Goodhue County
Land Use Management

Building – Environmental Health – Zoning Departments
509 West 5th Street, Red Wing, MN 55066
651-385-3103

To: Planning Advisory Commission
From: Megan Smith, Land Use Management Director
Mtg. Date: April 21, 2025
Report Dated: April 14, 2025

ATTACHMENTS:

1. Application
    a. Cover Letter and Narrative (4 pages)
    b. Kyllo Quarry Test Borings (1 page)
    c. MnDNR Conservation Planning Report for the Kyllo Quarry (5 pages)
    d. MnDNR Natural Heritage Review (4 pages)
    e. FEMA FIRMette Flood Hazard Map of Area (1 page)
    f. Project Plans (7 pages)
    g. USDA NRCS Soil Resource Report (30 pages) Note this report is part of the official record and file but was not photocopied for the agenda. It is available on request.

AGENDA ITEM:
Hold a public hearing and consider a conditional use permit request for a mining site located at 21249 460th Street, Zumbrota MN.

APPLICATION INFORMATION:
Property Owner: Lesley Kyllo Trust
Owner Agent/Applicant: Chris Priebe, G-Cubed Engineering
Operator: Bruening Rock Products
Site Address: 21249 460th Street, Zumbrota MN
Parcel Number: 47.034.1000
Abbreviated Legal Description: The SW 1/4 & S 1/2 OF NW 1/4, EXCEPT 6 ACRES NORTH OF RR, AND EXCEPT 1 ACRE AND EXCEPT 0.10 ACRE, ALL IN SECT-34 TWP-110 RANGE-015, LOCATED IN ZUMBROTA TOWNSHIP, GOODHUE COUNTY, MINNEOSTA.
Zoning District: A1 (Agricultural Protection District)
Township: Zumbrota Township

SUMMARY OF REQUEST:
The Commission will be hearing testimony and considering a request submitted for a mining site located at 21249 460th Street, Zumbrota MN. The request is to mine 29.71 acres of land, which is part of a larger 229-acre tract that is being used for agricultural and farming. The property is owned is Lesley Kyllo Trust. The applicant is G-Cubed Engineering on behalf of Bruening Rock Products.

In addition to the mining, a scale, scale house, and access road are part of the project plans.

The property is zoned A-1, and located in Zumbrota Township, just south of county 10 Boulevard, and north of highway 60. The North Fork of the Zumbro river helps define the northern edge of the property, and the site is subject to the County's floodplain and shoreland regulations.

VARIANCE APPLICATION:
An important consideration for the Planning Advisory Commission is that a variance application is also under review and will be considered by the Board of Adjustment on April 28, 2025. This request is to allow a mining site within 1000 feet of public water, or to the limit of the floodplain, whichever is great. In this case, the 1000-foot distance is greater than the limit of the floodplain.

Because mining is allowed, conditionally in the zoning district it is not a use variance. Shoreland and floodplain are overlay districts to place further restrictions on natural features in the County.

The recommendation of staff is to proceed with the conditional use permit review, while knowing that the denial of a variance will mean either the project does not happen, or that the project will have to be redesigned, and the site will change. If the site development plans change, the County will require the re-submission of the conditional use permit because it would have changed substantially from the initial review of the CUP. If this occurs, staff will work with the applicant on the next steps.

ANALYSIS AND FINDING OF FACT:
The County's zoning ordinance has specific criteria for conditional uses, as well as conditional uses in shoreland areas. The application also must be found to be compliant with the county's mineral extraction ordinance. These draft findings are outlined below.

A. Conditional use Permit Findings
An application for a conditional use permit in accordance with Article 4, section 3 of the Goodhue Co Zoning Ordinance have been met, as follows, and the Planning Advisory Commission finds as follows:

1. That the CUP/IUP will not be injurious to the use and enjoyment of other property in the immediate vicinity for the purposes already permitted, nor substantially diminish and impair property values within the immediate vicinity.

2. That the establishment of the CUP/IUP will not impede the normal and orderly development and improvement of surrounding vacant property for uses predominant to the area.

3. That adequate utilities, access roads, drainage and other necessary facilities have been or are being provided.

4. That adequate measures have been or will be taken to provide sufficient off-street parking and loading space to serve the proposed use.

5. That adequate measures have been or will be taken to prevent or control offensive odor, fumes, dust, noise, and vibration so that none of these will constitute a nuisance, and to control lighted signs and other lights in such a manner that no disturbance to neighboring properties will result.

B. <u>SHORELAND CONDITIONAL USE PERMIT FINDINGS:</u>

A portion of the site falls within the 100-year floodplain of the North Fork of the Zumbro River, and also is subject to shoreland requirements, the findings of which are stated below:

1. As regulated in Article 31, Section 14 of the Shoreland ordinance, preventing soil erosion is of upmost importance to the County and the plans, including the operations plan, has demonstrated sufficient evidence that erosion into the North Fork of the Zumbro River will be prevented.
2. No structures will be erected that are visible from the North Fork of the Zumbro river
3. No water-oriented structures such as docks, lifts or the like will be permitted as part of this permit.
4. There is no fill being placed in the floodplain and therefore there is no additional danger to life and property due to increased flood height or velocities caused by encroachments from this project.
5. No wells or septic systems are being proposed which could contaminate the shared drinking water supply of the County, or contaminate the public waters of the county.
6. The proposed use is compatible with the surrounding properties, with existing development and development anticipated in the foreseeable future.
7. The proposed use is in compliance with the Comprehensive Plan
8. Site access is obtained through land that is not within the floodplain and therefore emergency vehicles and access during a flood is possible.
9. The County has considered the expected heights, velocity, duration, rate of rise, and sediment transport of the flood waters expected at the site, and found no substantial impact to surrounding properties.

<u>Staff Recommendation:</u>

Staff recommends the Planning Advisory Commission:

A. adopt the staff report into the record;
B. accept the application, testimony, exhibits, and other evidence presented into the record; and
C. Recommend that the County Board of Commissioners **APPROVE** the request for a conditional use permit with the following conditions:

1. The site must be registered annually with the County and submit a financial security in accordance with Section 6 of the County's Mineral Extraction Ordinance
2. A variance will be required to place mining operations within 1000 feet from the bank of the North Fork of the Zumbro river. If a variance is not obtained, the conditional use permit is null and void.

1

GOODHUE COUNTY CONDITIONAL/INTERIM USE PERMIT APPLICATION

Parcel # 47.034.1000 Permit#_____

PROPERTY OWNER INFORMATION

Last Name Kyllo First Lesley Email:

Street Address 21249 460th St Phone

City Zumbrota State MN Zip 55992 Attach Legal Description as Exhibit "A" ☒

Authorized Agent Chris Priebe G-Cubed Engineering Phone 507-867-1666

Mailing Address of Landowner: 21249 460th St., Zumbrota, MN 55923

Mailing Address of Agent: 14070 Hwy 52 SE, Chatfield, MN 55923

PROJECT INFORMATION

Site Address (if different than above):

Lot Size 229 Acres Structure Dimensions (if applicable) NA

What is the conditional/interim use permit request for? Aggregate Mineral Mining

Written justification for request including discussion of how any potential conflicts with existing nearby land uses will be minimized

Bruening Rock Products is applying for a CUP to mine limestone aggregate from an existing inactive quarry in Zumbrota Township.

DISCLAIMER AND PROPERTY OWNER SIGNATURE

I hereby swear and affirm that the information supplied to Goodhue County Land Use Management Department is accurate and true. I acknowledge that this application is rendered invalid and void should the County determine that information supplied by me, the applicant in applying for this variance is inaccurate or untrue. I hereby give authorization for the above mentioned agent to represent me and my property in the above mentioned matter.

Signature of Landowner: Arlen Kyllo Date 3-27-25

Signature of Agent Authorized by Agent: 3-27-2025

TOWNSHIP INFORMATION

Township Zoning Permit Attached? ☐ If no please have township complete below:

By signing this form, the Township acknowledges being made aware of the request stated above. In no way does signing this application indicate the Township's official approval or denial of the request.

Signature Karrie Hoerneman Title Clerk Date 4-8-25

Comments:

COUNTY SECTION

COUNTY FEE $400 RECEIPT #_____ DATE PAID _____

Applicant requests a CUP/IUP pursuant to Article ____ Section ____ Subdivision ____ of the Goodhue County Zoning Ordinance

What is the formal wording of the request?

Shoreland _____ Lake/Stream Name_____ Zoning District _____

Date Received_____ Date of Public Hearing _____ DNR Notice _____ City Notice _____

Action Taken: ___Approve _____ Deny Conditions:

Goodhue County

PROJECT SUMMARY

Please provide answers to the following questions in the spaces below. If additional space is needed, you may provide an attached document.

1. Description of purpose and planned scope of operations (including retail/wholesale activities).

Bruening Rock Products is proposing to open and operatate an additional 29.71 acre limestone rock quarry in Zumbrota Township. The existing quarry has been inactive for many years and is approximately 3.09 acres.

2. Planned use of existing buildings and proposed new structures associated with the proposal.

There are no existing buildings. A scale and scale house will be constructed at teh entrance of the quarry.

3. Proposed number of non-resident employees.

NA

4. Proposed hours of operation (time of day, days of the week, time of year) including special events not within the normal operating schedule.

Normal operating hours will be 7:00 AM to 7:00 PM Monday thru Friday and 7 AM to 12 PM on Saturday.

5. Planned maximum capacity/occupancy.

NA

6. Traffic generation and congestion, loading and unloading areas, and site access.

It is estimated that there will be an averatge of 25 truck trips a day during normal operations. Up to 40 truck trips per day may be possible on busy operational days. All loading and unloading will be on-site. Access to the quarry will be off of 460th St. a township road.

7. Off-street parking provisions (number of spaces, location, and surface materials).

Parking for employees will be within the quarry and locations will vary based on where the active mining is taking place.

8. Proposed solid waste disposal provisions.

Solid waste will be handled by a private hauling company and will be minimal at this site.

9. Proposed sanitary sewage disposal systems, potable water systems, and utility services.

A porta-potty will be utilized for employee use.

10. Existing and proposed exterior lighting.

There is no existing lighting. most work will be completed during daylight hours. If lighting is necessary it will be focused on the working area and not a nuisance to surrounding properties.

11. Existing and proposed exterior signage.

There will be a sign placed at the entrance of the quarry. This will contain quarry rules and contact information for the owner.

12. Existing and proposed exterior storage.

NA

13. Proposed safety and security measures.

The site is in a rural area, mainly used for aggricultural purposes. Their will be a gate at the entrance that will be closed and locked when the quarry is not in operation.

14. Adequacy of accessibility for emergency services to the site.

The site will be accessible for all emergency services.

15. Potential for generation of noise, odor, or dust and proposed mitigation measures.

The site meets all setbacks to neighboring properties. Mitigation for noise, odor, and dust is outlined in the CUP application documents.

16. Anticipated landscaping, grading, excavation, filling, and vegetation removal activities.

Best management practices will be utilized during all quarry activities. existing vegetation will remain in-place until the area is actively being mined.

17. Existing and proposed surface-water drainage provisions.

The existing quarry drains to the north towards the Zumbro River. The expansion is proposing to provide a 10' wide bench at an elevation 1 foot above the 100yr flood elevation. This will eliminate flooding the quarry floor area and allow for all stormwater to be contained on-site.

18. Description of food and liquor preparation, serving, and handling provisions.

NA

19. Provide any other such information you feel is essential to the review of your proposal.

The existing quarry is within the shoreland area. The proposal is not to operate closer to the river but to work away from the river.

The existing vegetation between the quarry and the river will remain in-place to provide a visual buffer from the river to the operation.

Kyllo Quarry – Bruening Rock Products Application Supplemental

Goodhue Count Article 14 – Section 4. Mineral Extraction Permit Required.

Subd. 7 . Mineral Extraction Facilities shall be prohibited within 1000 feet from Public Waters as defined in MN 103G.005. We are unable to meet this requirement as the existing quarry is adjacent to the Zumbro River. The proposal is to work from the existing rock face away from the Zumbro River and the 100Yr flood plain. We are proposing to excavate a 10' bench at an elevation 1' above the 100' flood elevation at the existing quarry wall. This will minimize the potential for flood waters to enter the active quarry area and minimize any runoff from the quarry operations to the Zumbro River. We are applying to the Board of Adjustment for a variance on this regulation due to the proximity of the existing quarry to the river and the plans to continue to work away from the river with protections in place for the river.

Goodhue County Article 14 – Section 5. Conditional/Interim Use Permit Application Requirements for New Mineral Extraction Facilities.

Subd. 1. An application form shall be submitted to the County

A. The required Maps A, B, and C are attached and are 7 pages.
B. The operator contact shall be:
   Bruening Rock Products, Inc
   Attn: Ronald Fadness (General Counsel)
   900 Montgomery Street
   P.O. Box 127
   Decorah, IA 52101
   (563) 682-2933
C. The property owner contact is:
   Lesley Kyllo Disclaimer Trust
   21249 460th St
   Zumbrota, MN 55992
D. The proposed quarry is 29.71 acres and is described on Sheet 2 of the attached maps. The adjacent properties are not owned by the same owners as the above referenced property.
E. Proposed material to be excavated is overburden material, road rock, and construction rip rap. Material will be excavated using common construction equipment. It will be run through a crusher and a screener for size. Material will be stored in stockpiles on-site. General stockpile location is shown on Sheet 5 of the attached maps. Blasting is proposed and depending on demand for material is proposed 1 to 3 times a year. This will be contracted to a licensed blasting contractor.
F. The facility is proposed to operate for approximately 50 years, Monday – Friday from 7:00 AM to 7 PM and 7:00 AM to 12:00 PM on Saturday. The quarry is estimated to be operational during the active construction season, April through

November. There is potential that the quarry will be open beyond these months if the demand is there.

G. Typical construction equipment shall be utilized to extract the material from the quarry surface. The operator shall utilize excavators, front end loaders, haul trucks, screeners, and crushers. All equipment will be maintained.
H. It is estimated that an average of 25 round-trip truck trips per day shall access the quarry and during construction season a peak day may have up to 40 round-trip truck trips per day.
I. There will be no lighting pointing upward or towards any structure on adjoining properties.

Subd. 2. Supporting Documentation.

