter of the Southeast Quarter (NE 1/4 SE 1/4) and the Southeast Quarter of the Southeast Quarter (SE 1/4 SE 1/4) of Section Thirty Six (36),Township Sixteen (16) North, Range Thirteen (13) East, Town of Brooklyn, GreenLake County, Wisconsin.

Current Zoning Classification A-1 Current Use of Property Ag/Non-Ag

Detailed Description of Proposed Use Limestone quarry. See attached documentation.

PLEASE PROVIDE A DETAILED SITE PLAN WITH THE APPLICATION

Fees: Zone Change $375
Conditional Use Permit $375.00
Variance $375.00
Special Exception $375.00
NMM Reclamation Permit $450

PZP-010 (04/09)

Public Hearing **June 14, 2024**

Item VII: Reclamation Permit Public Hearing

Attn: Land Use Planning & Zoning Committee:

Owner:
Christopher D & Ruth M Retzlaff

Applicant:
Kopplin and Kinas CO INC

The following review checklist is to work as a guide to explain the reclamation standards for a reclamation plan. NR 135.20 requires that the county publicly notices and allows the public an opportunity for a public hearing regarding the reclamation plan. As long as the reclamation plan meets all of the requirements it must be approved according to NR 135.17(1). According to Section 323-17.A.(2)(a) of the Nonmetallic Mining Reclamation ordinance, the Green Lake County Land Use Planning and Zoning Department shall consider the reclamation-related testimony in the zoning-related hearing in deciding on a permit application. The Land Use Planning & Zoning Committee is not the approval body in this case.

Reclamation Plan Review Checklist

This checklist is based on a restatement of reclamation plan requirements of NR135.19 and the County's Non-Metallic Mining Ordinance # 323.

Applicant: ______Kopplin and Kinas CO INC ________________________________

Site Location: ___ NE and SE ¼ of the SE ¼ of Section 36, T16N, R13E, Town of Brooklyn._________

__x___ New Mine Automatic Permit # _____23___________

__x___ Yes _____ No Does the plan provide adequate detail on how reclamation will be conducted?
___x__ Yes _____ No Does the plan meet the uniform statewide reclamation standards?
__x___ Yes _____ No Can the target post-mining land use(s) be achieved?

_____ Approve Plan
_____ Plan returned for additional information (See Checklist)

Reviewed by: ____Max Richards_________________ Date: ______________________

Reviewed by: _____Matt Kirkman__________________ Date: ___________________________

NR 135.19(1) PLAN REQUIRED. An operator who conducts or plans to conduct nonmetallic mining on or after August 1, 2001, shall submit to the regulatory authority a reclamation plan that meets the requirements of this section and complies with the standards of Subch. II. To avoid duplication, the reclamation plans may, by reference, incorporate existing plans and materials that meet the requirements of Chapter NR 135.

- ❑ **Site Information:**

NR 135.19(2) SITE INFORMATION. The reclamation plan shall include information sufficient to describe the existing natural and physical conditions of the site, including, but not limited to:

- ❑ **Maps:**

  NR 135.19(2)(a) Maps of the nonmetallic mining site including the general location, property boundaries, the aerial extent, geologic composition and depth of the nonmetallic mineral deposit, the distribution, thickness and type of topsoil, the approximate elevation of ground water, the location of surface waters, and the existing drainage patterns.

  Note: Some of or all of the information required above may be shown on the same submittal, i.e. the site map required by par. (a) may also show topography required by par. (c).

