Trott Brook Crossing
Environmental Assessment Worksheet

September 8, 2021

Responsible Governmental Unit (RGU)

City of Ramsey
Community Development
7550 Sunwood Drive NW
Ramsey, Minnesota 55303
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City of RAMSEY

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Memorandum

To: Minnesota Environmental Quality Board
Environmental Review Distribution List

From: Bruce Westby, City Engineer

Date: September 8, 2021

Subject: Trott Brook Crossing EAW

As the Responsible Governmental Unit (RGU), the City of Ramsey is issuing this Environmental Assessment Worksheet (EAW) for Trott Brook Crossing. The public comment period on this EAW begins when the public notice is published in the Minnesota Environmental Quality Board (EQB) Monitor on September 28, 2021. A press release and public notice will be submitted for publication in the Anoka County Union Herald. Public comments on this EAW will be accepted by the City of Ramsey until 4:30pm on October 28, 2021.

Environmental Assessment Worksheet (EAW)

Trott Brook Crossing

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Environmental Assessment Worksheet (EAW)

Trott Brook Crossing

This Environmental Assessment Worksheet (EAW) form and EAW Guidelines are available at the Environmental Quality Board's website at: http://www.eqb.state.mn.us/EnvRevGuidanceDocuments.htm. The EAW form provides information about a project that may have the potential for significant environmental effects. The EAW Guidelines provide additional detail and resources for completing the EAW form.

Cumulative potential effects can either be addressed under each applicable EAW Item, or can be addresses collectively under EAW Item 19.

Note to reviewers: Comments must be submitted to the RGU during the 30-day comment period following notice of the EAW in the *EQB Monitor*. Comments should address the accuracy and completeness of information, potential impacts that warrant further investigation and the need for an EIS.

1. Project Title: **Trott Brook Crossing**

2. Proposer:	Sotarra	**RGU:**	City of Ramsey
Contact person:	Tracey Rust	Contact person:	Bruce Westby
Title:	Senior Development Manager	Title:	City Engineer
Address:	1660 Highway 100 S, Suite 400	Address:	7550 Sunwood Drive NW
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Phone:	(952)-221-2566	Phone:	(763) 433-9826
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Email	Tracey.rust@sotarra.com	Email	bwestby@ci.ramsey.mn.us

4. Reason for EAW Preparation

Required:
- ☐ EIS Scoping
- ☑ Mandatory EAW

Discretionary:
- ☐ Citizen petition
- ☐ RGU discretion
- ☐ Proposer initiated

If EAW or EIS is mandatory give EQB rule category subpart number(s) and name(s):
MN Rules Part 4410.4300, Subp. 19.D. (Residential development)

5. Project Location

County: Anoka County, Minnesota
City/Township: City of Ramsey
PLS Location (¼, ¼, Section, Township, Range): part of W ½ of Section 10 and part of the E ½ of Section 9, T32N, R25W
Watershed (81 major watershed scale): Rum River (21)
GPS Coordinates: 45.280233, -93.451084
Tax Parcel Number(s): 10-32-25-21-0002, 10-32-25-22-0003, 10-32-25-22-0002, 09-32-25-11-0001, 09-32-25-14-0001, 09-32-25-42-0003 and 09-32-25-13-0001

At a minimum attach each of the following to the EAW:

- *County map showing the general location of the project;*
- *U.S. Geological Survey 7.5 minute, 1:24,000 scale map indicating project boundaries (photocopy acceptable); and*
- *Site plans showing all significant project and natural features. Pre-construction site plan and post-construction site plan.*

6. Project Description

a. Provide the brief project summary to be published in the EQB Monitor, (approximately 50 words).

Trott Brook Crossing is proposed on approximately 200.5 acres of land in the northern portion of the City of Ramsey, Anoka County. The project will include as many as 275 single-family homes and parkland with tree preservation. Site development will include installation of municipal sewer and water, mass grading, and stormwater management practices.

b. Give a complete description of the proposed project and related new construction, including infrastructure needs. If the project is an expansion include a description of the existing facility. Emphasize: 1) construction, operation methods and features that will cause physical manipulation of the environment or will produce wastes, 2) modifications to existing equipment or industrial processes, 3) significant demolition, removal or remodeling of existing structures, and 4) timing and duration of construction activities.

Trott Brook Crossing is proposed on approximately 200.5 acres of land in the northern part of the City of Ramsey, Anoka County, Minnesota (**Figure 1**). The project area is primarily cropland and wetlands, with a lesser amount of woodland and grassland. The site is located in the West ½ of Section 10 and part of the E ½ of Section 9, Township 32 North, Range 25 West (**Figure 2**).

The project will include as many as 275 single-family homes, installation of municipal sewer and water, mass grading, and stormwater management practices. The proposed Site Plan is included in **Appendix A**. The project will convert about 94 acres of cropland and 25 acres of woodland to streets, homes, lawns, landscaping, and stormwater features. The balance of the site will include about 7 acres of tree avoidance, 56 acres of wetlands and about 10 acre of grassland preservation. The project will include dedication of a 21.9-acre public park.

The site includes sandy soils, 40 feet of topographic relief, and with flat to moderate slopes (**Figure 3**). Slopes within the developed area will be graded and recontoured during project construction. The development area will be mass graded to install utilities, streets, residential building pads, and stormwater basins.

Development of the project area will involve installation of public and private infrastructure, including streets, municipal water and sanitary sewer, stormwater systems, electrical lines, and telephone lines. The project area will be served by City of Ramsey fire and police services and by the Anoka-Hennepin School District.

It is anticipated that construction of the development will start in April of 2022 and be phased over approximately seven years, depending on market conditions. Sanitary sewer will be extended from Nowthen Blvd NW. Construction will generally be phased from the east to the west based on market demand. The number of phases will be determined by market demand and absorption. Infrastructure will be installed at the initiation of each construction phase. In most cases, streets, water main, and sanitary sewer will only be installed to serve the upcoming phase of construction. Stormwater basins will be created at the start of each construction phase to treat stormwater and minimize potential effects of stormwater runoff.

c. *Project magnitude:*

Table 1. Project Magnitude

Characteristic	Number of Units
Total Project Acreage	200.5
Linear project length	N/A
Number and type of residential units	As many as 275 single-family detached
Commercial building area (square feet)	0
Industrial building area (square feet)	0
Institutional building area (square feet)	0
Other uses – specify (acres)	N/A
Structure height(s) (feet)	20-35

d. *Explain the project purpose; if the project will be carried out by a governmental unit, explain the need for the project and identify its beneficiaries.*

The purpose of the Trott Brook Crossing is to provide a single-family residential development in the City of Ramsey to meet market demand, in proximity to transportation corridors and open spaces. The project will be carried out by a private entity.

e. *Are future stages of this development including development on any other property planned or likely to happen?* ☐ Yes ☑ No
If yes, briefly describe future stages, relationship to present project, timeline and plans for environmental review.

Future stages are not planned or likely.

f. *Is this project a subsequent stage of an earlier project?* ☐ Yes ☑ No
If yes, briefly describe the past development, timeline and any past environmental review.

The project is not a subsequent stage of an earlier project.

7. Cover Types

Estimate the acreage of the site with each of the following cover types before and after development:

Table 2. Cover Types

Land Cover	Before (acres)[1]	After (acres)[2]
Wetlands	58.33	56.33
Deep water/streams	0.94	0.94
Wooded/forest	32.66	7.37
Brush/grassland	11.94	10.50
Cropland	93.57	0.00
Lawn/landscaping	0.40	72.01
Impervious surface	2.66	36.32
Stormwater pond	0.00	17.03
Other (describe)	0.00	0.00
Totals	200.50	200.50

Existing cover types are shown on **Figure 4**.

8. Permits and Approvals Required

List all known local, state and federal permits, approvals, certifications and financial assistance for the project. Include modifications of any existing permits, governmental review of plans and all direct and indirect forms of public financial assistance including bond guarantees, Tax Increment Financing and infrastructure. All of these final decisions are prohibited until all appropriate environmental review has been completed. See Minnesota Rules, Chapter 4410.3100.