A. The existing land use is agricultural and an existing non-active aggregate quarry.
B. The current zoning of the property and adjacent properties is A-1 Agricultural Protection. The property adjacent to the south 460th St is A2 Agricultural.
C. Soils are typically Silt Loam with slopes ranging from 2 to 18 percent across the agricultural area of the proposed quarry. The existing quarry contains complex soils that contain Silt Loam over cobbly loam and slopes range from 12 to 70%. Soil Boring logs are attached.
D. The proposed quarry is a high point on the property with existing drainage flowing southerly, northerly, easterly. Although the hill will be excavated there will be minor impacts to the direction of surface water flow. The quarry will drain inward and infiltrate through sandy/aggregate floor of the quarry. Drainage around the quarry will continue to drain southerly, northerly, and easterly. It is not expected that groundwater will be encountered during mining activities. Per the Geological Atlas of Goodhue County, the water table depth is 50 to 200 feet. Most wells in the area show the Static Water Level greater than the depth of excavation.
E. The mineral source is limestone aggregate. Depending on the rock formation it is proposed that up to 151 feet of depth may be excavated. This may vary based on material found on-site. The maximum proposed excavation is 3,062,821.19 Cu.yds of aggregate to be excavated. The aggregate to be excavated is to be used as road rock and other road or site construction related needs.
F. All required local, state, and federal permits will be received prior to excavation activities.
G. The proposed quarry is a high point on the property with existing drainage flowing westerly, southerly, and easterly. Although the hill will be excavated there will be minor impacts to the direction of surface water flow. The quarry will drain inward and infiltrate through sandy/aggregate floor of the quarry. Drainage around the quarry will continue to drain west, south, and southeast. It is not expected that groundwater will be encountered during mining activities.
H. Quarry drainage shall be contained on-site. There should be minimal effects to the existing drainage patterns to the downstream area of the quarry.
I. There are no wetlands on-site. The excavation will be protected from NW prevailing winds by the screening berm and the quarry itself. This should minimize any negative erosion. All surface water within the quarry shall be contained by the quarry to minimize any runoff erosion. Traffic will be routed to county highway system which is adequately sized for any increase in traffic. The noise will be

similar to any construction related activity and will be limited to the approved operating schedule.

J. The site itself is in an A-1 district and is screened by existing tree vegetation. A vegetated berm is proposed around the West, East, and South sides of the quarry which will aid in screening the quarry. Due to the location of the quarry, there is a minimal risk of security issues therefore we are not proposing a fence at this time. There will be a sign with site rules and regulations at the entrance of the quarry.
K. Complaints should be directed to Ronald Fadness, General Counsel of Bruening Rock Products, Inc. (563) 382-2933. All complaints will be investigated and a resolution sought out.
L. See attached soil borings. It is not expected that groundwater is to be encountered during excavation.
M. See Sheet 6 of the attached maps.
N. A scale will be constructed at the entrance/exit of the pit. All vehicles will be weighed when entering and exiting to ensure they are within limits.
O. The entrance of the quarry is 3,300 feet along a gravel access road prior to entering the county road access point. The length of travel will minimize any mud or debris from being tracked onto any public road.
P. Dewatering is not proposed and will not be utilized.
Q. In the case of a failure of the perimeter berm caused by erosion or blowout all stormwater would be retained within the pit boundary and filtered out through the quarry floor within the site. The perimeter berm failure would be repaired immediately and seeded within 7 days. The drainage pattern within the site will be to the center of the disturbed area which would prevent sediments from eroding from the site.

   There is no processing proposed that would produce process water, or tailings. Fueling and oil changes are contracted to venders who service equipment daily. Oil changes are performed with equipment which extracts used oil from engines mechanically which significantly reduces the chance of spillage. With the exception of the petroleum products in the construction equipment there should be no other form of chemical contamination on-site. If a fuel spill would happen, mitigation measures including: observing safety precautions, stopping the spill, calling 911 if fire or public safety hazards are created, containing the spilled material, reporting the spill to the Minnesota Duty Officer and clean up. Spill containment and emergency preparedness can minimize damage and cost of cleanup. Materials such as containment sorbent and pads may be kept on-site during construction and mining operations. Any spill greater than five gallons of petroleum requires the operator to contact the Minnesota Duty Officer at (651) 649-5451 or (800) 422-0798 and report the spill.

R. A pre-blast survey will be performed by a Minnesota Licensed Engineer of surrounding dwellings and buildings within one half mile prior to initial blasting. Yearly seismic surveys will be offered and conducted by the engineer if blasting has occurred within the year.
S. There will be a perimeter berm screening visibility of the quarry along with a sign at the entrance of the pit with contact information and regulations.

T. There are no public schools, churches, campgrounds, nursing homes, and platted residential properties within one mile of the proposed quarry.
U. No public monies will be utilized in the establishment, operation, monitoring, or reclamation aspects of the proposed quarry.

Kyllo Quarry – Bruening Rock Products Reclamation Estimate

The proposed end use of the Kyllo Quarry will be grassland to be used as animal habitat.

Once quarry operations have been completed the operator will be responsible for the removal of all internal roads, scale, scale house, and machinery (miscellaneous removals). The site shall then be graded per the reclamation map (common excavation). Once mass grading is complete 6" salvaged topsoil shall be spread across all disturbed areas (salvaged topsoil respread). Upon completion of topsoil spreading the entire site shall be seeded, mulched, and fertilized in accordance with the latest Minnesota Manual for Erosion Control and MnDOT Regulations. Vegetation shall be inspected at 6 months and 12 months, noxious weeds shall be removed and non-vegetated areas reseeded as needed (seed, fertilize and mulch).

Below is a cost estimate for final reclamation.

Kyllo Quarry - Bruening Rock Products

Reclamation Estimate

3/26/2025

	ITEM DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	AMOUNT
1	Common Excavation	48400	CY	$5.00	$242,000.00
	(calculated as in place material excavated and placed as onsite to meet reclamation grades)				
2	Salvaged Topsoil Respread	24200	CY	$8.00	$193,600.00
	(6" average depth)				
3	Seed, fertilize and mulch	29.71	acre	$2,500.00	$74,275.00
4	Miscellaneous removals & disposals	1	LS	$12,500.00	$12,500.00
	(internal roads, scale, scale house)				
				Total =	**$522,375.00**

MAP A–EXISTING SITE CONDITIONS

a. PROPERTY BOUNDARIES SURVEYED – SEE SHEET 2
b. EXISTING CONTOURS FROM MN LIDAR
c. EXISTING VEGETATION – AG. LAND AND TREES/SHRUBS
d. EXISTING STRUCTURES – NA
e. EXISTING POWERLINE RUNNING NORTH/SOUTH APPROXIMATELY 2' EAST OF WEST PROPERTY LINE. NO PIPELINES OR OTHER UTILITIES WITHIN QUARRY LIMITS.
f. EXISTING EASEMENTS – NA
g. EXISTING 33' ROAD RIGHT OF WAY FOR 460TH ST RUNNING EAST/WEST ALONG THE SOUTH PROPERTY LINE.
h. ROAD ACCESS WILL BE FROM 460TH ST TO THE SOUTH WHICH IS MAINTAINED BY ZUMBROTA TOWNSHIP.
i. EXISTING BLUFF IMPACT ZONE – SEE SHEET 1
j. TEST BORING LOCATIONS – SEE SHEET 1
k. THREATENED AND ENDANGERED SPECIES:
  k.a. NHIS REQUEST SUBMITTED TO MnDNR 2/25/2025
l. THICKNESS AND TYPE OF EXISTING TOPSOIL AND SUBSOIL – DOWNS–HERSHEY – > 6'. ACCORDING TO USDA–NRCS WEB SOIL SURVEY. SEE ATTACHED.
m. NO EXISTING HISTORICAL, CULTURAL, ARCHEOLOGICAL FEATURES IDENTIFIED IN THE SHPO OR COUNTY DATEBASE. SEE ATTACHED.
n. EXISTING EXCAVATION OF QUARRY SHOWN ON MAP A(SHEET 1).

GEOLOGY SEE SHEET 3
HYDROLOGY SEE SHEET 4

GRAPHIC SCALE
200 0 100 200 400
(IN FEET)
1 IN = 200 FT

OWNER:
LESLEY KYLLO TRUST
21249 460TH STREET
ZUMBROTA, MN 55992

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.
GEOFFREY G GRIFFIN
DATE X/X/XX REG. NO. 21940

DATE: 02/24/2025
Prepared For:
BRUENING ROCK PRODUCTS
900 MONTGOMERY STREET
DECORAH, IA 52101
FILE NO.: 23–065

G-Cubed
14070 Hwy 52 S.E.
Chatfield, MN 55923
ENGINEERING
SURVEYING
PLANNING
Ph. 507-867-1666
Fax 507-867-1665
www.ggg.to

DESIGNED CMP
DRAWN CMP
CHECKED CMP

REVISED	BY	DATE
PRELIMINARY	CMP	02/24/2025

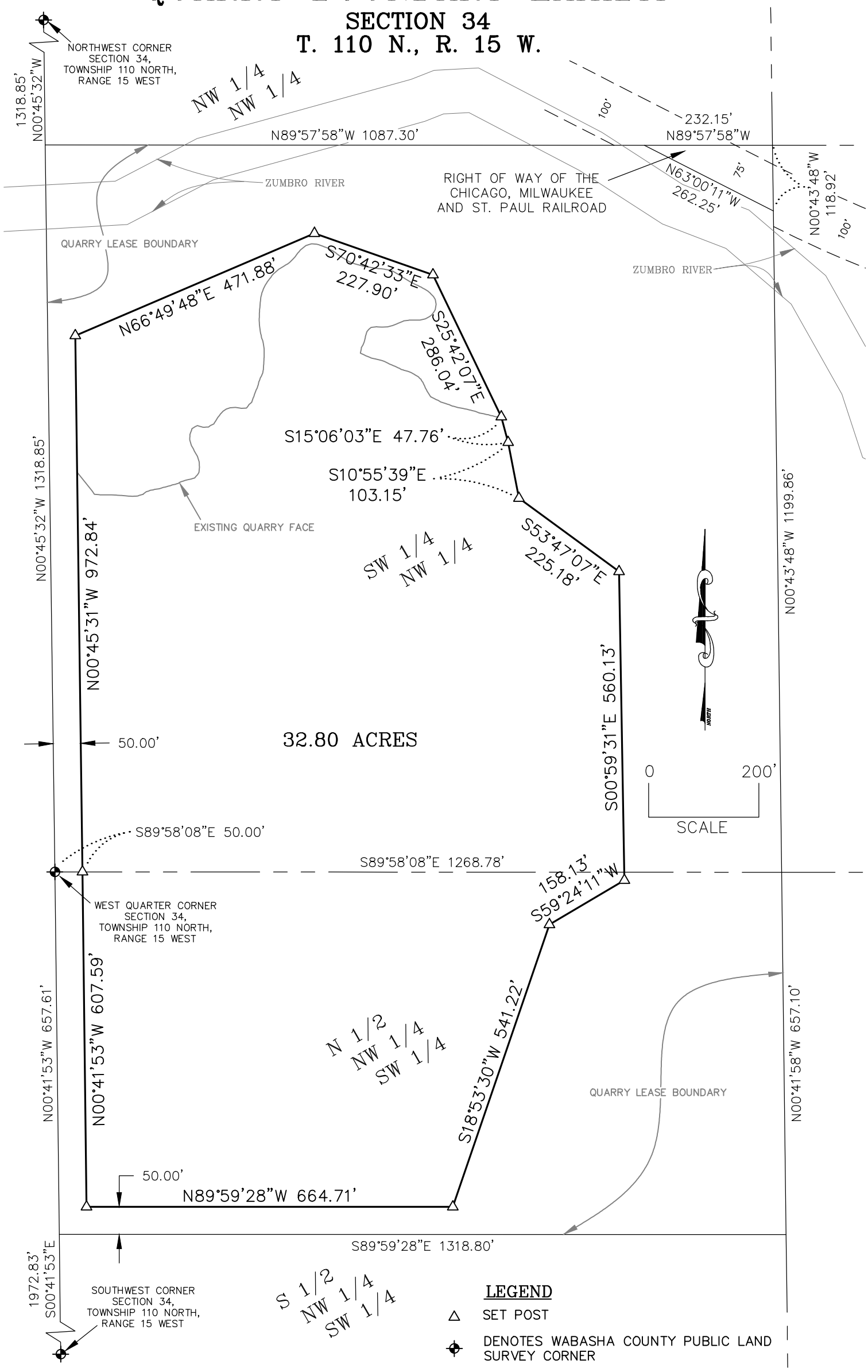
ZUMBROTA TOWNSHIP
GOODHUE COUNTY

KYLLO QUARRY
MAP A–EXISTING SITE CONDITIONS

NOTE: IMAGE FROM US GOODHUE COUNTY GIS SERVICES

QUARRY BOUNDARY EXHIBIT

SECTION 34
T. 110 N., R. 15 W.



QUARRY BOUNDARY DESCRIPTION:

That part of the Southwest Quarter of the Northwest Quarter and that part of the North Half of the Northwest Quarter of the Southwest Quarter, all in Section 34, Township 110 North, Range 15 West, Wabasha County, Minnesota, described as follows:

Commencing at the southwest corner of said Southwest Quarter of the Northwest Quarter; thence on an assumed bearing of South 89°58'08" East, along the south line of said Southwest Quarter of the Northwest Quarter, 50.00 feet to the point of beginning; thence North 00°45'31" West, along a line 50.00 feet easterly of and parallel with the west line of said Southwest Quarter of the Northwest Quarter, a distance of 972.84 feet; thence North 66°49'48" East 471.88 feet; thence South 70°42'33" East 227.90 feet; thence South 25°42'07" East 286.04 feet; thence South 15°06'03" East 47.76 feet; thence South 10°55'39" East 103.15 feet; thence South 53°47'07" East 225.18 feet; thence South 00°59'31" East 560.13 feet; thence South 59°24'11" West 158.13 feet; thence South 18°53'30" West 541.22 feet to a point 50.00 feet northerly of and parallel with the south line of said North Half of the Northwest Quarter of the Southwest Quarter; thence North 89°59'28" West, along a line 50.00 feet northerly of and parallel with said south line of the North Half of the Northwest Quarter of the Southwest Quarter, a distance of 664.71 feet to a point 50.00 feet easterly of and parallel with the west line of said North Half of the Northwest Quarter of the Southwest Quarter; thence North 00°41'53" West, along a line 50.00 feet easterly of and parallel with the west line of said North Half of the Northwest Quarter of the Southwest Quarter, a distance of 607.59 feet to the point of beginning.