  - ❑ **General Location:**
    Found in Appendix Map A-1 (USGS Quadrangle/Property Overlay), Explained in section 4.1 (Location and Land Use)
  - ❑ **Property Boundaries:**
    Found in Appendix Maps A-1 (USGS Quadrangle/Property Overlay), A-2 (Existing Ground), A-3 (Soil Map), A-4 (Existing Agriculture), A-5 (Proposed Site & Phasing), A-6 (Geologic Cross-Section), and A-7 (Reclamation Grading Plan). Explained in section 4.1 (Location and Land Use)
  - ❑ **Aerial Extent:**
  - ❑ *Found in Appendix Maps A-1 (USGS Quadrangle/Property Overlay), A-2 (Existing Ground), A-3 (Soil Map), A-4 (Existing Agriculture), A-5 (Proposed Site & Phasing), A-6 (Geologic Cross-Section), and A-7 (Reclamation Grading Plan)*
  - ❑ **Geologic Composition and Depth of the Mineral Deposit:**
    Found in Appendix Map A-6 (Geologic Cross-Section), supported by Appendix B- (Local Well Construction Reports), Explained in section 4.4 (Geology & Description of the Mineral Resources)
  - ❑ **Distribution, Thickness, and Type of Topsoil:**
    Found in Appendix Map A-3 (Soil Map), Explained in section 4.3 (Distribution, Thickness, and Types of Soil)
  - ❑ **Approximate Elevation of Ground Water:**
    Found in Appendix Map A-6 (Geologic Cross-Section), supported by Appendix B- (Local Well Construction Reports), Explained in section 4.5 (Surface Water, Wetlands, and Groundwater), 4.6 (Local Well Construction Summary)
  - ❑ **Location of Surface Waters:**
    Found in Appendix Map A-1 (USGS Quadrangle/Property Overlay), Explained in section 4.5 (Surface Water, Wetlands, & Groundwater), 4.9 (Wisconsin Chapter 30 Determination), and in Appendix C- (Wisconsin Chapter 30 Determination)
  - ❑ **Existing Drainage Patterns:**
    Found in Appendix Map A-2 (Existing Ground), Explained in sections 4.5 (Surface Water, Wetlands, & Groundwater), and 5.1 (Access, Buffer Zone, Site Preparation, & Erosion Control)
  - ❑ **Existing Topography:**
    Found in Appendix Map A-2 (Existing Ground)

NR 135.19(2)(c) Existing topography as shown on contour maps of the site at intervals specified by the regulatory authority.

Note: Some of or all of the information required here may be combined to avoid duplication, e.g. a single map may show anticipated post-mining topography required by par.(c) as well as structures and roads as required by par. (d).

- **Location of Manmade Features:**

  NR 135.19(2)(d) Location of manmade features on or near the site.
  Found in Appendix Map A-4 (Existing Agriculture), Explained in section 3 (Background)

- **Previously Mined Areas: (IF APPLICABLE)**

  NR 135.19(2)(e) For existing mines, a plan view drawing showing the location and extent of land previously affected by nonmetallic mining, including the location of stockpiles, wash ponds, and sediment basins.
  Found in Section 3 (Background)

- **Biological Information:**

  NR 135. 19(2)(b) Information available to the mine operator on biological resources, plant communities, and wildlife use at and adjacent to the proposed or operating mine site.
  Explained in section 4.7 (Agricultural Vegetation & Wildlife)

- **Post-mining Land Use:**

  NR 135.19(3) POST-MINING LAND USE. (a) the reclamation plan shall specify a proposed post-mining land use for the nonmetallic mine site. The proposed post-mining land use shall be consistent with local land use plans and local zoning at the time the plan is submitted, unless a change to the land use plan or zoning is proposed. The proposed post-mining land use shall also be consistent with any applicable state, local, or federal laws in effect at the time the plan is submitted.

Found in Section 7 (Post Mining Land Use & Reclamation Plan) and Appendix Map A-7 (Reclamation Grading Plan)

Note: A proposed post-mining land use is necessary to determine the type and degree of reclamation needed to correspond with that land use. The post-mining land use will be key in determining the reclamation plan. Final slopes, drainage patterns, site hydrology, seed mixes, and the degree of removal of mining-related structures, drainage structures and sediment control structures will be dictated by the approved post-mining land use.

NR 135.19(3)(b) Land used for nonmetallic mineral extraction in areas zoned under an exclusive agricultural use ordinance pursuant to subch. III of ch. 91., Stats., shall be restored to agricultural use.
Found in Sections 4.7 (Agricultural Vegetation and Wildlife), 7 (Post Mining Land Use & Reclamation Plan), Appendix Maps A-4 (Existing Agriculture), and A-7 (Reclamation Grading Plan)

Note: Section 91.46 (6), Stats., contains this requirement. Section 91.01 (2), Stats., defines the term "agricultural use."