Table 3. Permits and Approvals Required

Unit of Government	Type of Application	Status
City of Ramsey	Mandatory EAW Decision	To be applied for
City of Ramsey	Preliminary and Final Plat Approval	To be applied for
City of Ramsey	Grading Permit	To be applied for
City of Ramsey	Building Permit	To be applied for
City of Ramsey	Comprehensive Plan Amendment	To be applied for
City of Ramsey	Zoning Amendment	To be applied for
City of Ramsey	MUSA Expansion	To be applied for
City of Ramsey	Stormwater Management and Erosion Control Approval	To be applied for
City of Ramsey	Variance	To be applied for if needed
City of Ramsey	Municipal Water Connection Permit	To be applied for
City of Ramsey	Sanitary Sewer Connection Permit	To be applied for
Lower Rum River WMO	Wetland Boundary and Type Approval	To be applied for
Lower Rum River WMO	Wetland Fill Permit	To be applied for
Lower Rum River WMO	Watershed Permit	To be applied for
Minnesota Department of Health	Water Main Extension Approval	To be applied for
Minnesota Department of Natural Resources	Water Appropriation Permit	To be applied for
Minnesota Department of Natural Resources	Public Waters Work Permit	To be applied for
Minnesota Pollution Control Agency	NPDES/SDS General Permit	To be applied for
Minnesota Pollution Control Agency	Sanitary Sewer Extension Approval	To be applied for
U. S. Army Corps of Engineers	Wetland Delineation Concurrence	Submitted
U. S. Army Corps of Engineers	Approved Jurisdictional Determination	To be applied for
U. S. Army Corps of Engineers	Wetland or Water Resource Impact Permit	To be applied for

Cumulative potential effects may be considered and addressed in response to individual EAW Item Nos. 9-18, or the RGU can address all cumulative potential effects in response to EAW Item No. 19. If

addressing cumulative effect under individual items, make sure to include information requested in EAW Item No. 19

9. Land Use

a. Describe:

i. Existing land use of the site as well as areas adjacent to and near the site, including parks, trails, prime or unique farmlands.

Approximately 47% of the project area has been in agricultural use since at least the 1930s and the remaining portion consists of wetlands, woodland, grassland and a small amount of impervious and lawn at the farmstead and gravel access road. Surrounding land use is residential to the south and west, agricultural (future residential) to the north, and residential to the east (**Figure 5**).

Farmland ratings for soils mapped in the project area are listed in **Table 4** under **Item 10b** of this EAW. Of the fifteen soil map units present in the project area, one soil type covering 5.69% of the site is prime farmland if drained, and fourteen soils covering the remainder of the site are not prime farmland.

ii. Plans. Describe planned land use as identified in comprehensive plan (if available) and any other applicable plan for land use, water, or resources management by a local, regional, state, or federal agency.

The City of Ramsey 2040 Comprehensive Plan guides the site for R-1 (Low-Density Residential [MUSA]). The Comprehensive Plan requires Low-Density Residential to develop at densities of 3-4 units per acre. The proposed project could not meet that density requirement while also meeting the City minimum lot size requirements. Therefore, the net density of the site, after factoring out open space, is 2.2 lots/acre. The plat dedicates 21.9 acres for parks and open space with approximately 6.8 acres of the park consisting of wetlands. The proposed plan for Trott Brook Crossing includes a trail connection with the existing development to the south. The City of Ramsey Comprehensive Parks and Recreation Plan shows proposed future trail connections west and east of the existing development south of Trott Brook. Mapping prepared by the Minnesota DNR shows Metro Conservation Corridors on the western, eastern and northern portions of the City of Ramsey including Trott Brook Crossing.

iii. Zoning, including special districts or overlays such as shoreland, floodplain, wild and scenic rivers, critical area, agricultural preserves, etc.

<u>Zoning Overview</u>

The City of Ramsey Zoning Map shows the majority of the project area zoned for R-1 MUSA (Low-Density Residential). One parcel (PID #09-32-25-42-0003) on the southwest portion of the site is currently zoned R-1 Rural Developing, but will be rezoned to R1 MUSA. The Trott Brook Crossing project will comply with City R-1 MUSA zoning requirements with plat approval.

The project area does not fall in or near a wild and scenic river or an agricultural preserve, and is not within the Mississippi River Corridor Critical Areas (MRCCA).

Floodplains

The site includes floodplain on the southern portion adjacent to Trott Brook, MN DNR Public Waterway M-063-001.5 (**Figure 6**). The site falls in FEMA (Federal Emergency Management Agency) FIRM (Flood Insurance Rate Map) Panel 27003C0165E, which shows that the floodway elevation adjacent to Trott Brook, Flood Zone AE (1% annual chance flood), ranges from 871.4 feet at the upstream end of the site to 871.2 feet at the downstream end of the site. The project will avoid floodplain impacts and comply with Lower Rum River Watershed Management Organization (LRRWMO) Stormwater Standards that require lowest floor elevations to be at least 3 feet above the highest anticipated groundwater table and 2 feet above the 100-year flood elevation, or 1 foot above the emergency overflow of storm ponds, whichever is greater.

Shorelands

The Trott Brook Crossing development site includes shoreland on the southern portion (**Figure 7**). The shoreland overlay district extends 300 feet from the edge of the bank of the river channel of Trott Brook (MN DNR Public Waterway M-063-001.5), or to the landward extent of the floodplain, whichever is greater.

The City of Ramsey ordinances specify that the minimum lot width within shoreland for the Trott Brook Crossing project is 80 feet, and that the lots within shoreland do not exceed 25% impervious surface. The project proponent will be designing with lot lines that do not extend into floodplain, wetlands or wetland buffers, but will be submitting a variance for impervious surface for lots on the southern portion of the project that exceed the 25% impervious threshold.

b. Discuss the project's compatibility with nearby land uses, zoning, and plans listed in Item 9a above, concentrating on implications for environmental effects.

The project is compatible with surrounding land uses, which include primarily residential and agricultural land. The Trott Brook Crossing project will comply with City R-1 zoning requirements. The net density of the site is 2.2 lots/acre, similar to the existing residential development adjacent to and south of the project.

c. Identify measures incorporated into the proposed project to mitigate any potential incompatibility as discussed in Item 9b above.

To minimize the affects of development on adjacent properties, the project proponent may include additional landscape plantings where it borders large lots in the western end of the project.

10. Geology, Soils and Topography / Land Forms

a. Geology - Describe the geology underlying the project area and identify and map any susceptible geologic features such as sinkholes, shallow limestone formations, unconfined/shallow aquifers, or karst conditions. Discuss any limitations of these features for the project and any effects the project could have

on these features. Identify any project designs or mitigation measures to address effects to geologic features.

The Geologic Atlas of Anoka County, Minnesota (Minnesota Geological Survey 2013) indicates the surficial geology of the area is characterized by the following three units:

Richfield terrace - Sand and gravelly sand about 50 to 70 feet (15 to 21 meters) above the modern floodplain, ranging in elevation from about 870 feet (265 meters) in southern Fridley to about 915 feet (279 meters) in western Ramsey.

Peat and muck - Partially decomposed plant matter deposited in swamps, commonly formed in ice-block melt-out depressions and in former meltwater channels. Generally mapped only where greater than 4 feet (1.2 meters) thick. Includes fine-grained organic matter laid down in ponded water, marl at depth in places, and small bodies of open water.

Sand and clay facies - Generally thinly bedded, clay to sandy silt; silt predominates over clay in most places. Deposited in ice-block melt-out depressions by slack water of the Mississippi River at the Richfield terrace level. In places may include exhumed silt and clay of the New Brighton Formation (unit Qbc).

The estimated depth to bedrock in the project area, based on the Geologic Atlas, generally ranges between 51 and 350 feet.

Sinkholes and karst lands are not known to occur in western Anoka County where the project is located. Minnesota Karst Lands and Sinkhole Mapping prepared by Calvin Alexander and others (2006) does not shows karst lands or sinkholes in or near the project area. The site geology is not anticipated to be problematic.

b. Soils and topography - Describe the soils on the site, giving NRCS (SCS) classifications and descriptions, including limitations of soils. Describe topography, any special site conditions relating to erosion potential, soil stability or other soils limitations, such as steep slopes, highly permeable soils. Provide estimated volume and acreage of soil excavation and/or grading. Discuss impacts from project activities (distinguish between construction and operational activities) related to soils and topography. Identify measures during and after project construction to address soil limitations including stabilization, soil corrections or other measures. Erosion/sedimentation control related to stormwater runoff should be addressed in response to Item 11.b.ii.