Containing 32.80 acres, more or less.

I HEREBY CERTIFY THAT THIS SURVEY, PLAN, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED LAND SURVEYOR UNDER THE LAWS OF THE STATE OF MINNESOTA

Geoffrey G Griffin

DATE 3/26/2025 REG. NO. 21940

G-Cubed
14070 Hwy 52 S.E.
Chatfield, MN 55923
ENGINEERING
SURVEYING
PLANNING
Ph. 507-867-1666
Fax 507-867-1665
www.ggg.to

DATE: 3/26/2025
Prepared For:
Bruening Rock Products
900 Montgomery St
Deocorah,IA 52101

EXPLANATION FOR STRATIGRAPHIC COLUMN

LITHOLOGY

LIMESTONE
DOLOSTONE
SANDY
SANDSTONE
SHALY
SILTSTONE
SHALE
Vugs (commonly filled with coarse calcite)
Breccia; brecciated
K-bentonite bed (altered volcanic ash bed)

Oolites
Glauconite
Ph Phosphate pellets
Algal domes; stromatolites
Burrows
Pebbles
Flat-pebble conglomerate
Cross-bedded (festoon)
Cross-bedded (planar to tangential)
Hummocky cross-strata
Dolomitic
Contact marks a major erosional surface

HYDROSTRATIGRAPHIC CHARACTER

COMPONENTS

Fine clastic (very fine sandstone, siltstone, or shale)
Shale
Coarse clastic (quartzose sandstone)
Carbonate rock
Mixed carbonate and clastic rocks
Fracture or solution feature

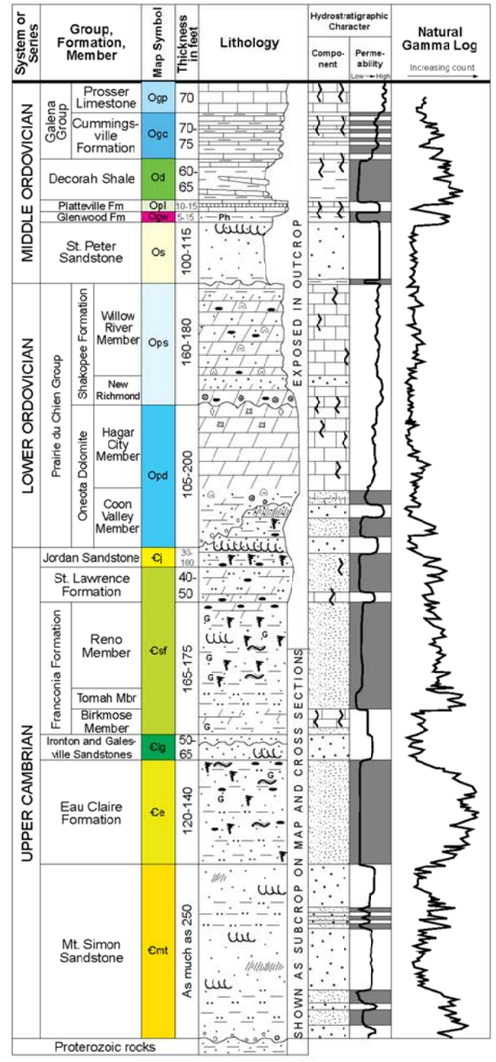
RELATIVE PERMEABILITY

High (aquifer)
Low (likely confining unit)

Os **St. Peter Sandstone**—Mostly very fine grained to medium-grained, poorly cemented sandstone. Lacks structure or, less commonly, shows subtle cross-stratification, especially in uppermost part. Some intensely burrowed, pale-green shaly intervals. Grain size becomes progressively finer upward in lower half, coarser upward in upper half. A shale bed as thick as one foot in lower three feet of formation extends laterally at least across the northern part of county. Possible unconformity along basal contact. Commonly exposed along steep hill slopes that are held in place by caps of Platteville Formation. Unit thickness, 100–115 feet.

Cps **Shakopee Formation**—160–180 feet thick.
Willow River Member—Thin- to medium-bedded dolostone, sandstone, sandy dolostone, and minor amount of shale. As much as 150 feet thick.
New Richmond Member—Quartzose sandstone as much as eight feet thick overlying intraclastic, oolitic dolostone and sandy dolostone. Basal contact is a disconformity. As much as 50 feet thick.

STRATIGRAPHIC COLUMN



GRAPHIC SCALE
2000 0 1000 2000 4000
(IN FEET)
1 IN = 2000 FT

OWNER:
LESLEY KYLLO TRUST
21249 460TH STREET
ZUMBROTA, MN 55992

GEOLOGY:

o. GEOLOGIC UNIT IS Os – ST. PETER SANDSTONE & OPS – SHAKOPEE FOUNDATION
p. DEPTH TO BEDROCK IS AT 8'–12'
q. CONFINING UNITS – NA
r. FRACTURE PATTERNS AND TRACES – NA
s. CAVES, JOINTS, FRACTURES, SINKHOLES, STREAM SINKS, AND SPRINGS – NA

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GEOFFREY G GRIFFIN
DATE X/X/XX REG. NO. 21940

DATE: 02/24/2025
Prepared For:
BRUENING ROCK PRODUCTS
900 MONTGOMERY STREET
DECORAH, IA 52101
FILE NO.: 23–065

G-Cubed
14070 Hwy 52 S.E.
Chatfield, MN 55923
ENGINEERING
SURVEYING
PLANNING
Ph. 507867-1666
Fax 507867-1665
www.ggg.to

DESIGNED CMP
DRAWN CMP
CHECKED CMP

REVISED	BY	DATE
PRELIMINARY	CMP	02/24/2025

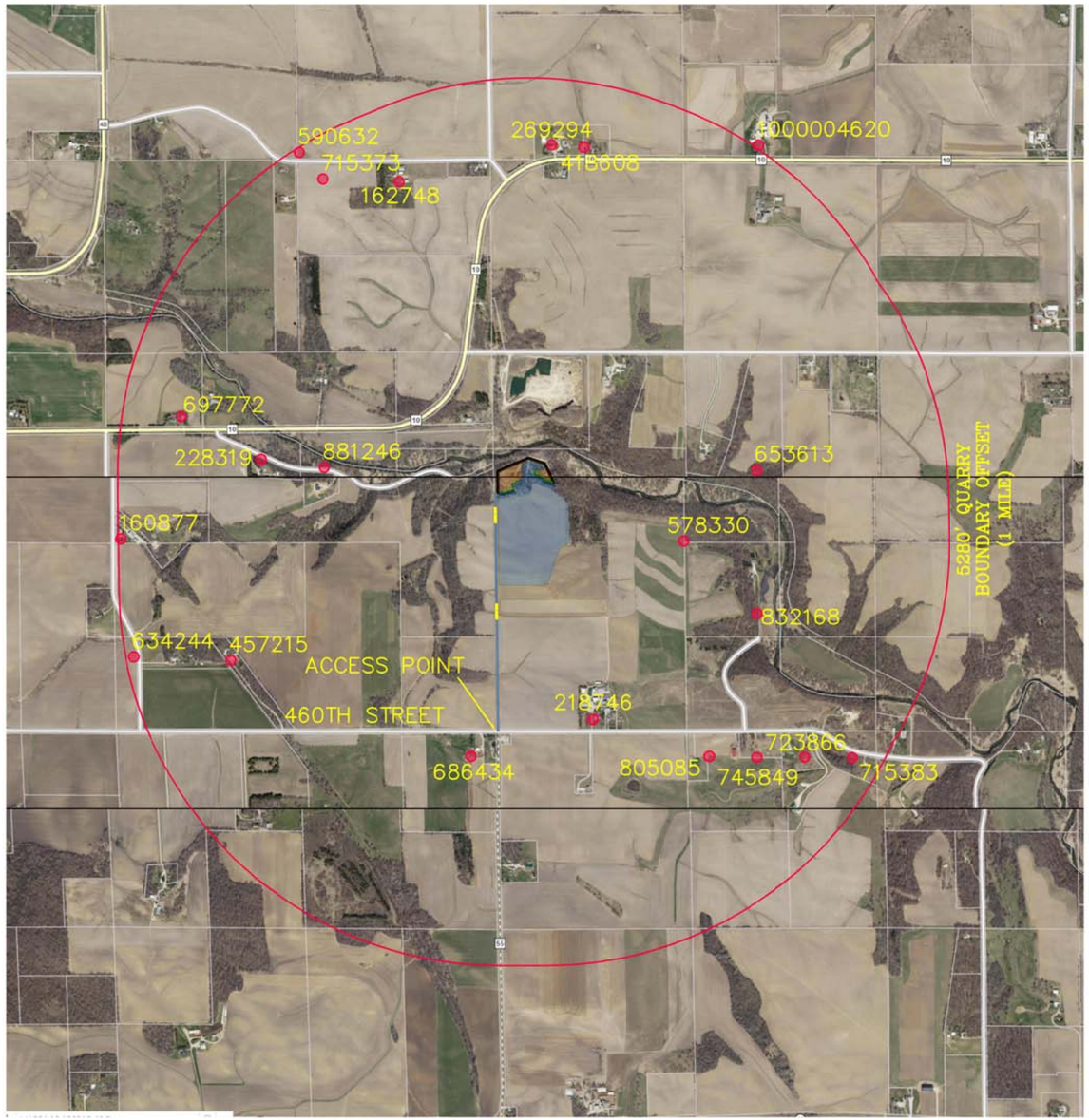
ZUMBROTA TOWNSHIP
GOODHUE COUNTY

KYLLO QUARRY
MAP A–EXISTING SITE CONDITIONS

NOTE: IMAGE FROM US GEOLOGICAL ATLAS OF GOODHUE COUNTY

GEOLOGY

SHEET 3 OF 7 SHEETS



Well ID	Well Name	Address	Township	Range	Section	Well Depth (ft)	Elev. (ft)	Casing Depth (ft)	Casing Dia. (in)
218746	KYLLO, ARLEN	NA	110	15	34	380	1072	320	4
162748	TRI, BOB	NA	110	15	28	360	1082	310	4
160877	ELLINGSON, MELVIN	45494 200TH AV	110	15	33	340	1012	307	4
418608	BUCK, DONNELL	21267 445TH ST	110	15	27	320	1068	285	4
269294	LOHMAN, JAMES	NA	110	15	27	NA	1085	NA	NA
457215	RYAN, RICHARD	20449 460TH ST W	110	15	33	320	1021	305	4
228319	BENITT, LLOYD	NA	110	15	33	140	990	119	4
4620	STILLER, DALE	NA	110	15	27	180	1085	NA	NA
805085	HAUGEN, ORRIN	21304 460TH ST	109	15	3	375	NA	344	4
745849	HOUSE, JEFF	21790 460TH ST	109	15	3	300	NA	275	4
686434	KYLLO, NEIL & WENDY	20950 460TH ST	109	15	4	375	NA	344	4
634244	RAASCH, JIM	45814 200TH AV	110	15	33	380	NA	336	4
832168	CAGE, MATT & DEBRA	45600 216TH AV	110	15	34	280	NA	252	4
578330	ANDERSON, EDWARD	21879 460TH ST	110	15	34	280	NA	245	4
653613	PETERS, DION AND AMANDA	21588 450TH ST	110	15	34	335	NA	300	4
881246	FLOTTERUD, DERIK	20688 453RD ST WA	110	15	33	340	NA	294	4
697772	RING, GARRY	20179 COUNTY 10 BL	110	15	33	320	NA	293	4
715373	MICHELS, SAM & JAN	20648 445TH ST	110	15	28	440	NA	399	4
590632	KAROW, GREG	20950 CTY.10 BL	110	15	28	295	NA	265	4
625813	JENSCH, BILL	20138 445TH ST	110	15	28	415	NA	385	4

ALL WELL INFORMATION IS FROM THE MN DEPARTMENT OF HEALTH COUNTY WELL INDEX

t. DRAINAGE PATTERNS – SEE CONTOURS SHEET 1
u. PER GEOLOGIC ATLAS OF GOODHUE COUNTY PLATE 7, THE WATER TABLE DEPTH IS 50'–200'+. THE GROUNDWATER FLOW IS NORTH.
v. WELLS WITHIN 1 MILE DEPICTED ON SHEET 4 DEPTHS ON CHART.
w. THERE ARE NO KNOWN SPRINGS WITHIN 600' OF THE PROPERTY.
x. THERE ARE NO KNOWN SEPTICS WITHIN 600' OF THE PROPERTY..
y. MN DNR DESIGNATED TROUT STREAM SHOWN ON MAP. ZUMBRO RIVER, NORTH FORK (MN DNR TROUT STREAM ID: M–034–049).