- ❑ **Reclamation Measures**

NR 135.19(4) RECLAMATION MEASURES. The reclamation plan shall include a description of the proposed reclamation, including methods and procedures to be used and a proposed schedule and sequence for the completion of reclamation activities for various stages of reclamation of the nonmetallic mining site. The following shall be included:

- ❑ **Earthwork and Grading:**

NR 135.19(4)(a) A description of the proposed earthwork and reclamation, including final slope angles, high wall reduction, benching, terracing, and other structural slope stabilization measures.
Explained in section 7.1 (Site Grading & Preparation) Shown in Appendix Maps A-5 (Proposed Site & Phasing), A-6 (Geologic Cross Section), and A-7 (Reclamation Grading Plan)

- ❑ **Topsoil:**

NR 135.19(4)(b) The methods of topsoil or topsoil substitute material removal, storage, stabilization, and conservation that will be used during reclamation.
Explained in Sections 4.3 (distribution, Thickness, and Types of Soils), 5.1 (Access, Buffer Zone, Site Preparation, & Erosion Control), 7.1(Site Grading and Preparation), 7.2 (Overburden & Topsoil Placement), 7.3 (Site Revegetation & Erosion Control) Shown in Appendix Maps A-3 (Soil Map), A-5 (Proposed Site & Phasing), and A-7 (Reclamation Grading Plan)

- ❑ **Topography:**

NR 135.19(4)(c) A plan or map which shows anticipated topography of the reclaimed site and any water impoundments or artificial lakes needed to support the anticipated future land use of the site.
Explained in section 7.1 (Site Grading & Preparation), Shown in Appendix Map A-7 (Reclamation Grading Plan)

- ❑ **Structures:**

NR 135.19(4)(d) A plan or map which shows surface structures, roads, and related facilities after the cessation of mining.
Explained in Sections 5.3 (Portable Asphalt & Concrete Batch Plant Operations) and 5.4 (Support Structures) Shown in Appendix Map A-7 (Reclamation Grading Plan)

- ❑ **Cost:**

NR 135.19(4)(e) The estimated cost of reclamation for each stage of the project or the entire site if reclamation staging is not planned.
Explained in section 7.5 (Estimated Cost of Reclamation) and Shown in Reclamation Cost Summary Table.

- **Revegetation Plan:**

  NR 135.19(4)(f) A revegetation plan which shall include timing and methods of seed bed preparation, rates and kinds of soil amendments, seed application timing, methods and rates, mulching, netting and any other techniques needed to accomplish solid and slope stabilization.
  Explained in section 7.3 (Site Revegetation & Erosion Control)

- **Revegetation Standards:**

  NR 135.19(4)(g) Quantifiable standards for revegetation adequate to show that a sustainable stand of vegetation has been established which will support the approved post-mining land use. Standards for revegetation may be based on the precent vegetative cover, productivity, plant density, diversity or other applicable measures.
  Explained in section 7.6 (Criteria For Measuring Reclamation Success)

- **Erosion Control:**

  NR 135.19(4)(h) A plan and, if necessary, a narrative showing erosion control measures to be employed during reclamation activities. These shall address how reclamation activities will be conducted to minimize erosion and pollution of surface and groundwater.
  Explained in section 7.3 (Site Revegetation & Erosion Control) Shown in Appendix Map A-7 (Reclamation Grading Plan)

- **Interim Reclamation: (OPTIONAL)**

  NR 135.19(4)(i) A description of any areas which will be reclaimed on an interim basis sufficient to qualify for the waiver of fees pursuant to s. NR 135.41 and which will be subsequently disturbed prior to final reclamation. Descriptions shall include an identification of the proposed areas involved, methods or reclamation to comply with the standards in Subch. II and timing of interim and final reclamation.
  Explained in Section 7.4 (Interim Reclamation)

- **Criteria for Successful Reclamation**

  NR 135. 19(5) The reclamation plan shall contain criteria for assuring successful reclamation in accordance with s. NR 135.13.
  Explained in sections 7.1 (Site Grading and Preparation) and 7.6 (Criteria for Measuring Reclamation Success) Shown in Appendix Map A-7 (Reclamation Grading Plan)

- **Certification of the Reclamation Plan**

  NR 135.19(6) CERTIFICATION OF RECLAMATION PLAN. The operator shall provide a signed certification that reclamation will be carried out in accordance with the reclamation plan. If the operator does not own the land, the land owner or lessor, if different from the operator or owner, shall also provide a signed certification that they concur with the reclamation plan and will allow its implementation.
  Found in Section 10 (Reclamation Plan Compliance Certification)

- **Financial Assurance**
  Initial active acres will be assured and $28,344.62 per acre. Future Financial Assurance numbers will be subject to change.
  NR 135.40(1-13)

- **Submitting the Plan**

  NR 135.19(7) APPROVAL. The regulatory authority shall approve, approve conditionally, or deny the reclamation plan in writing in accordance with s. NR 135.21(1). Conditional approvals shall be issued according to s. NR 135.21(2), and denials of permit applications shall be made according to s. NR 135.22.