The Web Soil Survey indicates the project area includes fifteen soil mapping units that consist of mostly loamy sands (**Table 4** and **Figure 7**).

Table 4. Soil Classifications

Symbol	Soil Name	% of Area	% Hydric	Hydric Category	Farmland Category
NyC	Nymore loamy sand, 6 to 12 percent slopes	16.88	0	Non-Hydric	Not prime farmland
Rf	Rifle mucky peat	16.86	100	Hydric	Not prime farmland
NyA	Nymore loamy sand, 0 to 2 percent slopes	13.63	0	Non-Hydric	Not prime farmland
NyB	Nymore loamy sand, 2 to 6 percent slopes	11.53	5	Predominantly Non-Hydric	Not prime farmland
Mc	Marsh	8.23	100	Hydric	Not prime farmland
AnA	Anoka loamy fine sand, 0 to 2 percent slopes	7.73	0	Non-Hydric	Not prime farmland
ZmB	Zimmerman fine sand, 1 to 6 percent slopes	6.28	2	Predominantly Non-Hydric	Not prime farmland
Bx	Brickton silt loam	5.69	93	Predominantly Hydric	Prime farmland if drained
NrD	Nymore loamy coarse sand, 12 to 25 percent slopes	4.85	0	Non-Hydric	Not prime farmland
Bm	Blomford loamy fine sand	4.26	95	Predominantly Hydric	Not prime farmland
D20A	Isan-Isan, frequently ponded, complex, 0 to 2 percent slopes	3.29	95	Predominantly Hydric	Not prime farmland
D67C	Hubbard loamy sand, Mississippi River Valley, 6 to 12 percent slopes	0.51	0	Predominantly Non-Hydric	Not prime farmland
ZmC	Zimmerman fine sand, 6 to 12 percent slopes	0.27	4	Predominantly Non-Hydric	Not prime farmland
ZmD	Zimmerman fine sand, 12 to 24 percent slopes	0.03	2	Predominantly Non-Hydric	Not prime farmland
AnB	Anoka loamy fine sand, 2 to 6 percent slopes	0.002	0	Non-Hydric	Not prime farmland

Three of the fifteen soils do not have limitations for dwelling units and local streets. Twelve of the soils (AnA, AnB, AnC, Bm, Bx, D20A, Mc, NrD, Rf, ZmC, ZmD, NyC) have limitations due to factors such as ponding, depth to saturated zone, shrink-swell, frost action, and slope.

Grading operations for residential development construction are expected to affect about 115 acres and involve movement of about 400,000-500,000 cubic yards of soil to construct streets, residential building pads, and stormwater features.

Elevations in the project area range from 904 feet above mean sea level at the highest point in the northwestern part of the site to 864 feet at the lowest point in the southeastern part of the site.

Review of a Digital Elevation Model (DEM) showing slopes of 0-11.9%, 12.0-17.9% and 18.0-19.6% revealed that the site contains only narrow bands of steep slopes that do not extend further than 50 feet, and no bluffs (**Figure 3**). Soils mapping classifies the steepest part of the site as 12-25% slopes (**Table 4, Figure 7**). As shown on the Site Plan (**Appendix A**), these slopes are proposed to be developed into residential lots and a street.

Development of the project area will disturb more than one acre of land and therefore will require application for coverage under the National Pollutant Discharge Elimination System/State Disposal System (NPDES/SDS) General Permit administered by the Minnesota Pollution Control Agency (MPCA) prior to initiation of earthwork. In compliance with the General NPDES Permit for construction activities, the project proponent and construction contractor will need to implement Best Management Practices (BMPs) to reduce erosion and sedimentation and stabilize exposed soils after construction. Erosion and sedimentation control BMPs related to stormwater runoff are discussed in greater detail within **Item 11.b.ii**. Additional BMPs required for construction projects within 1 mile of and draining to impaired waters are listed under **Item 11.a.i.**

NOTE: For silica sand projects, the EAW must include a hydrogeologic investigation assessing the potential groundwater and surface water effects and geologic conditions that could create an increased risk of potentially significant effects on groundwater and surface water. Descriptions of water resources and potential effects from the project in EAW Item 11 must be consistent with the geology, soils *and topography/land forms and potential effects described in EAW Item 10.*

11. Water Resources

a. Describe surface water and groundwater features on or near the site in a.i. and a.ii. below.

i. Surface water - lakes, streams, wetlands, intermittent channels, and county/judicial ditches. Include any special designations such as public waters, trout stream/lake, wildlife lakes, migratory waterfowl feeding/resting lake, and outstanding resource value water. Include water quality impairments or special designations listed on the current MPCA 303d Impaired Waters List that are within 1 mile of the project. Include DNR Public Waters Inventory number(s), if any.

Eight wetlands were delineated on the subject site by Kjolhaug Environmental Services on June 2, 2021 (**Figure 6**). A wetland delineation report has been submitted to the Lower Rum River Watershed Management Organization (LRRWMO) and the U.S. Army Corps of Engineers (USACE), and concurrence is pending. The U.S. Army Corps of assigned the wetland delineation submittal regulatory file no. 2021-01498-SSC on July 27, 2021. The wetland delineation report has been included in **Appendix B**. Delineated wetlands within the project boundary are summarized below on the following page in **Table 5**.

Table 5. Delineated Wetlands on the Trott Brook Crossing Site

WL ID	Wetland Area (acres)	Circular 39	Cowardin	Eggers and Reed	Vegetation	Observed Drainage Features	Mapped NWI Wetland
1	0.03	Type 1	PEMAf	Farmed, seasonally flooded basin	Sparse manna grass	None. Isolated depression surrounded by upland.	PEM1Af
2	0.03	Type 1	PEMAf	Farmed, seasonally flooded basin	Healthy corn with ag weeds (yellow rocket, cinquefoil)	None. Isolated depression surrounded by upland.	--
3	0.006	Type 1	PEMAf	Farmed, seasonally flooded basin	Sparse groundsel	None. Isolated depression surrounded by upland.	PEM1Af
4	17.99 (on-site)	Type 3/2/1	PEMC/B/A	Shallow marsh, sedge meadow, and wet meadow	Sedges interior with fringe of cattail and lake sedge, with outer perimeter of reed canary grass	Wetland extends offsite to west and north	PEM1C/PEM1A/ PFO1A
5	38.08 (on-site)	Type 3/2/1/6	PEMC/B/A/ PSS1A/ PFO1A	Shallow marsh, sedge meadow, wet meadow and deciduous forested and scrub-shrub floodplain	Sedge dominated fringe with lesser reed canary grass, transitioning to nanny berry, dogwood, green ash floodplain (see footnote)	Wetland located along the edge of Trott Brook	R2UBFx/PEM1Cd/ PFO1A/PEM1Ad/ PSS1A
6	0.31 (on-site)	Type 3/2	PEMC/B	Shallow marsh and wet meadow	Cattail center with reed canary grass fringe with lesser lake sedge, giant goldenrod, and willow shrubs	Wetland connects to offsite wetland bordering Trott Brook	PEM1C/PEM1A/ PFO1A
7, 7a, 7b	0.96, 0.11, 0.02	Type 5/3/1	PUBGx/ PEMC/PEMA	Excavated shallow open water, shallow marsh, and wet meadow	Open water, cattail, reed canary grass	Wetland drains to Wetland 5 via ephemeral gully	PABG/PEM1Ad
8	0.43	Type 2/1	PEMB/Af	Wet meadow and seasonally flooded basin (farmed edge)	Cattail, reed canary grass, farmed edge	None. Isolated depression surrounded by upland.	--

Wetland 5 Footnote: The SW portion of Wetland 5 contained a canopy of American elm, black ash, yellow birch, basswood, green ash, and paper birch with common buckthorn in the understory. The majority of Wetland 5 was wet meadow next to the floodplain of Trott Brook. Species observed included wood nettle Jack in the pulpit, white snakeroot, sedges, burdock, enchanter's nightshade, sweet cicely, bedstraw, sensitive fern, lady fern, violet, geranium, jewelweed, meadowrue, reed canary grass, manna grass, bugleweed, and horsetail.