GRAPHIC SCALE
1000 0 500 1000 2000
(IN FEET)
1 IN = 1000 FT

OWNER:
LESLEY KYLLO TRUST
21249 460TH STREET
ZUMBROTA, MN 55992

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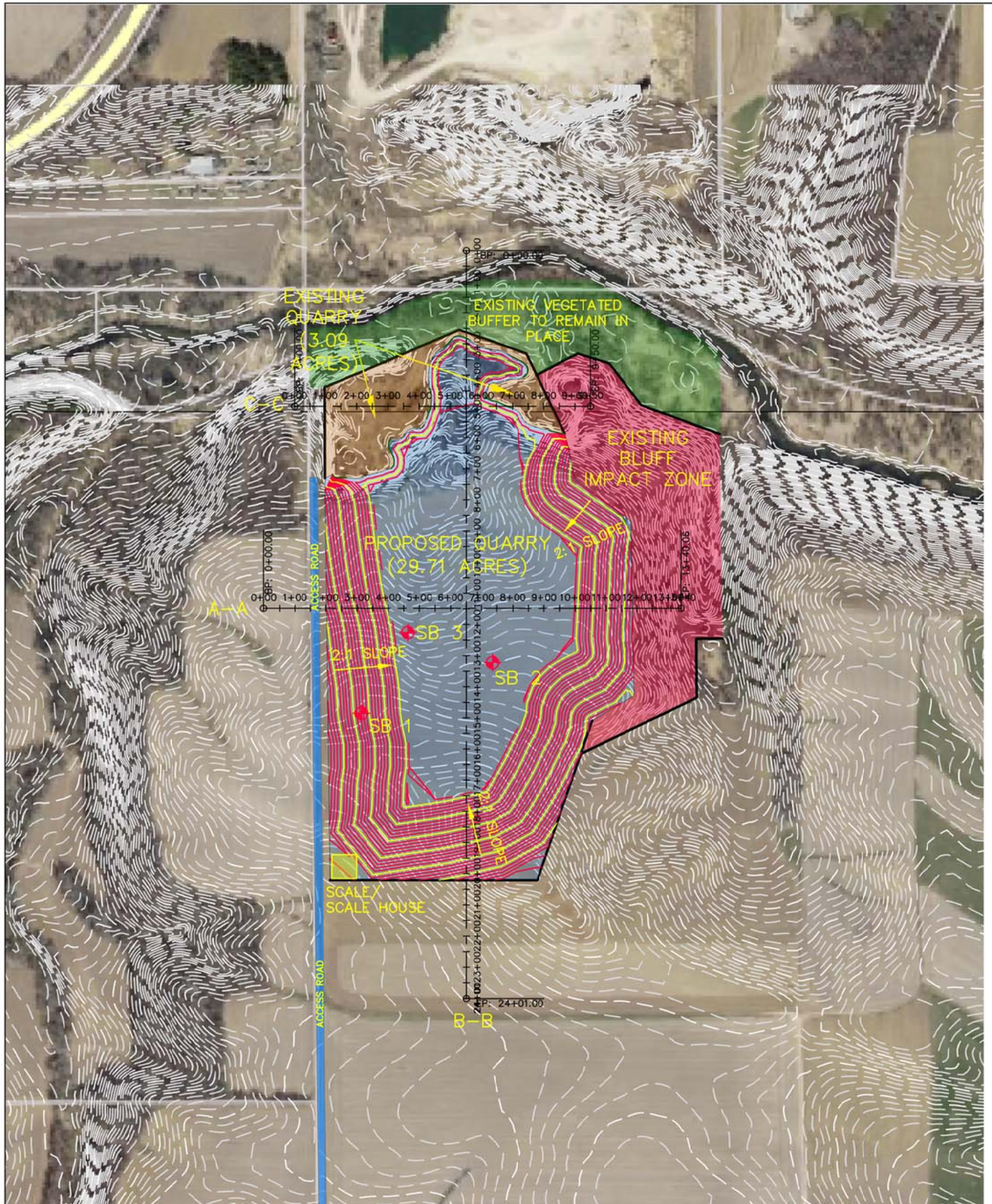
ZUMBROTA TOWNSHIP
GOODHUE COUNTY

KYLLO QUARRY
MAP A–EXISTING SITE CONDITIONS

NOTE: IMAGE FROM MN DEPARTMENT OF HEALTH COUNTY WELL INDEX

HYDROLOGY



MAP B–PROPOSED OPERATIONS

a. BOUNDARY SURVEYED – SEE SHEET 2
b. ALL EXISTING VEGETATION SHALL REMAIN UNTIL DISTURBANCE IS REQUIRED FOR THE MINING OPERATION. ALL NON–DISTURBED AREA SHALL REMAIN STABLE FROM EROSION UNTIL THE MINING OPERATION IS PRESENT AT THAT LOCATION. AT WHICH POINT ALL RUNOFF SHALL REMAIN WITHIN THE QUARRY BOUNDARY.
c. ALL OVERBURDEN SHALL BE PLACED IN STOCKPILE WITHIN THE QUARRY LIMITS. TOPSOIL AND NON–SALEABLE MATERIAL SHALL BE SEEDED WHEN NOT ACTIVE FOR 7 CONSECUTIVE DAYS TO LIMIT EROSION.
d. A SCALE AND SCALE HOUSE WILL BE CONSTRUCTED.
e. AREA TO BE MINED APPROXIMATELY 29.71 ACRES. SEE CROSS SECTIONS SHEET 6 FOR MINING DEPTH.
f. SEE CROSS SECTIONS SHEET 6 FOR OVERBURDEN DEPTHS.
g. LOCATION OF PROCESSING AREAS WILL OCCUR IN THE WITHIN THE 32.80 ACRE MINING AREA. ALL VEHICLES WILL BE PARKED WITHIN THE QUARRY BOUNDARY. THESE TASKS ARE NOT STATIONARY AND WILL BE MOVED AS MINING MOVES ACROSS THE SITE.
h. STORAGE OF MINED MATERIALS WILL ALL OCCUR WITHIN THE 32.80 ACRE MINING AREA. MATERIAL STOCK PILES WILL BE STORED ON THE ON THE QUARRY FLOOR AND WILL HAVE A MAXIMUM HEIGHT OF 35 FEET. THEY WILL MOVE THROUGHOUT THE QUARRY AS THE PROCESS MOVES.
i. ALL VEHICLES SHALL BE PARKED WITHIN THE 29.71 ACRE QUARRY. TYPICALLY ALONG THE ACCESS ROAD BUT MAY MOVE THROUGHOUT AS OPERATIONS REQUIRE.
j. EXPLOSIVES WILL NOT BE STORED ON–SITE.
k. FUEL WILL NOT BE STORED ON–SITE.
l. ALL DRAINAGE WILL BE INWARD. DISTURBED SLOPES NOT IN ACTIVE MINING FOR LONGER THAN 7 DAYS WILL BE SEEDED TO PREVENT EROSION.
m. THE QUARRY ITSELF WILL ACT AS A WATER INFILTRATIONS BASIN. ALL DRAINAGE WITHIN THE QUARRY WILL FLOW TO THE QUARRY LOW POINT. ANY OVERFLOW ABOVE THE 100 YEAR FLOOD WOULD BE TO THE NORTH.
n. ALL DRAINAGE IS WITHIN THE QUARRY. SEE PROPOSED CONTOURS SHEET 5.
o. THE EXISTING ACCESS ROAD WILL BE UTILIZED.
p. THERE WILL BE NO ADDITIONAL PROPOSED ROAD ACCESS POINTS.
q. MATERIAL FROM THIS SITE WILL BE USED IN MULTIPLE CONSTRUCTION PROJECTS THROUGHOUT SE MINNESOTA. TRUCKS HAULING FROM THE SITE SHALL FOLLOW WEIGHT LIMITS ON ROADS LEAVING THE SITE AND TO THE FINAL DESTINATION.

PROJECT PHASING – SECTION 6M
THIS PROJECT IS LESS THAN 40 ACRES AND WILL BE COMPLETED IN 1 PHASE. THE MINING OPERATION SHALL BEGIN WITH STRIPPING TOPSOIL AND PLACING IT IN THE PERIMETER BERMS AS PROPOSED ON MAP B. THE EXCAVATION OF THE AGGREGATE WILL BEGIN AT THE EXISTING QUARRY AND CONTINUE WESTERLY UNTIL ALL THE MARKETABLE MATERIAL IS EXTRACTED. RECLAMATION WILL COMMENCE UPON COMPLETION OF THE MINING PROCESS.

WEED CONTROL – SECTION 6N
THE OPERATOR WILL MOW VEGETATION WITHIN THE QUARRY TO CONTROL WEEDS AND MAINTAIN A REASONABLE APPEARANCE OF THE SITE.

WASTE DISPOSAL – SECTION 6O
ALL WASTE GENERATED FROM THE MINING OPERATION SHALL BE DISPOSED OF IN ACCORDANCE WITH FEDERAL, STATE, AND COUNTY REQUIREMENTS.

OWNER:
LESLEY KYLLO TRUST
21249 460TH STREET
ZUMBROTA, MN 55992

GRAPHIC SCALE
200 0 100 200 400
(IN FEET)
1 IN = 200 FT

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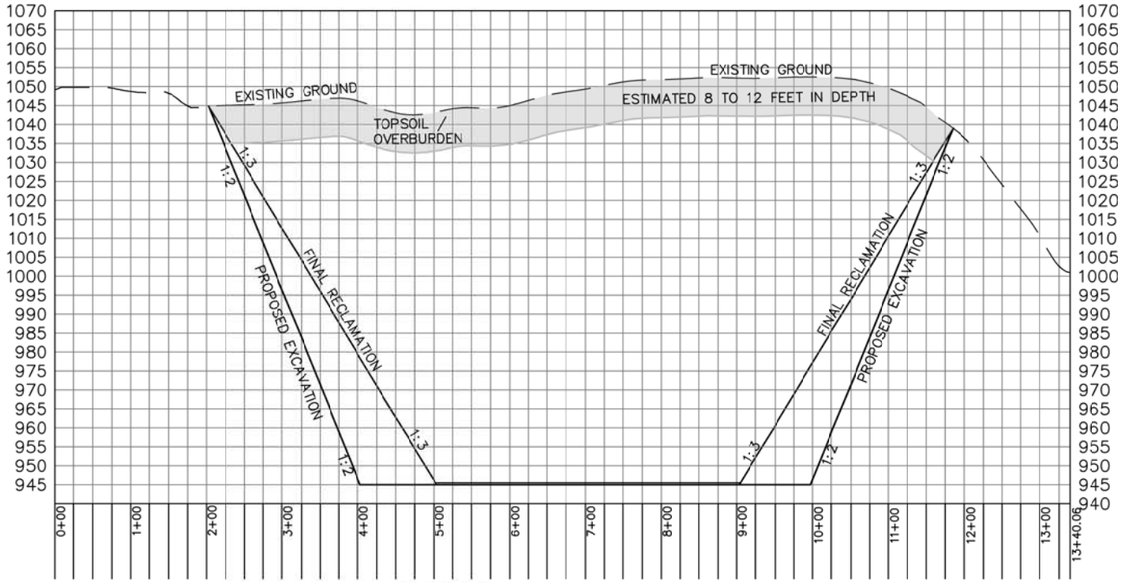
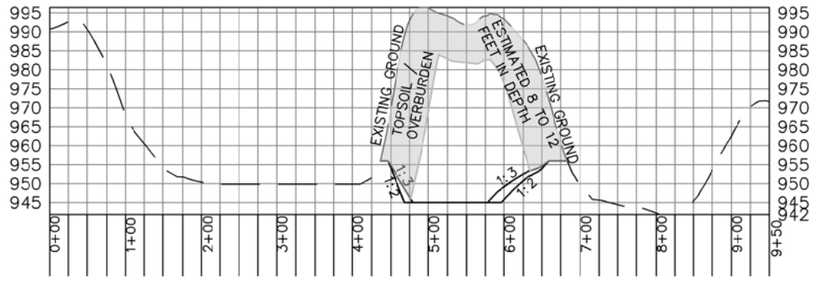
ZUMBROTA TOWNSHIP
GOODHUE COUNTY

KYLLO QUARRY
MAP B–PROPOSED OPERATIONS

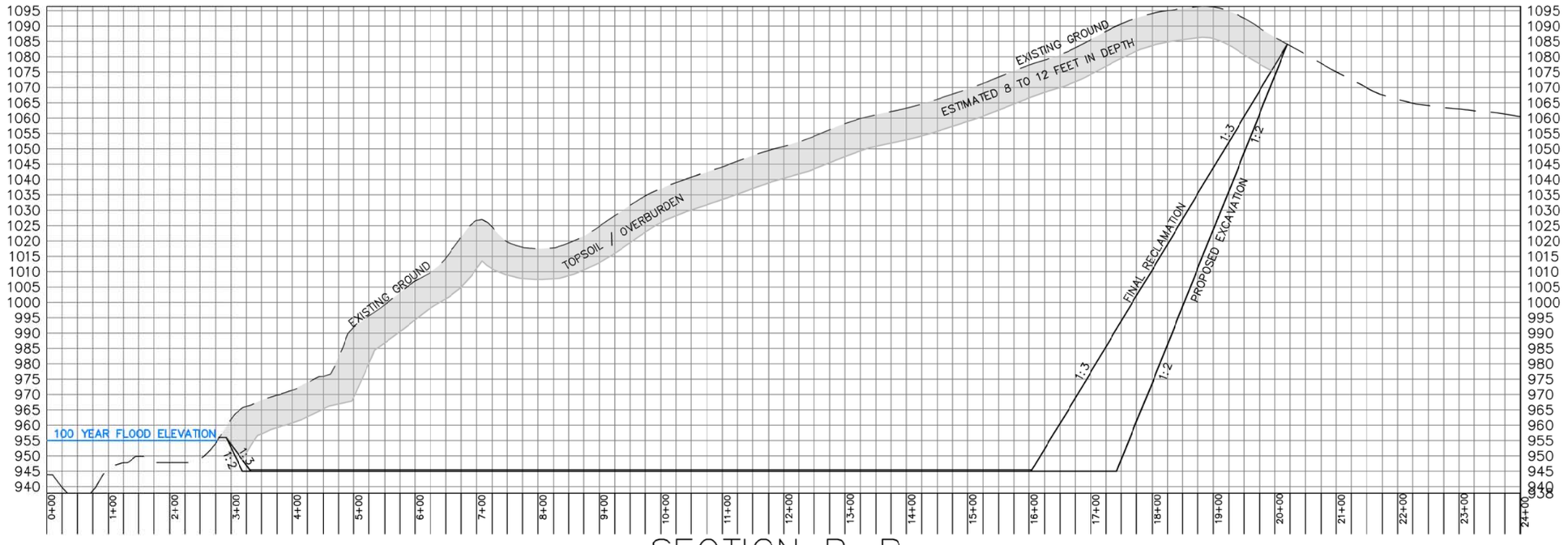
PROPOSED OPERATIONS



SECTION A–A



SECTION C–C



SECTION B–B

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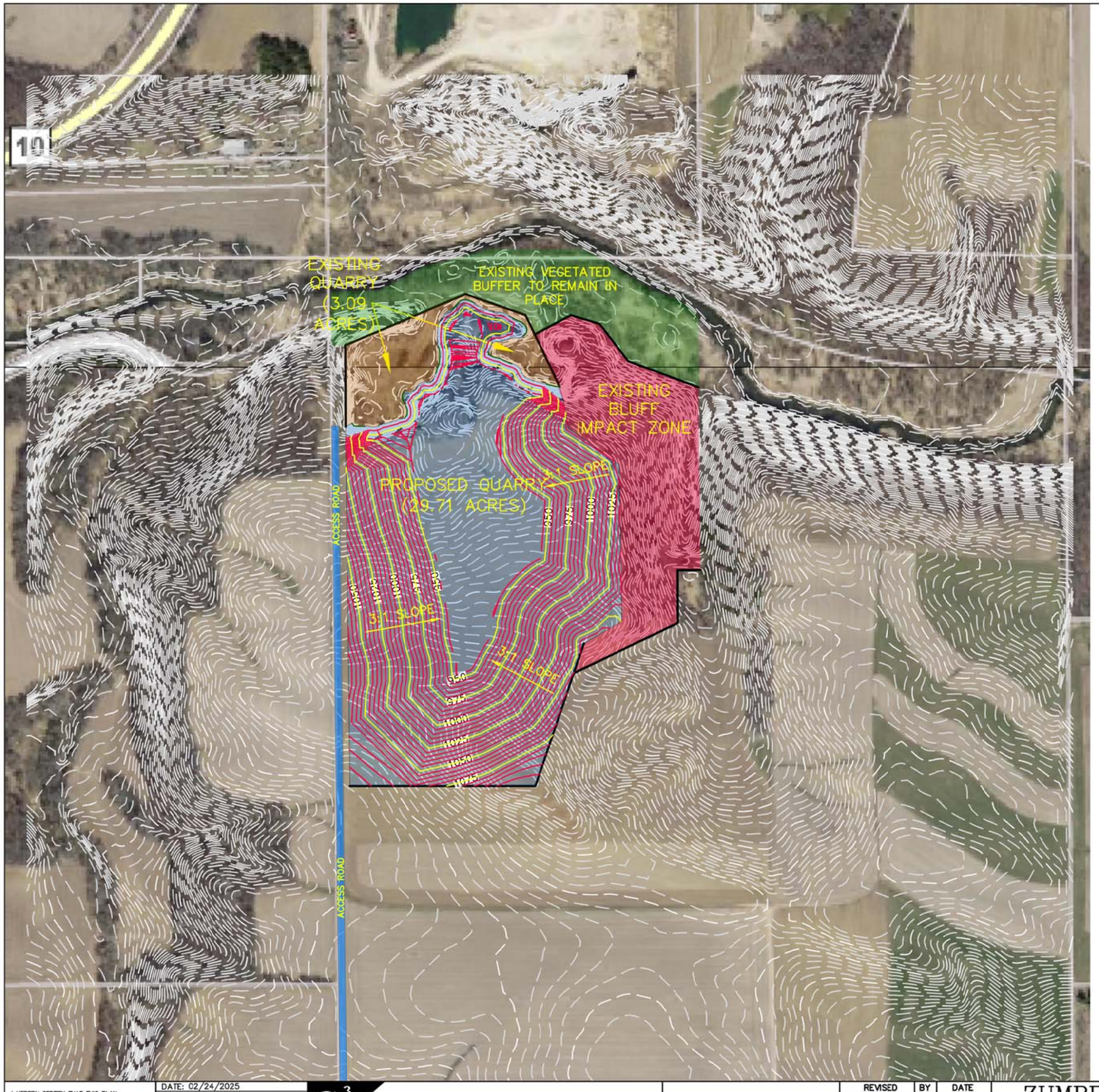
ZUMBROTA TOWNSHIP
GOODHUE COUNTY

KYLLO QUARRY
MAP B – PROPOSED OPERATIONS

NOTE: IMAGE FROM US GOODHUE COUNTY GIS SERVICES

CROSS–SECTIONS



MAP C–RECLAMATION PLAN

a. BOUNDARY SURVEYED – SEE SHEET 2
b. CONTOURS SHOWN AT 5' INTERVALS. SEE SHEET 6 FOR CROSS SECTIONS.
c. FINAL LAND USE WILL BE GRASSLAND/ANIMAL HABITAT
d. ALL DISTURBED AREAS SHALL BE SEEDED WITH MNDOT SEED MIX 35–241 AT A RATE OF 26.0 LBS/ACRES, PER 2024 SEEDING MANUAL.
e. NO PROPOSED STRUCTURES TO BE ERECTED FOR THE END USE OF THE QUARRY.
f. ALL TEMPORARY IMPROVEMENTS WILL BE REMOVED FOR FINAL RECLAMATION.
g. SALVAGED TOPSOIL SHALL BE SPREAD ACROSS ALL DISTURBED AREAS AT A MIN. OF 6 INCHES.
h. SOILS AMENDMENTS SHALL NOT BE REQUIRED.
i. ALL DISTURBED SOILS SHALL BE SEEDED, MULCHED, FERTILIZED IN ACCORDANCE WITH THE LATEST MINNESOTA MANUAL FOR EROSION CONTROL AND MNDOT REGULATIONS.
j. DISTURBED SLOPES NOT IN ACTIVE MINING FOR LONGER THAN 7 DAYS WILL BE SEEDED TO PREVENT EROSION. THIS SITE IS LESS THAN 40 ACRES, COUNTY REGULATION OF NO MORE THAN 40 ACRES SHALL BE OPEN MINED IS NOT APPLICABLE.
k. FINAL VEGETATION SHALL BE INSPECTED AT 6 MONTHS AND 12 MONTHS. IN BOTH OCCASIONS AN AREA WITHOUT VEGETATIVE COVER SHALL BE RESEEDED AND MULCHED.

GRAPHIC SCALE
200 0 100 200 400
(IN FEET)
1 IN = 200 FT

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ZUMBROTA TOWNSHIP
GOODHUE COUNTY

KYLLO QUARRY
MAP C–RECLAMATION PLAN

RECLAMATION

Kyllo Quarry Test Borings by Bruening Rock Products on 03/12/2025

Boring #1 – Elev. 1070
0- 9’ – Silty Loam Overburden
9’- 45’ – Rock
45’- 49’ – Seam of Sandy Rock
49’- 65’ – Rock
65’- 69’ – Seam of Sandy Rock
69’- 110’ – Rock
110’ End of Bore Elev. 960 – No groundwater encountered

Boring #2 – Elev. 1060
0- 8’ – Silty Loam Overburden
8’- 40’ – Rock
40’- 45’ – Seam of Sandy Rock
45’- 70’ – Rock
70’- 74’ – Seam of Sandy Rock
74’- 100’ – Rock
100’ End of Bore Elev. 960 – No groundwater encountered

Boring #3 – Elev. 1050
0- 12’ – Silty Loam Overburden
12’- 45’ – Rock
45’- 49’ – Seam of Sandy Rock
49’- 65’ – Rock
65’- 69’ – Seam of Sandy Rock
69’- 100’ – Rock
100’ End of Bore Elev. 950 – No groundwater encountered

Conservation Planning Report: Kyllo Quarry

This document is intended for planning purposes only for the area of interest defined by the user. The report identifies ecologically significant areas documented within the defined area of interest plus any additional search distance indicated below. These ecologically significant areas can be viewed in the Explore Tab of the Minnesota Conservation Explorer. Please visit MN Geospatial Commons for downloadable GIS data.

This document does not meet the criteria for a Natural Heritage Review. If a Natural Heritage Review is needed, please define an Area of Interest in the Explore Tab and click on the Natural Heritage Review option.

This document does not include known occurrences of state-listed or federally listed species.

MBS Sites of Biodiversity Significance

Search distance = 330 feet

Minnesota Biological Survey (MBS) Sites of Biodiversity Significance are areas with varying levels of native biodiversity that may contain high quality native plant communities, rare plants, rare animals, and/or animal aggregations. A Biodiversity Significance Rank is assigned on the basis of the number of rare species, the quality of the native plant communities, size of the site, and context within the landscape. MBS Sites are ranked Outstanding, High, or Moderate. Areas ranked as Below were found to be disturbed and are retained in the layer as negative data. These areas do not meet the minimum biodiversity threshold for statewide significance but may have conservation value at the local level as habitat for native plants and animals, corridors for animal movements, buffers surrounding higher quality natural areas, or as areas with high potential for restoration of native habitat. The DNR recommends avoidance of MBS Sites of Biodiversity Significance ranked High or Outstanding.

Wetlands within MBS Sites of Outstanding or High Biodiversity Significance may be considered Rare Natural Communities under the Wetland Conservation Act. For technical guidance on Rare Natural Communities, please visit WCA Program Guidance and Information.

For more information please visit MBS Sites of Biodiversity Significance.

The following MBS Sites of Biodiversity Significance are within the search area:

MBS Site Name	Biodiversity Significance	Status
ZUMBROTA 34	Below	final

DNR Native Plant Communities

Search distance = 330 feet

A native plant community is a group of native plants that interact with each other and with their environment in ways not greatly altered by modern human activity or by introduced organisms. These groups of native plant species form recognizable units, such as oak savannas, pine forests, or marshes, that tend to repeat over space and time. Native plant communities are classified and described by considering vegetation, hydrology, landforms, soils, and natural disturbance regimes.

DNR Native Plant Community types and subtypes are given a Conservation Status Rank that reflects the relative rarity and endangerment of the community type in Minnesota. Conservation Status Ranks range from S1 (critically imperiled) to S5 (secure, common, widespread, and abundant). Native plant communities with a Conservation Status Rank of S1 through S3 are considered rare in the state. The DNR recommends avoidance of rare native plant communities.

Wetland native plant communities with a conservation status rank of S1 through S3 may also be considered Rare Natural Communities under the Wetland Conservation Act. For technical guidance on Rare Natural Communities, please visit WCA Program Guidance and Information.

DNR Native Plant Communities may be given a Condition Rank that reflects the degree of ecological integrity of a specific occurrence of a native plant community. The Condition Rank is based on species composition, vegetation structure, ecological processes and functions, level of human disturbance, presence of exotic species, and other factors. Condition Ranks range from A-rank (excellent ecological integrity) to D-rank (poor ecological integrity. A Condition Rank of NR means Not Ranked and a Condition Rank of MULTI mean multiple ranks are present because the record is a native plant community complex.

For more information please visit Minnesota's Native Plant Communities.

SEARCH RESULTS: No features were found within the search area.

Calcareous Fens

Search distance = 5 miles

A calcareous fen is a rare and distinctive peat-accumulating wetland that is legally protected in Minnesota under the Wetland Conservation Act (*Minnesota Statutes*, section 103G.223). Many of the unique characteristics of calcareous fens result from the upwelling of groundwater through calcareous substrates. Because of this dependence on groundwater hydrology, calcareous fens can be affected by nearby activities or even those several miles away. For more information regarding calcareous fens, please see the Calcareous Fen Fact Sheet or review the List of Known Calcareous Fens.

SEARCH RESULTS: No features were found within the search area.

DNR Old Growth Stands

Search distance = 330 feet

Old-growth forests are natural forests that have developed over a long period of time, generally at least 120 years, without experiencing severe, stand-replacing disturbances such as fires, windstorms, or logging. Old-growth forests are a unique, nearly vanished piece of Minnesota's history and ecology; less than 4% of Minnesota's old-growth forests remain. The DNR recommends avoidance of all DNR Old Growth Stands. The following DNR Old Growth Stands have been documented within the search area.

SEARCH RESULTS: No features were found within the search area.

MN Prairie Conservation Plan

Search distance = 330 feet

The Minnesota Prairie Conservation Plan, a twenty-five year strategy for accelerating prairie conservation in the state, identifies Core Areas, Corridors, and Corridor Complexes as areas to focus conservation efforts. The Plan's strategies include protection, enhancement, and restoration of grassland and wetland habitat. To meet the Plan's goals, approaches within Core Areas will need to include restoration and approaches within Corridors will need to include conservation of grassland habitat which can provide stepping stones between larger Core Areas.

SEARCH RESULTS: No features were found within the search area.

Important Bird Areas

Search distance = 1 mile

Important Bird Areas, identified by Audubon Minnesota in partnership with the DNR, are part of an international conservation effort aimed at conserving globally important bird habitats. They are voluntary and non-regulatory, but the designation demonstrates the significant ecological value of the area.

SEARCH RESULTS: No features were found within the search area.

Lakes of Biological Significance

Search distance = 330 feet

Lakes of Biological Significance are high quality lakes as determined by the aquatic plant, fish, bird, or amphibian communities present within the lake. To be included in this layer, a lake only needs to meet the criteria for one of these four community types. The lake is assigned a biological significance of Outstanding, High, or Moderate based on the community with the highest quality.

SEARCH RESULTS: No features were found within the search area.

USFWS Habitat Conservation Plans

A Habitat Conservation Plan (HCP) is a mechanism for compliance with the federal Endangered Species Act for a given set of activities and protected species. An HCP is required by the U.S. Fish and Wildlife Service (USFWS) as part of an application for an incidental take permit (ITP). The ITP allows the permit holder to proceed with activities covered in the HCP that could result in the unintentional take of federally listed species.

Lakes States Forest Management Bat Habitat Conservation Plan (Bat HCP): (search distance = 0; within area of interest only) This HCP was created to provide flexibility to the Minnesota Department of Natural Resources (DNR) to manage forests while addressing federal Endangered Species Act (ESA) regulations related to federally threatened and endangered bat species. The Bat HCP covers three bat species within Minnesota: northern long-eared bat, little brown bat, and tricolored bat. This report is intended to help non-federal, non-DNR landowners evaluate their potential eligibility for the Landowner Enrollment Program of the Bat HCP (For DNR-administered land, DNR staff should refer to the Bat HCP Implementation Policy).

Landowner Enrollment Program – DNR's incidental take permit may be extended through the Landowner Enrollment Program (LEP) to eligible non-federal landowners who conduct forest management activities. Landowners may be eligible to enroll in the LEP if they are a county land administrator, own more than 10,000 acres, or own land that overlaps a Bat HCP feature. The results below indicate if the defined area of interest overlaps a Bat HCP feature. For more information on how to enroll in the LEP, please visit the Landowner Enrollment Program (LEP).

SEARCH RESULTS: No Bat HCP features were found within the area of interest. Landowners are only eligible to apply for the Landowner Enrollment Program if they are a county land administrator or they own more than 10,000 acres.

USFWS Regulatory Layers

To ensure compliance with federal law, conduct a federal regulatory review using the U.S. Fish and Wildlife Service's (USFWS) online Information for Planning and Consultation (IPaC) tool. This report is not a substitution for a Section 7 review.