Impaired waters (including their DNR Public Water Inventory Number) within one mile of the project are listed below in **Table 6**.

Table 6. Impaired Waters

Name	DNR ID	AUID	Reach	Impairment Type (s)	Approved TMDL(s)
Trott Brook	M-063-001.5	07010207-680	CD 51 to Rum R	AQL (Aquatic Life)	TMDL approved for: Dissolved oxygen TMDL not required for: None Additional impairments: FishesBio; InvertBio

Impaired waters listed by the Minnesota Pollution Control Agency (MPCA) and located within 1 mile of the site include Trott Brook (AUID 07010207-680), which is impaired for aquatic life (AQL). Because Trott Brook is an impaired receiving water within 1 mile of the project, additional BMPs are required for water quality protection, including:

1. complete stabilization of exposed soil within seven calendar days after construction activity in respective parts the project temporarily or permanently ceases;
2. temporary sediment basin(s) for common drainage areas covering five or more acres of area disturbed at one time; and
3. mandatory Stormwater Pollution Prevention Plan (SWPPP) review because the project will disturb more than 50 acres land.

The SWPPP must be submitted to the MPCA at least 30 days prior to the construction start date.

The project area does not include any trout streams/lakes, wildlife lakes, migratory waterfowl feeding/resting lake, or outstanding resource value waters.

ii. Groundwater – aquifers, springs, seeps. Include: 1) depth to groundwater; 2) if project is within a MDH wellhead protection area; 3) identification of any on-site and/or nearby wells, including unique numbers and well logs if available. If there are no wells known on site or nearby, explain the methodology used to determine this.

Groundwater discharge was observed at several springs within the northern portion of Wetland 5 (**Figure 6**). Depth to groundwater varies across upland portion of the project area from 7.5 feet to deeper than 21 feet below the soil surface based upon geotechnical borings and piezometer readings. Haugo GeoTechnical Services (HGTS) performed geotechnical soil borings on the site on July 21, 2021. Groundwater elevations observed during geotechnical borings are shown on the following page in **Table 7**. A field map and boring logs provided by HGTS are included in **Appendix C**.

Table 7. Ground Water Elevations Observed During Geotechnical Site Assessment

Boring Number	Ground Elevation, Feet MSL	Water Table Depth Below Ground Surface, Feet (End of Drilling)	Water Table Elevation, Feet MSL (End of Drilling)
1	884.3	18.1	866.2
2	903.2	Not encountered	No water table to 882.2
3	889.1	12.2	876.9
4	892.4	11.3	881.1
5	888.3	12.5	875.8
6	883.3	11.1	872.2
7	882.6	19.6	863.0
8	875.1	12.2	862.9
9	888.5	Not listed, 7.5 at time of drilling	881.0 at time of drilling
10	890.0	12.2	877.8
11	902.5	Not encountered	No water table to 881.5
12	885.7	14.5	871.2

Three piezometers were installed on July 21, 2021 by Haugo GeoTechnical Services (**Table 8**). Piezometer locations are shown in the GeoTechnical Boring Report (**Appendix C**).

Table 8. Piezometer Water Level Summary

Piezometer Number	Date	Approximate Depth to Groundwater (feet)	Approximate Groundwater Elevation (feet)
SB-4/P-4	8/4/2021	10.81	883.7
SB-6/P-6	8/4/2021	8.26	876.6
SB-10/P10	8/4/2021	8.75	884.3

The groundwater elevations observed with geotechnical borings and piezometer readings ranged from 7.5 feet below the soil surface to greater than 21 feet below the soil surface. The elevation of groundwater observed ranged from to 862.9 to 884.3 ft msl.

Boring logs for nearby wells were also referenced to determine the depth to groundwater in the project area. The elevation depth to static groundwater levels in 11 groundwater wells located near the project area ranged from 15 to 25 feet and from 862 ft msl to 885 ft msl (**Table 9**).

Table 9. Nearby Field Verified Groundwater Wells – Minnesota Well Index

Well No.	Surface Elevation (ft msl)	Depth (feet)	Cased Depth (feet)	Depth to		Location (Direction from Site, within 0.25 miles)	Aquifer
				Static Water Level Elevation (ft msl)	Bedrock (feet)		
434642	883	97	84	865	-	South	Quat. buried artes. aquifer
471736	884	170	135	869	120	South	Tunnel City Group
450174	885	58	50	870	-	North	Quat. buried artes. aquifer
570113	895	85	76	873	-	North	Quat. buried artes. aquifer
460099	885	165	141	869	139	South	Tunnel City Group
408603	884	196	156	869	105	East	Tunnel City-Wonewoc
521655	898	75	66	883	-	North	Quat. buried artes. aquifer
510517	910	170	120	885	98	North	Tunnel City Group
743426	885	104	92	862	-	South	Quat. buried artes. aquifer
562382	904	142	126	879	117	North	Tunnel City Group

The project area does not fall within a Minnesota Department of Health (MDH) wellhead protection area. Although numerous groundwater wells are located in the general vicinity of the site, the Minnesota County Well Index does not identify any wells located on-site. One unregistered well was found during the land survey for the property on the central portion of the site adjacent to the farmstead.

b. Describe effects from project activities on water resources and measures to minimize or mitigate the effects in Item b.i. through Item b.iv. below.

i. Wastewater - For each of the following, describe the sources, quantities and composition of all sanitary, municipal/domestic and industrial wastewater produced or treated at the site.

1) If the wastewater discharge is to a publicly owned treatment facility, identify any pretreatment measures and the ability of the facility to handle the added water and waste loadings, including any effects on, or required expansion of, municipal wastewater infrastructure.

The project is expected to produce normal domestic wastewater that is typical of residential developments. The project will not include industrial wastewater production or on-site wastewater treatment.

Sanitary wastewater production for the project was estimated using methods described in the Sewer Availability Charge (SAC) Procedure Manual (Metropolitan Council 2017). Metropolitan Council has established 274 gallons per day (GPD) as the average daily wastewater production from a typical single-family residential unit. Based on this residential equivalent, the project is expected to generate an average flow of 72,610-75,350 gallons of wastewater per day (approximately 265-275 residential units). Trott Brook Crossing is proposed to be served with sanitary sewer via a new lift station located in the southwest corner of the property and a forcemain sewer east of Variolite Street NW, which will connect to an existing sanitary sewer stub north of 166th Avenue NW.

Domestic wastewater from the project will be routed through the City of Ramsey sanitary sewer system and ultimately to the Metropolitan Wastewater Treatment Plant (MWWTP) located on the Mississippi River near Pig's Eye Lake in St. Paul. With the capacity to treat 314 million gallons of wastewater per day (MGD), this is the largest wastewater treatment facility in Minnesota. As of June 2021, the MWWTP receives a flow of 164 MGD, equal to 52% of its capacity. The MWWTP is owned and operated by Metropolitan Council. The Metropolitan Council's 2040 Water Resources Policy Plan includes a specific plan to serve the region's projected growth through 2040 and a general plan to serve the region's growth far beyond 2040. The City of Ramsey and Metropolitan Council have planned for increased capacity to convey and treat sanitary wastewater. The proposed project is not expected to require expansion of wastewater treatment infrastructure or raise wastewater treatment capacity concerns.

2) *If the wastewater discharge is to a subsurface sewage treatment systems (SSTS), describe the system used, the design flow, and suitability of site conditions for such a system.*

Wastewater will not be discharged to subsurface sewage treatment systems.