For informational purposes only, this tool currently checks the following USFWS Regulatory Layers:

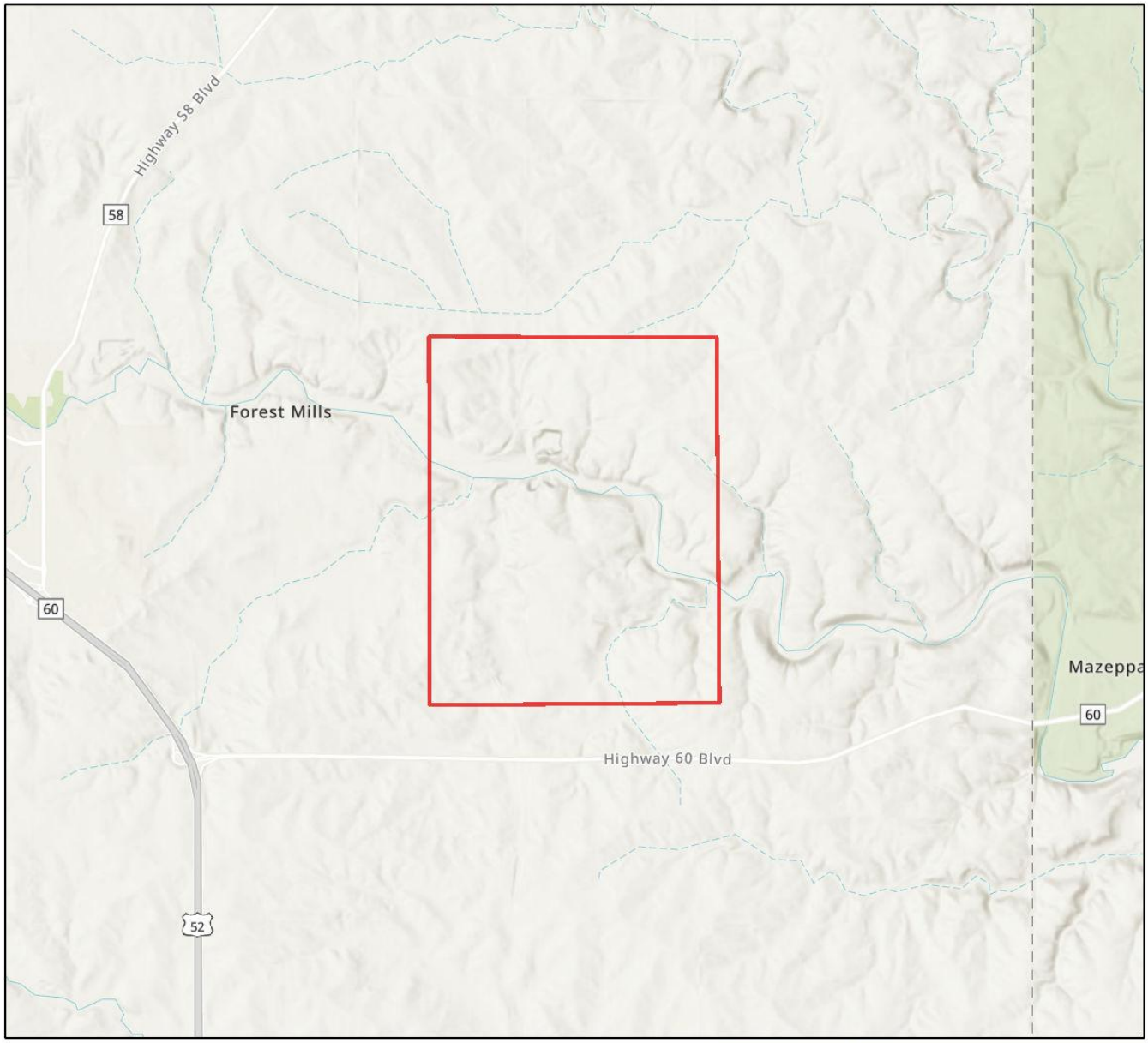
Rusty Patched Bumblebee High Potential Zones: (*search distance = 0; within area of interest only*) The rusty patched bumble bee (*Bombus affinis*), federally listed as endangered, is likely to be present in suitable habitat within the high potential zones. From April through October this species uses underground nests in upland grasslands, shrublands, and forest edges, and forages where nectar and pollen are available. From October through April the species overwinters under tree litter in upland forests and woodlands. The rusty patched bumble bee may be impacted by a variety of land management activities including, but not limited to, prescribed fire, tree-removal, haying, grazing, herbicide use, pesticide use, land-clearing, soil disturbance or compaction, or use of non-native bees. The USFWS RPBB guidance provides guidance on avoiding impacts to rusty patched bumble bee and a key for determining if actions are likely to affect the species; the determination key can be found in the appendix. Please visit the USFWS Rusty Patched Bumble Bee Map for the most current locations of High Potential Zones.

The following USFWS Regulatory Species are within the search area:

- Rusty Patched Bumble Bee High Potential Zone

Kyllo Quarry

Conservation Planning Map



N
W E
S

0 0.38 0.75 1.5 2.25 3 Miles

Area of Interest

Size (acres): 2,440.36

County(s): Goodhue

Esri, TomTom, Garmin, FAO, NOAA, USGS, EPA, USFWS
Esri, NASA, NGA, USGS
Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS,

Formal Natural Heritage Review - Cover Page

See next page for results of review. A draft watermark means the project details have not been finalized and the results are not official.

Project Name: Kyllo Quarry

Project Proposer: Bruening Rock Products

Project Type: Mining, Sand / Gravel / Crushed Stone

Project Type Activities: Tree Removal

TRS: T109 R15 S2, T109 R15 S3, T109 R15 S4, T110 R15 S26, T110 R15 S27, T110 R15 S28, T110 R15 S33, T110 R15 S34, T110 R15 S35

County(s): Goodhue

DNR Admin Region(s): Central

Reason Requested: Local Government Permit

Project Description: A 50 year quarry where the excavation and crushing of rock will take place. There will be no waste generated.

Existing Land Uses: The existing land is ag land for farming.

Landcover / Habitat Impacted: Agricultural field and woodlands will be affected.

Waterbodies Affected: No waterbody will be affected in this process.

Groundwater Resources Affected: No groundwater will be affected.

Previous Natural Heritage Review: No

Previous Habitat Assessments / Surveys: No

SUMMARY OF AUTOMATED RESULTS

Category	Results	Response By Category
Project Details	Comments	Tree Removal - Recommendations
Ecologically Significant Area	Comments	Potential Local Conservation Value
State-Listed Endangered or Threatened Species	Needs Further Review	State-protected Species - Needs Further Review
State-Listed Species of Special Concern	Comments	Recommendations
Federally Listed Species	Comments	Visit IPaC for Federal Review RPBB High Potential Zone

DEPARTMENT OF NATURAL RESOURCES

February 25, 2025

Project Name: Kyllo Quarry
Project Proposer: Bruening Rock Products
Project Type: Mining, Sand / Gravel / Crushed Stone
Project ID: MCE #2025-00197

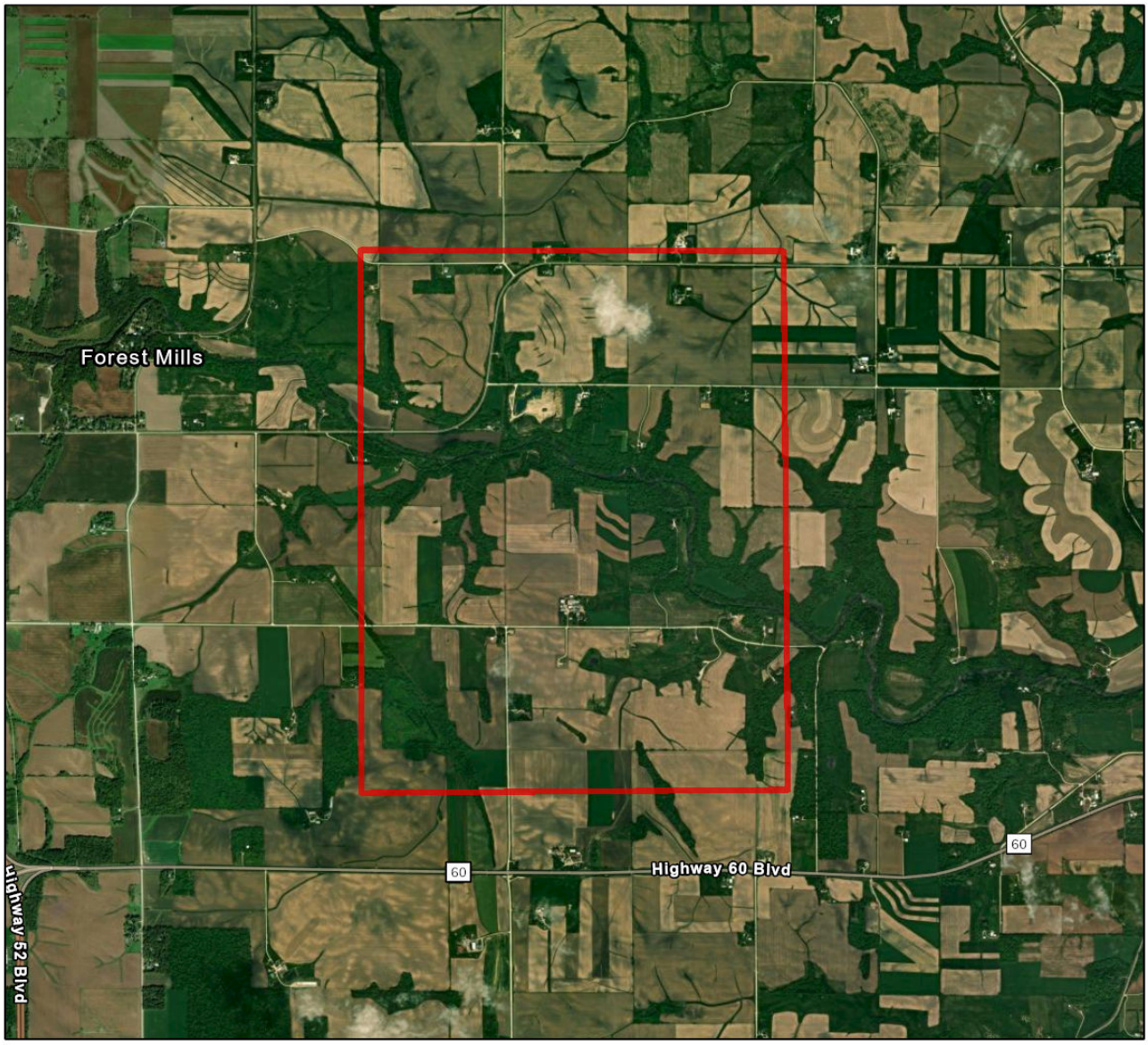
AUTOMATED RESULTS: FURTHER REVIEW IS NEEDED
As requested, the above project has undergone an automated review for potential impacts to rare features. Based on this review, one or more rare features may be impacted by the proposed project and further review by the Natural Heritage Review Team is needed. You will receive a separate notification email when the review process is complete and the Natural Heritage Review letter has been posted.

Please refer to the table on the cover page of this report for a summary of potential impacts to rare features. For additional information or planning purposes, use the Explore Page in Minnesota Conservation Explorer to view the potentially impacted rare features or to create a Conservation Planning Report for the proposed project.

If you have additional information to help resolve the potential impacts listed in the summary results, please attach related project documentation in the Edit Details tab of the Project page. Relevant information includes, but is not limited to, additional project details, completed habitat assessments, or survey results. This additional information will be considered during the project review.

Kyllo Quarry

Aerial Imagery With Locator Map



N
W E
S

0 0.25 0.5 1 1.5 2 Miles

Project Boundary

Project Type: Mining, Sand / Gravel / Crushed Stone

Project Size (acres): 2,440.36

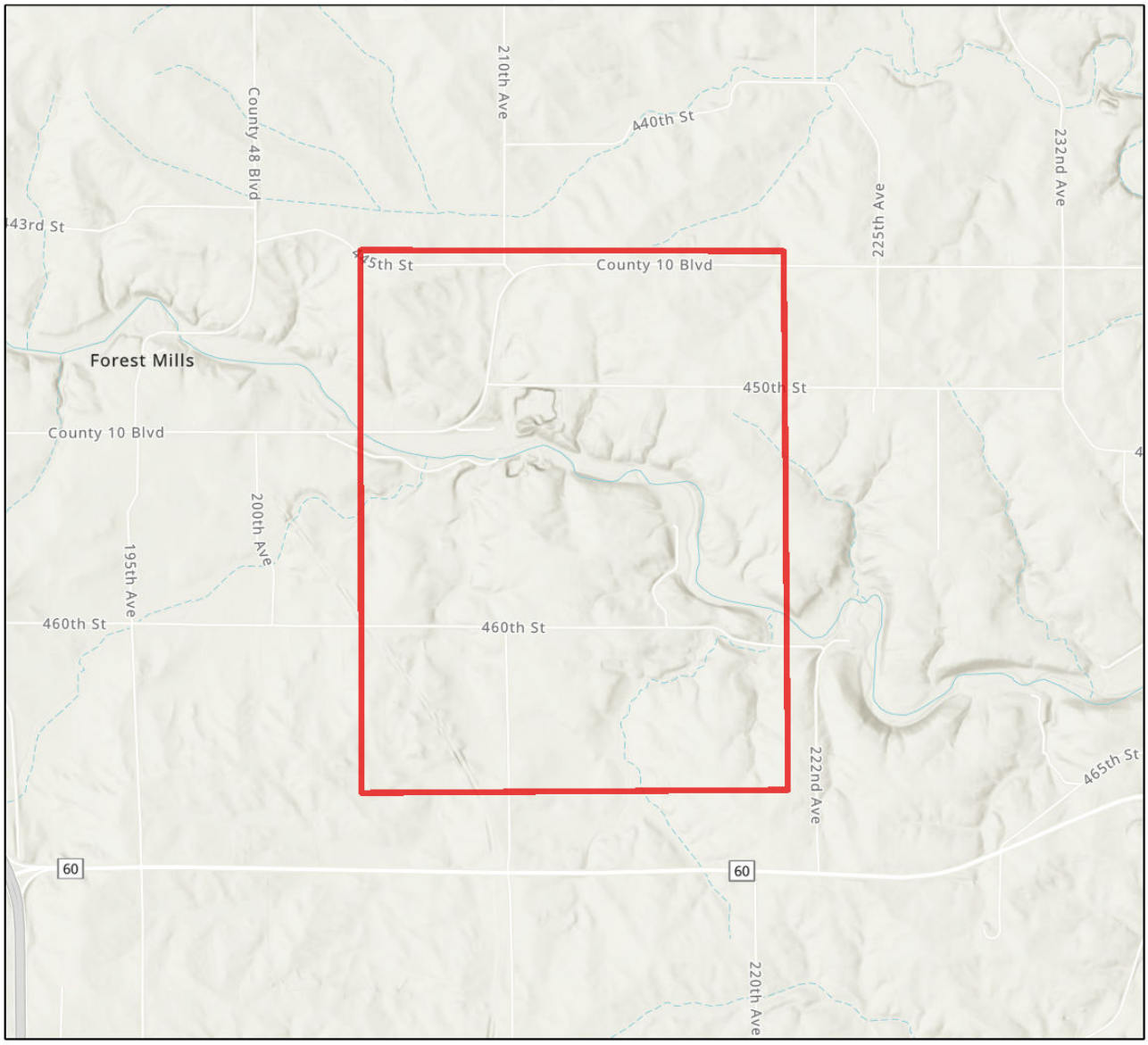
County(s): Goodhue

TRS: T109 R15 S2, T109 R15 S3, T109 R15 S4, T110 R15 S26, T110 R15 S27 +

Esri, TomTom, Garmin, FAO, NOAA, USGS, EPA, USFWS
Earthstar Geographics
Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS,