3) *If the wastewater discharge is to surface water, identify the wastewater treatment methods and identify discharge points and proposed effluent limitations to mitigate impacts. Discuss any effects to surface or groundwater from wastewater discharges.*

Wastewater will be treated in the MWWTP described above and then discharged to the Mississippi River. The MWWTP is an advanced secondary wastewater treatment plant located on the east bank of the Mississippi River, approximately three miles south of downtown St. Paul. Treatment capability is maintained during times of flood by a levee and floodwall that protect the plant treatment area. The plant uses an activated sludge process to remove phosphorus and ammonia nitrogen from wastewater prior to discharge to the Mississippi River. Sludge is processed by thickening, centrifugal dewatering, and fluidbed incineration with energy recovery (steam and electricity). These processing facilities were completed in 2004 as part of a major rehabilitation and upgrade program at the plant, which included state-of-the-art air pollution control systems and an alkaline stabilization system that produces biosolids for agricultural utilization. Ash from incineration is disposed of in a landfill.

ii. *Stormwater - Describe the quantity and quality of stormwater runoff at the site prior to and post construction. Include the routes and receiving water bodies for runoff from the site (major downstream water bodies as well as the immediate receiving waters). Discuss any environmental*

effects from stormwater discharges. Describe stormwater pollution prevention plans including temporary and permanent runoff controls and potential BMP site locations to manage or treat stormwater runoff. Identify specific erosion control, sedimentation control or stabilization measures to address soil limitations during and after project construction.

Pre-Construction Site Runoff

Soils in the project area are sandy with high infiltration rates, and most precipitation likely infiltrates into the ground, resulting in little surface runoff. Surface runoff from the project area under existing conditions likely contains some sediment, pesticides, fertilizers, and other nutrients. Existing runoff on the northwest portion of the site drains to the northwest into a wetland complex that extends offsite. Existing runoff on the south and central portion of the site drains to the south into wetland adjacent to Trott Brook.

Post-Construction Site Runoff

Compliance with LRRWMO, City of Ramsey, and NPDES requirements will minimize and mitigate potential adverse effects on receiving waters. Project development will change the land use from agricultural and woodland to residential with streets and parks. This land use change is expected to have mixed effects on runoff water volume and quality. Post-development runoff water quality will be typical of suburban developments, and will likely be slightly degraded by pollutants carried in runoff from streets, roofs, and driveways.

The proposed project will add about 36.32 acres of impervious surface, consisting of streets, homes, and driveways. The increased impervious surface area is expected to increase runoff volume and urban pollutants locally during significant storm events. However, stormwater rate and volume controls that comply with City of Ramsey and LRRWMO requirements will limit increases in runoff volume and associated pollutant transport. Much of the increased runoff and pollution is expected to be associated with large, infrequent storm events. The creation of stormwater ponds and infiltration basins is expected to mitigate potential adverse effects from the increased impervious surface area.

The project will include approximately 17.03 acres of stormwater and infiltration basins in compliance with City of Ramsey and LRRWMO requirements. Potential adverse effects of runoff volume and quality will be mitigated by the construction of stormwater basins designed to manage peak runoff rates, runoff volume, and water quality. Storm water volume control and BMP's will have at least the total net new impervious routed to them to provide full credit.

Storm events will discharge runoff at flow rates that are less than existing rates into Trott Brook and the wetland on the northwest portion of the site. Proposed stormwater management and erosion and sediment control practices are expected to minimize cumulative effects of post-development runoff on downstream waters. Project construction will include other water quality BMPs such as temporary sediment basins to comply with the MPCA General Stormwater Permit for Construction Activity.

Section 117-392 of the of Ramsey City Code requires permanent stormwater pollution controls, including: (1) infiltrating or retaining the first inch of precipitation over the impervious surface of the site; (2) retaining the post-construction runoff volume on-site for the 95th percentile storm; and (3) no

increase in the post-construction rate, volume, and duration of runoff over existing conditions for the one- and two-year storms. LRRWMO Stormwater Standards require stormwater basins designed to store the volume of the 100-year storm; stormwater treatment to NURP standards prior to discharge to a lake, stream, wetland, or offsite; and infiltration of a runoff volume equal to 1 inch from all impervious surfaces on-site. The proposed project design will meet these requirements, and will provide volume reduction consistent with City requirements.

Stormwater ponds designed to NURP criteria are considered effective in removing sediment, pollutants, and nutrients, as discussed in Protecting Water Quality in Urban Areas: Best Management Practices for Dealing with Storm Water Runoff from Urban, Suburban and Developing Areas of Minnesota (MPCA 2000). The NURP research projects conducted by the U.S. EPA concluded that 90% removal of total suspended solids was an attainable goal, and that significant removal of other pollutants, such as phosphorus, was also achievable. Although nutrient removal efficiency varies with site conditions, well-designed wet ponds and constructed wetland treatment systems are effective in removing sediment and associated pollutants, such as trace metals, nutrients and hydrocarbons. Stormwater basins also remove or treat oxygen-demanding substances, bacteria and dissolved nutrients.

Stormwater and Erosion Control BMPs

Because project construction will disturb more than one acre of land, the project proponent will be required to apply to the MPCA for coverage under the National Pollutant Discharge Elimination System/State Disposal System (NPDES/SDS) General Permit prior to initiating earthwork on the site. BMPs will be employed during construction to reduce erosion and sediment loading of stormwater runoff. Inspection of BMPs will be required after each rainfall exceeding 0.5 inches in 24 hours, and on a routine basis every 7 days. The NPDES permit will also require perimeter sediment control maintenance and sediment removal. BMPs to be implemented during construction include:

1. Construction of temporary sediment basins in the locations proposed for stormwater ponding, and development of these basins for permanent use following construction.
2. Installation of silt fence and other perimeter erosion controls prior to initiation of earthwork and maintenance of these controls until viable turf or ground cover is established on exposed areas.
3. Periodic street cleaning and installation of a rock construction entrance to reduce tracking of dirt onto public streets.
4. Stabilization of exposed soils within the time limits specified in the General NPDES permit.
5. Energy dissipation, such as riprap, installed at storm sewer outfalls.
6. Use of cover crops, native seed mixes, sod, and landscaping to stabilize exposed surface soils after final grading.

Erosion control plans will be reviewed and accepted by the City of Ramsey and the LRRWMO prior to project construction initiation. Potential adverse effects from construction-related sediment and erosion on water quality will be minimized by implementation of the above BMPs during and after construction.

iii. Water Appropriation. Describe if the project proposes to appropriate surface or groundwater (including dewatering). Describe the source, quantity, duration, use and purpose of the water use and if a DNR water appropriation permit is required. Describe any well abandonment. If connecting to an existing municipal water supply, identify the wells to be used as a water source and any effects on, or required expansion of, municipal water infrastructure. Discuss environmental effects from water appropriation, including an assessment of the water resources available for appropriation. Identify any measures to avoid, minimize, or mitigate environmental effects from the water appropriation.

Surface/Groundwater Appropriations and Dewatering

Project construction may require temporary dewatering and groundwater appropriation to facilitate installation of sanitary sewer and excavation of storm ponds. The project will not involve installation of new water wells. Project construction will require a MN DNR water appropriation permit if dewatering required for installation of utilities exceeds 10,000 gallons/day or 1 million gallons/year. The extent and duration of temporary construction dewatering needed is currently unknown. Construction dewatering may be unnecessary. Groundwater appropriated for construction dewatering will be discharged to temporary sediment basins within the project area. It is not anticipated that construction dewatering will be extensive or continue long enough to affect nearby domestic water wells.

Well Abandonment

The project area does not include any existing registered wells according to the Minnesota Well Index (**Table 9, Appendix D**). However, one unregistered well was found in the central portion of the site during the land survey for the property. The project proponent will ensure the well is abandoned in compliance with MDH requirements prior to project construction as noted under **Item 11.a.ii**.

Connection to a Public Water Supply

The project will be connected to the City of Ramsey municipal water supply. The City of Ramsey draws its public water supply from the Tunnel City-Wonewoc aquifer. The City currently maintains eight municipal wells with a permitted capacity to pump a total of 850 million gallons of water per year (MGY) based on Minnesota DNR water use data (**Table 10**). The Ramsey Water Supply Plan projects that the permitted volume of 850 MGY will not be exceeded until between 2025 and 2030.

Table 10. City of Ramsey Municipal Water Appropriation Permits

Permit No.	Well No.	Annual Permitted Volume (MGY)	Annual Average Use 2013-2018 (MGY)	Annual Maximum Use 2013-2018 (MGY)
1985-6005	161441	850	113.8	144.3
1985-6005	416183	850	0.9	5.5
1985-6005	580303	850	88.2	164.9
1985-6005	580313	850	124.2	194.0
1985-6005	593672	850	56.3	82.3
1985-6005	706840	850	122.9	138.1

Permit No.	Well No.	Annual Permitted Volume (MGY)	Annual Average Use 2013-2018 (MGY)	Annual Maximum Use 2013-2018 (MGY)
1985-6005	743832	850	89.1	161.6
1985-6005	743833	850	51.5	129.9

During 2013-2018, these wells used a combined average of 646.9 MGY, indicating an average available unused permitted volume of 203.1 MGY. Based on past use and permitted capacity, the existing municipal wells have sufficient surplus capacity to serve the proposed project. A twelve (12) inch watermain exists under the east side of Variolite Street between 163rd Avenue NW and 173rd Avenue NW. Watermain extended through the Trott Brook is anticipated to be 8-inch diameter (to be determined). Water flow, pressure, and storage will be adequate to serve the development area. As indicated under **Item 11.a.ii**, the project is not located in or near a wellhead protection area.

iv. Surface Waters

a) Wetlands. Describe any anticipated physical effects or alterations to wetland features such as draining, filling, permanent inundation, dredging and vegetative removal. Discuss direct and indirect environmental effects from physical modification of wetlands, including the anticipated effects that any proposed wetland alterations may have to the host watershed. Identify measures to avoid (e.g., available alternatives that were considered), minimize, or mitigate environmental effects to wetlands. Discuss whether any required compensatory wetland mitigation for unavoidable wetland impacts will occur in the same minor or major watershed, and identify those probable locations.

The project is estimated to include less than 2.0 acres of wetland impacts. Wetlands proposed for impact will primarily consist of isolated depressions within the farmed portion of the site, and a road crossing on the eastern portion of the site. Wetland impacts may also be required to facilitate construction of a pedestrian bridge over Trott Brook as discussed in **Item 11.iv.b**. The project proponent will be required to demonstrate wetland impact avoidance and minimization measures by preparing a wetland permit application and responding to agency comments during wetland the permitting process.

The project proponent will be required to replace wetland impacts at appropriate ratios through the purchase of approved wetland credits from available wetland banks. Wetland replacement is most likely to occur offsite at available wetland banks because wetland banking allows for use of wetland credits that are created and functioning prior to wetland impacts. Under the WCA and CWA, it is anticipated that required wetland credits will come from banks located in the same Wetland Bank Service Area, and potentially within the same Major Watershed as the wetland impacts. Ultimately, the wetland credits that may be purchased for compensatory mitigation will depend upon the credit balances available for sale at the time when wetland replacement occurs.

The project proponent will be required to implement BMPs or other management practices that help reduce and eliminate wetland impacts over time. Project proponents and construction contractors will choose stormwater practices appropriate for the site and install practices according to permit guidelines. Stormwater treatment basins will be designed to treat runoff from impervious surfaces and help maintain the hydrology of avoided wetlands either through discharge of treated surface

runoff or infiltration. Buffers will be provided around avoided wetlands, which will preserve wetland functions and values over time.

b) Other Surface Waters. Describe any anticipated physical effects or alterations to surface water features (lakes, streams, ponds, intermittent channels, county/judicial ditches) such as draining, filling, permanent inundation, dredging, diking, stream diversion, impoundment, aquatic plant removal and riparian alteration. Discuss direct and indirect environmental effects from physical modification of water features. Identify measures to avoid, minimize, or mitigate environmental effects to surface water features, including in-water Best Management Practices that are proposed to avoid or minimize turbidity/sedimentation while physically altering the water features. Discuss how the project will change the number or type of watercraft on any water body, including current and projected watercraft usage.

Trott Brook (MN DNR Public Waterway M-063-001.5) is located on the southern portion of the site. There is an existing trail stub in a residential development on the south side of Trott Brook that was intended to extend northward onto the Trott Brook Crossing site. The proposed trail connection is anticipated to consist of an approximately 8-foot wide bridge that will facilitate pedestrian traffic between residential neighborhoods and the City of Ramsey. The proposed bridge may include a boardwalk within the wetland fringing Trott Brook to minimize wetland impacts. The pedestrian trail crossing is not anticipated to impede watercraft usage within Trott Brook.

The proposed project is not expected to affect and other surface water features such as lakes, streams, ponds, intermittent channels, or county/judicial ditches.

12. Contamination / Hazardous Materials / Wastes

a. Pre-project site conditions - Describe existing contamination or potential environmental hazards on or in close proximity to the project site such as soil or ground water contamination, abandoned dumps, closed landfills, existing or abandoned storage tanks, and hazardous liquid or gas pipelines. Discuss any potential environmental effects from pre-project site conditions that would be caused or exacerbated by project construction and operation. Identify measures to avoid, minimize or mitigate adverse effects from existing contamination or potential environmental hazards. Include development of a Contingency Plan or Response Action Plan.

The majority of the project area has been in agricultural use since at least the 1930s and the remainder has consisted of woodland and grassland. The project area does not include any known pipelines, transmission lines, or registered storage tanks. The site is not known to include environmental hazards and the agricultural land use history suggests a low potential for environmental contamination. The project area is not known to include previous building sites, disposal areas, storage tanks or pipelines.

<u>What's in My Neighborhood</u>

Review of MPCA and Minnesota Department of Agriculture (MDA) "What's in My Neighborhood" (WIMN) interactive website initially showed 51 observations of potential contamination sites at two locations on the western portion of Trott Brook Crossing. However, upon further review of the potential contamination site details, 33 of those sites were located outside of the City of Ramsey and

the remaining 28 sites appear to be associated with projects that are not located on the Trott Brook Crossing development site. MPCA staff were contacted and have indicated that the WIMN interactive website has varying levels of data accuracy and may contain mapping errors.

No soil or ground water contamination, abandoned dumps, closed landfills, existing or abandoned storage tanks, and hazardous liquid or gas pipelines were listed on properties bordering Trott Brook Crossing.

b. Project related generation/storage of solid wastes - Describe solid wastes generated/stored during construction and/or operation of the project. Indicate method of disposal. Discuss potential environmental effects from solid waste handling, storage and disposal. Identify measures to avoid, minimize or mitigate adverse effects from the generation/storage of solid waste including source reduction and recycling.

Neither the construction process nor the proposed residential development is expected to generate substantial solid or hazardous wastes, solid animal manure, sludge, or ash. Construction contractors will be required to dispose of wastes generated at the site during construction using approved methods and facilities. Contractors will be expected to minimize and mitigate adverse effects from solid waste generation and storage by recycling construction waste to the degree practicable. Brush and tree waste generated by construction will likely be chipped or otherwise disposed of rather than burned on site.

Residents of the Trott Brook Crossing development will contract individually with waste haulers for solid waste collection and recycling services under the City's open trash and recycling collection system, which uses eight licensed waste haulers. The City has a contract for residential curbside recycling of paper, plastics, glass, and metals, but has an open hauling system for garbage service. Participation in the recycling program by future residents of the project area is expected to reduce the volume of solid waste generated by the project. Residents can also enroll in the City's organics recycling program to further reduce solid waste. Solid waste generated in the City of Ramsey that is not recycled or hazardous is trucked to a nearby landfill such as the Elk River Landfill.

Once constructed, the project will generate wastes typical of residential development operations. Most solid waste is expected to include organics, paper, other waste, and plastic (**Table 11**).