Kyllo Quarry

USA Topo Basemap With Locator Map



N
W E
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Project Boundary

Project Type: Mining, Sand / Gravel / Crushed Stone

Project Size (acres): 2,440.36

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TRS: T109 R15 S2, T109 R15 S3, T109 R15 S4, T110 R15 S26, T110 R15 S27 +

Esri, TomTom, Garmin, FAO, NOAA, USGS, EPA, USFWS
Esri, NASA, NGA, USGS, FEMA
Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS,

National Flood Hazard Layer FIRMette

92°36'52"W 44°17'48"N

92°36'15"W 44°17'22"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Basemap Imagery Source: USGS National Map 2023

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 2/24/2025 at 1:01 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

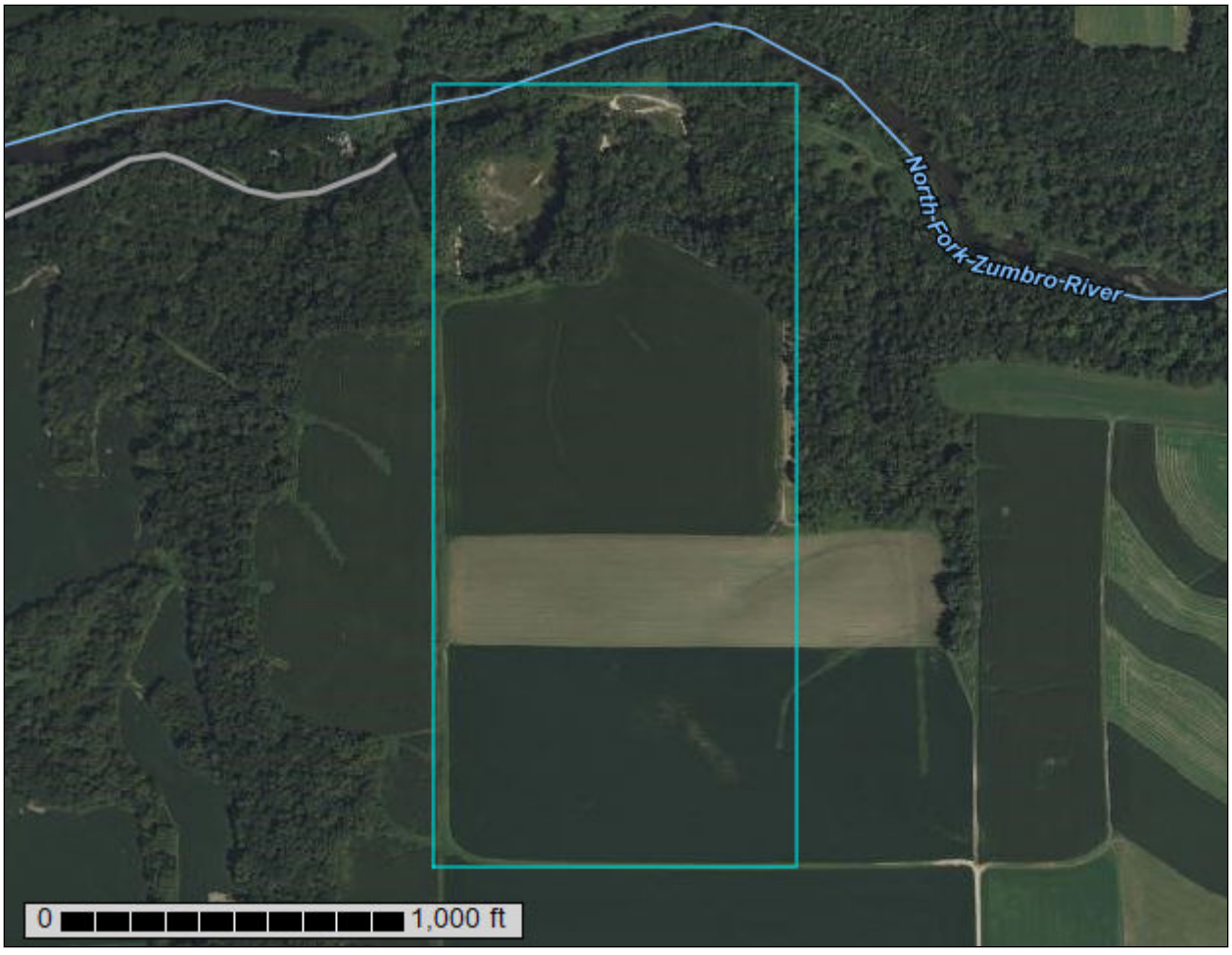
United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Goodhue County, Minnesota



March 25, 2025

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

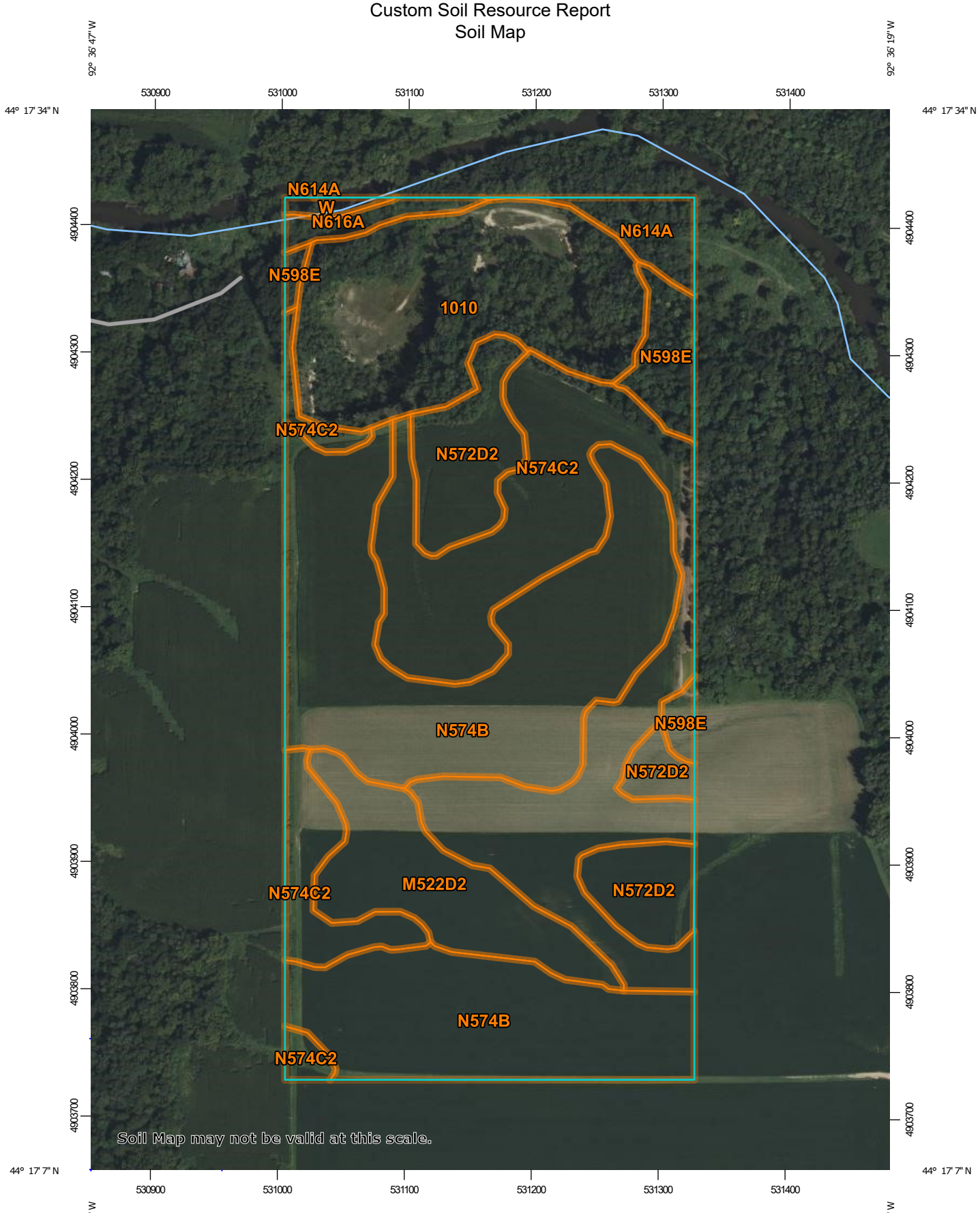
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



Map Scale: 1:4,060 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 150 300 600 900

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 15N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Goodhue County, Minnesota
Survey Area Data: Version 20, Sep 7, 2024

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Aug 17, 2020—Sep 2, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
1010	Pits, limestone quarry	9.0	16.2%
M522D2	Bassett-Racine complex, 12 to 18 percent slopes, moderately eroded	4.1	7.5%
N572D2	Downs-Hersey, bedrock substratum, complex, 12 to 18 percent slopes, moderately eroded	4.5	8.2%
N574B	Downs-Hersey complex, 2 to 6 percent slopes	18.8	33.8%
N574C2	Downs-Hersey complex, 6 to 12 percent slopes, moderately eroded	15.3	27.7%
N598E	Winneshiek-Waucoma complex, 18 to 35 percent slopes	1.7	3.1%
N614A	Kalmarville-Radford complex, 0 to 3 percent slopes, frequently flooded	1.1	1.9%
N616A	Littleton silt loam, 0 to 2 percent slopes, occasionally flooded	0.6	1.1%
W	Water	0.2	0.4%
Totals for Area of Interest		**55.4**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties

and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Goodhue County, Minnesota

1010—Pits, limestone quarry

Map Unit Setting

National map unit symbol: 2xm96
Elevation: 520 to 1,310 feet
Mean annual precipitation: 23 to 41 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 155 to 210 days
Farmland classification: Not prime farmland

Map Unit Composition

Pits, limestone quarry, limestone quarry: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Minor Components

Water, limestone quarry

Percent of map unit: 5 percent
Hydric soil rating: Unranked

M522D2—Bassett-Racine complex, 12 to 18 percent slopes, moderately eroded

Map Unit Setting

National map unit symbol: 1t2jv
Elevation: 980 to 1,310 feet
Mean annual precipitation: 28 to 33 inches
Mean annual air temperature: 43 to 48 degrees F
Frost-free period: 140 to 160 days
Farmland classification: Not prime farmland

Map Unit Composition

Bassett, moderately eroded, and similar soils: 50 percent
Racine, moderately eroded, and similar soils: 40 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bassett, Moderately Eroded

Setting

Landform: Till plains
Landform position (two-dimensional): Backslope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy sediments over loamy till

Typical profile

Ap - 0 to 9 inches: loam

Bt - 9 to 30 inches: loam
2Bt - 30 to 54 inches: loam
2BC - 54 to 80 inches: loam

Properties and qualities

Slope: 12 to 18 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.13 to 0.60 in/hr)
Depth to water table: About 42 to 48 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Available water supply, 0 to 60 inches: High (about 11.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: R104XY007IA - Loamy Upland Savanna
Forage suitability group: Sloping; Fine Texture (G104XS023MN)
Other vegetative classification: Sloping; Fine Texture (G104XS023MN)
Hydric soil rating: No

Description of Racine, Moderately Eroded

Setting

Landform: Till plains
Landform position (two-dimensional): Shoulder, backslope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy sediments over loamy till

Typical profile

Ap - 0 to 8 inches: loam
E - 8 to 12 inches: loam
Bt - 12 to 18 inches: clay loam
2Bt - 18 to 46 inches: sandy clay loam
2BC - 46 to 60 inches: loam

Properties and qualities

Slope: 12 to 18 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.13 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Available water supply, 0 to 60 inches: High (about 10.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: R104XY007IA - Loamy Upland Savanna
Forage suitability group: Sloping; Fine Texture (G104XS023MN)
Other vegetative classification: Sloping; Fine Texture (G104XS023MN)
Hydric soil rating: No

Minor Components

Kasson

Percent of map unit: 5 percent
Landform: Till plains
Landform position (two-dimensional): Backslope
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R104XY007IA - Loamy Upland Savanna
Other vegetative classification: Sloping Upland, Acid (G104XS006MN)
Hydric soil rating: No

Oran

Percent of map unit: 5 percent
Landform: Till plains
Landform position (two-dimensional): Footslope
Down-slope shape: Concave
Across-slope shape: Linear
Ecological site: R104XY007IA - Loamy Upland Savanna
Other vegetative classification: Sloping Upland, Acid (G104XS006MN)
Hydric soil rating: No

N572D2—Downs-Hersey, bedrock substratum, complex, 12 to 18 percent slopes, moderately eroded

Map Unit Setting

National map unit symbol: 1vg3k
Elevation: 590 to 1,310 feet
Mean annual precipitation: 31 to 39 inches
Mean annual air temperature: 41 to 50 degrees F
Frost-free period: 120 to 190 days
Farmland classification: Not prime farmland