Table 11. Estimated Solid Waste Composition

Waste Type	Estimated %
Organic	31.0
Paper	24.5
Other	18.3
Plastic	17.9
Hazardous	0.4
Metal	4.5
Glass	2.2
Electronics	1.2
Total	100.0

Waste Type	Estimated %

Source: 2013 Statewide Waste Characterization (Burns & McDonnell for MPCA 2013).

c. *Project related use/storage of hazardous materials - Describe chemicals/hazardous materials used/stored during construction and/or operation of the project including method of storage. Indicate the number, location and size of any above or below ground tanks to store petroleum or other materials. Discuss potential environmental effects from accidental spill or release of hazardous materials. Identify measures to avoid, minimize or mitigate adverse effects from the use/storage of chemicals/hazardous materials including source reduction and recycling. Include development of a spill prevention plan.*

Development of the project area is not expected to generate or require storage of substantial amounts of hazardous wastes or materials. Future residential development is expected to result in the storage or generation of small amounts of typical household cleaners, paints, lubricants, and small engine fuels over time. Petroleum storage tanks and commercial petroleum-based businesses are not proposed in the project area. The project may include temporary storage of fuel for construction equipment, which will be conducted in accordance with local and state regulations.

d. *Project related generation/storage of hazardous wastes - Describe hazardous wastes generated/stored during construction and/or operation of the project. Indicate method of disposal. Discuss potential environmental effects from hazardous waste handling, storage, and disposal. Identify measures to avoid, minimize or mitigate adverse effects from the generation/storage of hazardous waste including source reduction and recycling.*

Normal construction and household hazardous wastes are anticipated. Toxic or hazardous materials such as fuel for construction equipment and materials used in the construction of homes (paint, adhesives, stains, contaminated rags, acids, bases, herbicides, and pesticides) will likely be used during site preparation and home construction. Spills of these materials are not likely to occur, but a substantial spill could require notification of the Minnesota Duty Officer. Contractors and builders will be responsible for proper management and disposal of wastes generated during construction. Homeowners will be responsible for management and disposal of hazardous waste thereafter. Homeowners will be able to dispose of household hazardous waste at the Anoka County Household Hazardous Waste Facility.

13. Fish, Wildlife, Plant Communities and Sensitive Ecological Resources (Rare Features)

a. *Describe fish and wildlife resources as well as habitats and vegetation on or in near the site.*

Fish and wildlife resources on and near the site are related to the composition, quality, size, and connectivity of plant communities such as cultivated cropland, wetlands, woodlands, and grasslands. Vegetative cover types on the project area were mapped based on aerial photography and site observations made during the wetland delineation and field reviews (**Figure 4**). The project area is primarily cropland and woodland, with a lesser amount of grassland. Habitats in the project area are

likely used by wildlife adapted to agricultural and suburban environments, such as white-tailed deer, songbirds, small mammals, reptiles and amphibians.

The project area falls in the Anoka Sandplain Ecological Subsection of the MN DNR Ecological Classification System and the Anoka Sand Plain and Mississippi Valley Outwash of the Level IV Ecoregion of the U.S. EPA. This area consists of a flat, sandy lake plain and terraces along the Mississippi River. Land use in the area includes row crops, small grains, suburban development, wetlands, woodlands.

Much of the project area has reduced wildlife habitat value because it has been utilized to produce annually tilled agricultural crops for years. Cropland consisted of corn during field surveys in 2021. A tree survey will be performed to assess the quantity and quality of woodland on the project site, and identify any specimen trees present. The majority of the woodland proposed for removal with implementation of the project consists of rows of planted trees, which have limited ecological value.

*b. Describe rare features such as state-listed (endangered, threatened or special concern) species, native plant communities, Minnesota County Biological Survey Sites of Biodiversity Significance, and other sensitive ecological resources on or within close proximity to the site. Provide the license agreement number (**LA-989**) and/or correspondence number (**ERDB [none assigned]**) from which the data were obtained and attach the Natural Heritage letter from the DNR. Indicate if any additional habitat or species survey work has been conducted within the site and describe the results.*

State

A Natural Heritage Inventory System (NHIS) data request was submitted to the MN DNR to assess whether known locations of rare plant or animal species or other significant natural features are known to occur within an approximate 1-mile radius of the project area. A response had not yet been obtained from the MN DNR at the time this EAW was approved for distribution. In lieu of an MN DNR NHIS database search, Kjolhaug Environmental Services queried a licensed copy of the NHIS database to assess rare species and natural features previously identified on or near the site.

The NHIS review identified records of one state special concern species and one state threatened species recorded within a 1-mile radius of the project area. Neither of these species is on the Federal threatened and endangered species list.

Observations of Blanding's turtles (*Emydoidea blandingii*), a state threatened reptile, were recorded within one mile of the project area. Blanding's turtles prefer calm shallow water, rich aquatic vegetation, and select open grassy uplands with sandy soils for nesting. The project area includes potential Blanding's turtle nesting habitat, therefore the following measures will be implemented to minimize potential impacts:

- Designing the project roadways with surmountable curbs;
- Installing silt fencing to keep turtles out of construction areas and removing fencing after the area has been revegetated; and
- Distributing the Blanding's turtle flier to all contractors working on-site.

Midwest Natural Resources (MNR) conducted two field surveys in the project area for State Threatened and Endangered vascular plant species. MNR found no State Threatened or Endangered species, however one Special Concern species, the St. Lawrence grapefern (*Sceptridium rugulosum*), was discovered on the northern portion of the site. The Special Concern status is given to plant species that are either uncommon in the state or have specific habitat requirements, but do not meet criteria for State Endangered or Threatened. The rare plant survey recommended an additional survey of the site within the wetland fringing Trott Brook during the spring of 2022. The rare plant survey is included in **Appendix E**.

Federal

Online information on rare species information maintained by the U.S. Fish and Wildlife Service (USFWS) was also reviewed for the project area. The U.S. Fish and Wildlife Service (USFWS) listed the northern long-eared bat (*Myotis septentrionalis*) as federally threatened on May 4, 2015. On February 2, 2017, the USFWS listed the rusty patched bumble bee (*Bombus affinis*) as federally endangered.

A review of the USFWS Information for Planning and Consultation (IPaC) website with a polygon encompassing the project area identified the northern long-eared bat as the only federally-listed threatened or endangered species that may potentially be affected by activities at the project location. The IPaC website also noted that there are no critical habitats at this location.

The northern long-eared bat hibernates in caves during winter and establishes maternity roosting colonies under the loose bark of trees during the summer. The project area is not known to include caves and includes limited tree cover. As of June 3, 2020, MN DNR data showed no documented maternity roost trees or hibernacula entrances of the northern long-eared bat in the project vicinity.

A review of the USFWS Rusty Patched Bumble Bee Map indicates the project area falls within a Low Potential Zone. This means that the rusty patched bumble bee is not likely to be present in the project area. Most habitats suitable for rusty patched bumble bees in the Upper Midwest have been converted by agriculture or other land uses. Rusty patched bumble bees need areas that provide nectar and pollen from flowers, nesting sites (underground and abandoned rodent cavities or clumps of grasses), and overwintering sites for hibernating queens (undisturbed soil). Site reviews have not identified native prairie plantings or diverse areas of native wildflowers in the project area, indicating a lack of highly suitable bumble bee habitat.

c. *Discuss how the identified fish, wildlife, plant communities, rare features and ecosystems may be affected by the project. Include a discussion on introduction and spread of invasive species from the project construction and operation. Separately discuss effects to known threatened and endangered species.*

Project development is expected to convert about 94 acres of cropland and 25 acres of woodland to streets, homes, lawns, landscaping, and stormwater features. The balance of the site will include about 7 acres of tree preservation, 56 acres of avoided wetlands and floodplain and about 11 acres of grassland preservation.

The project may affect the number and type of wildlife species in the area, but changes in wildlife abundance are not expected to be regionally significant. The existing cropland and woodland provide wildlife food and cover. Some wildlife species that depend on agricultural cropland and woodland will be displaced by the project. The project will likely have short-term negative effects and long-term positive effects on species adapted to suburban habitats. Non-migratory species with small home ranges, like small mammals, may experience adverse effects such as mortality during project construction.

The project may have effects on Blanding's turtles that may occur in the area. To minimize potential adverse effects on turtles and their mobility, the project will minimize wetland impacts, implement sediment and erosion controls, design with primarily surmountable curbs on roadways, and consider using erosion control materials constructed of organic fibers rather than plastic.

The project involves removal of woodland that may provide suitable roosting habitat for the northern long-eared bat, but the federally threatened bat has not been documented on the site and the majority of the construction area is cropland devoid of potential roost trees. The majority of the woodland proposed for removal with project implementation consists of planted rows of conifers. Northern long-eared bats (NLEB) prefer large, mature trees with shaggy bark. The trees proposed for removal with development of Trott Brook Crossing do not appear to be consistent with NLEB habitat.