Map Unit Composition

Downs, moderately eroded, and similar soils: 65 percent
Hersey, bedrock substratum, moderately eroded, and similar soils: 25 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Downs, Moderately Eroded

Setting

Landform: Loess hills
Landform position (two-dimensional): Shoulder, backslope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loess

Typical profile

Ap - 0 to 8 inches: silt loam
E,BE - 8 to 17 inches: silt loam
Bt - 17 to 39 inches: silty clay loam
BC,C - 39 to 60 inches: silt loam

Properties and qualities

Slope: 12 to 18 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Very high (about 12.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: F105XY013WI - Loamy-Silty Upland
Forage suitability group: Sloping; Fine Texture (G105XS023MN)
Other vegetative classification: Sloping; Fine Texture (G105XS023MN)
Hydric soil rating: No

Description of Hersey, Bedrock Substratum, Moderately Eroded

Setting

Landform: Loess hills
Landform position (two-dimensional): Shoulder, backslope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loess over loamy till over limestone bedrock

Typical profile

Ap - 0 to 9 inches: silt loam
Bt - 9 to 60 inches: silt loam
2BC - 60 to 70 inches: clay loam
3R - 70 to 80 inches: weathered bedrock

Properties and qualities

Slope: 12 to 18 percent
Depth to restrictive feature: 60 to 80 inches to lithic bedrock
Drainage class: Well drained
Runoff class: Medium

Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.40 to 1.30 in/hr)
Depth to water table: About 66 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Available water supply, 0 to 60 inches: Very high (about 12.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: F105XY013WI - Loamy-Silty Upland
Forage suitability group: Sloping; Fine Texture (G105XS023MN)
Other vegetative classification: Sloping; Fine Texture (G105XS023MN)
Hydric soil rating: No

Minor Components

Nasset, moderately eroded

Percent of map unit: 5 percent
Landform: Loess hills
Landform position (two-dimensional): Shoulder, backslope
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: F105XY013WI - Loamy-Silty Upland
Other vegetative classification: Sloping; Fine Texture (G105XS023MN)
Hydric soil rating: No

Barremills, drainageway

Percent of map unit: 5 percent
Landform: Drainageways on loess hills
Landform position (two-dimensional): Footslope, toeslope
Down-slope shape: Concave
Across-slope shape: Linear
Ecological site: R105XY011WI - Mollic Loamy-Silty Upland
Other vegetative classification: Sloping Upland, Neutral (G105XS002MN)
Hydric soil rating: No

N574B—Downs-Hersey complex, 2 to 6 percent slopes

Map Unit Setting

National map unit symbol: 2yvb5
Elevation: 800 to 1,400 feet
Mean annual precipitation: 31 to 39 inches
Mean annual air temperature: 41 to 50 degrees F
Frost-free period: 120 to 190 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Downs and similar soils: 48 percent
Hersey and similar soils: 40 percent
Minor components: 12 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Downs

Setting

Landform: Till plains
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loess

Typical profile

Ap - 0 to 8 inches: silt loam
BE - 8 to 17 inches: silt loam
Bt1 - 17 to 33 inches: silt loam
Bt2 - 33 to 39 inches: silt loam
BC - 39 to 48 inches: silt loam
C - 48 to 79 inches: silt loam

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.14 to 1.42 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Very high (about 12.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Ecological site: F105XY013WI - Loamy-Silty Upland
Forage suitability group: Sloping Upland, Neutral (G105XS002MN)
Other vegetative classification: Sloping Upland, Neutral (G105XS002MN)
Hydric soil rating: No

Description of Hersey

Setting

Landform: Till plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loess over hersey loamy basal till

Typical profile

Ap - 0 to 8 inches: silt loam
Bt1 - 8 to 15 inches: silt loam
Bt2 - 15 to 22 inches: silt loam
Bt3 - 22 to 36 inches: silt loam
Bt4 - 36 to 58 inches: silt loam
2Bt5 - 58 to 79 inches: clay loam

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: 39 to 75 inches to densic material
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: About 42 to 48 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Very high (about 12.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Ecological site: F105XY013WI - Loamy-Silty Upland
Forage suitability group: Sloping Upland, Neutral (G105XS002MN)
Other vegetative classification: Sloping Upland, Neutral (G105XS002MN)
Hydric soil rating: No

Minor Components

Vasa

Percent of map unit: 7 percent
Landform: Till plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: F105XY008WI - Moist Loamy-Clayey Lowland
Other vegetative classification: Level Swale, Neutral (G105XS001MN)
Hydric soil rating: No

Newvienna, till substratum

Percent of map unit: 5 percent
Landform: Till plains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Ecological site: F105XY013WI - Loamy-Silty Upland
Other vegetative classification: Level Swale, Neutral (G105XS001MN)
Hydric soil rating: No

N574C2—Downs-Hersey complex, 6 to 12 percent slopes, moderately eroded

Map Unit Setting

National map unit symbol: 2yvb7
Elevation: 800 to 1,400 feet
Mean annual precipitation: 31 to 39 inches
Mean annual air temperature: 41 to 50 degrees F
Frost-free period: 120 to 190 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Downs and similar soils: 48 percent
Hersey and similar soils: 40 percent
Minor components: 12 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Downs

Setting

Landform: Ridges
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loess

Typical profile

Ap - 0 to 8 inches: silt loam
BE - 8 to 17 inches: silt loam
Bt1 - 17 to 33 inches: silt loam
Bt2 - 33 to 39 inches: silt loam
BC - 39 to 48 inches: silt loam
C - 48 to 79 inches: silt loam

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.14 to 1.42 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Very high (about 12.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: F105XY013WI - Loamy-Silty Upland
Forage suitability group: Sloping Upland, Neutral (G105XS002MN)
Other vegetative classification: Sloping Upland, Neutral (G105XS002MN)
Hydric soil rating: No

Description of Hersey

Setting

Landform: Till plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loess over loamy till

Typical profile

Ap - 0 to 8 inches: silt loam
Bt1 - 8 to 36 inches: silt loam
Bt2 - 36 to 48 inches: silt loam
2BC - 48 to 64 inches: loam
2C - 64 to 79 inches: loam

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 42 to 48 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 11.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: F105XY013WI - Loamy-Silty Upland
Forage suitability group: Sloping Upland, Neutral (G105XS002MN)
Other vegetative classification: Sloping Upland, Neutral (G105XS002MN)
Hydric soil rating: No

Minor Components

Vasa

Percent of map unit: 7 percent
Landform: Till plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Concave

Across-slope shape: Linear
Ecological site: F105XY008WI - Moist Loamy-Clayey Lowland
Other vegetative classification: Level Swale, Neutral (G105XS001MN)
Hydric soil rating: No

Newvienna, till substratum
Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: F105XY013WI - Loamy-Silty Upland
Other vegetative classification: Level Swale, Neutral (G105XS001MN)
Hydric soil rating: No

N598E—Winneshiek-Waucoma complex, 18 to 35 percent slopes

Map Unit Setting
National map unit symbol: 1t20r
Elevation: 590 to 1,310 feet
Mean annual precipitation: 31 to 39 inches
Mean annual air temperature: 41 to 50 degrees F
Frost-free period: 120 to 190 days
Farmland classification: Not prime farmland

Map Unit Composition
Winneshiek and similar soils: 37 percent
Waucoma and similar soils: 25 percent
Minor components: 38 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Winneshiek

Setting
Landform: Valley sides
Landform position (two-dimensional): Shoulder, backslope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy sediments over residuum over limestone bedrock

Typical profile
Ap - 0 to 7 inches: loam
E,BE - 7 to 16 inches: loam
Bt - 16 to 21 inches: clay loam
2Bt - 21 to 24 inches: clay
3R - 24 to 60 inches: weathered bedrock

Properties and qualities
Slope: 18 to 25 percent

Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C
Ecological site: F105XY012WI - Shallow Loamy-Silty Upland
Forage suitability group: Sandy (G104XS022MN)
Other vegetative classification: Sandy (G104XS022MN)
Hydric soil rating: No

Description of Waucoma

Setting

Landform: Valley sides
Landform position (two-dimensional): Backslope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy sediments over residuum over limestone bedrock

Typical profile

Ap - 0 to 6 inches: loam
E,BE - 6 to 17 inches: loam
Bt - 17 to 45 inches: loam
2Bt - 45 to 55 inches: clay
3R - 55 to 60 inches: weathered bedrock

Properties and qualities

Slope: 18 to 25 percent
Depth to restrictive feature: 40 to 80 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 9.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: B
Ecological site: F105XY013WI - Loamy-Silty Upland
Forage suitability group: Steep; Fine Texture (G104XS017MN)
Other vegetative classification: Steep; Fine Texture (G104XS017MN)
Hydric soil rating: No

Minor Components

Nordness

Percent of map unit: 14 percent
Landform: Valley sides
Landform position (two-dimensional): Shoulder
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: F105XY012WI - Shallow Loamy-Silty Upland
Other vegetative classification: Not Suited (G105XS024MN)
Hydric soil rating: No

Frontenac

Percent of map unit: 14 percent
Landform: Valley sides
Landform position (two-dimensional): Backslope, footslope
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R105XY011WI - Mollic Loamy-Silty Upland
Other vegetative classification: Not Suited (G104XS024MN)
Hydric soil rating: No

Mt. carroll, limestone substratum

Percent of map unit: 10 percent
Landform: Valley sides
Landform position (two-dimensional): Backslope
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: F105XY013WI - Loamy-Silty Upland
Other vegetative classification: Steep; Fine Texture (G105XS017MN)
Hydric soil rating: No

N614A—Kalmarville-Radford complex, 0 to 3 percent slopes, frequently flooded

Map Unit Setting

National map unit symbol: 1t7bq
Elevation: 590 to 1,310 feet
Mean annual precipitation: 31 to 39 inches
Mean annual air temperature: 41 to 50 degrees F
Frost-free period: 120 to 190 days
Farmland classification: Not prime farmland

Map Unit Composition

Kalmarville, frequently flooded, and similar soils: 50 percent
Radford, frequently flooded, and similar soils: 30 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Kalmarville, Frequently Flooded

Setting

Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Coarse-loamy alluvium over sandy alluvium

Typical profile

A - 0 to 43 inches: silt loam
2Cg - 43 to 60 inches: sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: Frequent
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Available water supply, 0 to 60 inches: High (about 11.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: B/D
Ecological site: F105XY003WI - Wet Loamy-Clayey Floodplain
Forage suitability group: Frequently Flooded (G105XS016MN)
Other vegetative classification: Frequently Flooded (G105XS016MN)
Hydric soil rating: Yes

Description of Radford, Frequently Flooded

Setting

Landform: Flood plains
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Silty alluvium

Typical profile

A - 0 to 12 inches: silt loam
C - 12 to 33 inches: silt loam
Ab - 33 to 72 inches: silt loam
Bgb - 72 to 80 inches: silt loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 18 to 24 inches

Frequency of flooding: Frequent
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Available water supply, 0 to 60 inches: Very high (about 13.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: B/D
Ecological site: F105XY003WI - Wet Loamy-Clayey Floodplain
Forage suitability group: Frequently Flooded (G105XS016MN)
Other vegetative classification: Frequently Flooded (G105XS016MN)
Hydric soil rating: No

Minor Components

Kennebec, occasionally flooded

Percent of map unit: 10 percent
Landform: Flood plains
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: F105XY003WI - Wet Loamy-Clayey Floodplain
Other vegetative classification: Sloping Upland, Neutral (G105XS002MN)
Hydric soil rating: No

Klum, occasionally flooded

Percent of map unit: 5 percent
Landform: Levees on flood plains
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: F104XY021IA - Sandy Floodplain Forest
Other vegetative classification: Sloping Upland, Neutral (G104XS002MN)
Hydric soil rating: No

Otter, frequently flooded, ponded

Percent of map unit: 5 percent
Landform: Channels on flood plains
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Linear
Ecological site: F105XY003WI - Wet Loamy-Clayey Floodplain
Other vegetative classification: Frequently Flooded (G105XS016MN)
Hydric soil rating: Yes

N616A—Littleton silt loam, 0 to 2 percent slopes, occasionally flooded

Map Unit Setting

National map unit symbol: 1t7c4

Elevation: 590 to 1,310 feet
Mean annual precipitation: 31 to 39 inches
Mean annual air temperature: 41 to 50 degrees F
Frost-free period: 120 to 190 days
Farmland classification: Prime farmland if protected from flooding or not frequently flooded during the growing season

Map Unit Composition

Littleton, occasionally flooded, and similar soils: 62 percent
Minor components: 38 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Littleton, Occasionally Flooded

Setting

Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Silty alluvium

Typical profile

Ap,A - 0 to 19 inches: silt loam
AB - 19 to 32 inches: silt loam
Bw - 32 to 49 inches: silt loam
C - 49 to 60 inches: silt loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 18 to 24 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Very high (about 13.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: B/D
Ecological site: F105XY003WI - Wet Loamy-Clayey Floodplain
Forage suitability group: Sloping Upland, Neutral (G105XS002MN)
Other vegetative classification: Sloping Upland, Neutral (G105XS002MN)
Hydric soil rating: No

Minor Components

Otter, occasionally flooded

Percent of map unit: 14 percent
Landform: Flood plains
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Linear
Ecological site: F105XY003WI - Wet Loamy-Clayey Floodplain

Other vegetative classification: Frequently Flooded (G105XS016MN)
Hydric soil rating: Yes

Kennebec, occasionally flooded
Percent of map unit: 14 percent
Landform: Flood plains
Landform position (three-dimensional): Rise
Down-slope shape: Concave
Across-slope shape: Linear
Ecological site: F105XY003WI - Wet Loamy-Clayey Floodplain
Other vegetative classification: Sloping Upland, Neutral (G105XS002MN)
Hydric soil rating: No

Lawler, occasionally flooded
Percent of map unit: 10 percent
Landform: Flats on flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R105XY007WI - Moist Mollic Loamy-Clayey Lowland
Other vegetative classification: Sloping Upland, Neutral (G104XS002MN)
Hydric soil rating: No

W—Water

Map Unit Setting
National map unit symbol: 1qfk2
Elevation: 980 to 1,310 feet
Mean annual precipitation: 28 to 33 inches
Mean annual air temperature: 43 to 48 degrees F
Frost-free period: 140 to 160 days
Farmland classification: Not prime farmland

Map Unit Composition
Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

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