Although project construction could be expected to slightly increase the potential for spread of invasive and weedy species, much of the project area has been disturbed by agricultural use for decades. BMPs may include the cleaning of construction equipment before transport, which might reduce the potential spread of invasive species.

d. Identify measures that will be taken to avoid, minimize, or mitigate adverse effects to fish, wildlife, plant communities, and sensitive ecological resources.

Measures to minimize and mitigate adverse effects on wildlife include the preservation of 7.37acres of woodland, creation of 17.03 acres of stormwater basins, dedicating wetland buffers adjacent to avoided wetlands and dedicating 21.9 acres of land for a public park. As indicated above, the project proponent will minimize potential effects on Blanding's turtles through wetland impact minimization and avoidance, implementing erosion and sediment control and designing with surmountable curbs on roadways. To the extent practicable, potential effects on northern long-eared bats and other woodland wildlife can be further minimized by clearing trees during October to April, outside of the wildlife breeding season. The most important practice is to avoid tree clearing during June 1 to August 15 when bats are rearing young.

A City of Ramsey staff member observed showy lady slippers (*Cypripedium reginae*) adjacent to Trott Brook near the project site (not within project limits). While showy lady slippers are not listed by the State or Federal government as a threatened or endangered species, they do have public value. When the pedestrian bridge is constructed over Trott Brook, the location of the crossing will be inspected to determine whether showy lady slippers are present. If present, the location of the trail or boardwalk access may be shifted to minimize impacts to this vascular plant species.

14. Historic Properties

Describe any historic structures, archeological sites, and/or traditional cultural properties on or in close proximity to the site. Include: 1) historic designations, 2) known artifact areas, and 3) architectural features. Attach letter received from the State Historic Preservation Office (SHPO). Discuss any anticipated effects to historic properties during project construction and operation. Identify measures that will be taken to avoid, minimize, or mitigate adverse effects to historic properties.

Nienow Cultural Consultants was retained to complete a Phase I Archaeological Survey of the project area.

Fieldwork was conducted during June 14-16, 2020, under the direction of Principal Investigator Jeremy Nienow, PhD., RPA, and licensed archaeological surveyor. Fieldwork consisted of a surface survey of all agricultural fields. Surface visibility in the agricultural fields ranged between 70 and 90%. Surface survey transects were spaced on a maximum of seven meter intervals. Nine shovel tests were excavated. Shovel tests were typically 35-40 centimeters (cm) wide and at least 80cm deep.

The surface survey identified six prehistoric artifacts including five tertiary quartz flakes and one piece of quartz shatter. No artifacts were identified during shovel testing. Based on these results, Nienow Cultural Consultants did not recommend the site eligible for the National Register of Historic Places, and did not recommend any further archaeological work. The Phase I Archaeological Survey Report is included in **Appendix F**.

15. Visual

Describe any scenic views or vistas on or near the project site. Describe any project related visual effects such as vapor plumes or glare from intense lights. Discuss the potential visual effects from the project. Identify any measures to avoid, minimize, or mitigate visual effects.

The project primarily entails conversion of farm fields to a single-family residential development, with smaller areas of woodland, wetland and meadow conversion. Substantial effects on visual resources are not anticipated in conjunction with project development, as the main visual effect will be the transition of views of the project area from mostly open agricultural land to residential development. The project will not involve installation of intense lights that would cause glare, nor will it include industries that would emit vapor plumes.

16. Air

a. Stationary source emissions. Describe the type, sources, quantities and compositions of any emissions from stationary sources such as boilers or exhaust stacks. Include any hazardous air pollutants, criteria pollutants, and any greenhouse gases. Discuss effects to air quality including any sensitive receptors, human health or applicable regulatory criteria. Include a discussion of any methods used assess the project's effect on air quality and the results of that assessment. Identify pollution control equipment and other measures that will be taken to avoid, minimize, or mitigate adverse effects from stationary source emissions.

The proposed project does not include heavy industrial facilities, but the project will still involve some stationary source air emissions. New residences are expected to include heating and cooling systems operated by natural gas and electricity, which will result in direct or indirect sources of stationary greenhouse gas (GHG) emissions. Emissions from heating and cooling systems are expected to be similar to those from other homes in the surrounding area.

The Minnesota Environmental Quality Board is working on a framework for integrating greenhouse gas (GHG) quantification and assessment requirements into the Environmental Review Program. However, standard requirements and assessment methods are not yet complete. In light of this constraint and in the absence of official guidance, the GHG assessment presented here is qualitative.

Common GHG greenhouse gas emissions include CO2, CH4, N2O. GHG emissions are customarily converted to carbon dioxide equivalents (CO2e) using global warming conversion factors to represent the global warming potential over 100 years, equivalent to one ton of CO2 derived from fossil fuel.

GHG emissions are expected to result from:

1. Operation of petroleum fueled equipment during project construction;
2. Combustion of natural gas used for heating homes;
3. Fossil fuels burned to generate electricity used at the project during construction and in homes;
4. Vehicle and air transportation related to project construction and operation;
5. Transport, treatment, and storage of solid waste and wastewater produced on-site;
6. Loss of carbon sequestration due to conversion of natural vegetation to developed and paved surfaces; and
7. Refrigeration, air conditioning, and the related manufacturing, service, and leakage of equipment.

Mitigation and adaption measures could help the project lessen the impacts of climate change and GHG emissions. Such measures may include:

1. Build homes with energy efficient building materials and lighting.
2. Encourage home purchases with energy efficient appliance and equipment.
3. Install programmable thermostats to allow more control over heating and cooling.
4. If irrigation systems are installed, City code requires them to include rain sensors or some other form of water efficient technology, such as a smart controller.
5. In open space areas, plant no-mow or prairie/pollinator mixes to increase carbon sequestration.
6. Plant trees within the development to increase carbon sequestration.
7. Install low-flow toilets and showers to reduce water consumption and natural gas combustion for heating water.

8. Consider installing rooftop solar, electric charging station or battery storage to make the development ready for electric vehicle use.
9. Protect trees along the Rush Creek corridor.

b. Vehicle emissions. Describe the effect of the project's traffic generation on air emissions. Discuss the project's vehicle-related emissions effect on air quality. Identify measures (e.g. traffic operational improvements, diesel idling minimization plan) that will be taken to minimize or mitigate vehicle-related emissions.

The proposed project will generate increased traffic in the area, which will result in a relatively small corresponding increase in carbon monoxide, carbon dioxide and other vehicle-related air emissions. GHG emissions related to traffic and transportation are listed under **Item 16.a** above. The project does not include air quality monitoring or modeling.

c. Dust and odors - Describe sources, characteristics, duration, quantities, and intensity of dust and odors generated during project construction and operation. (Fugitive dust may be discussed under item 16a). Discuss the effect of dust and odors in the vicinity of the project including nearby sensitive receptors and quality of life. Identify measures that will be taken to minimize or mitigate the effects of dust and odors.

The project is not expected to generate dust or odors at levels considered unusual for suburban development construction practices. Dust and odors produced during construction is expected to be consistent with applicable regulations of the MPCA and local governments. Dust and odor levels are expected to be slightly higher during project construction than post-construction.

The construction process is expected to generate some fugitive dust, but dust is not expected to be generated in objectionable quantities. The dust receptors near the project area include the single-family homes south of Trott Brook Crossing, the Brookside Elementary School east of the site, and rural residential homes north and west of the site. Odors routinely generated during construction will be typical of those associated with construction activity, such as exhaust from diesel and gasoline powered construction equipment.

Consideration will be given to suppression of airborne dust by application of water if fugitive dust generation during site grading exceeds levels typically expected during normal construction practices.

17. Noise

Describe sources, characteristics, duration, quantities, and intensity of noise generated during project construction and operation. Discuss the effect of noise in the vicinity of the project including 1) existing noise levels/sources in the area, 2) nearby sensitive receptors, 3) conformance to state noise standards, and 4) quality of life. Identify measures that will be taken to minimize or mitigate the effects of noise.

Construction Noise

It is anticipated that local noise levels will temporarily increase during project construction, but noise levels are expected to be at or near existing levels after construction is complete. Noise levels on and adjacent to the project area will vary considerably during construction, depending on the amount of construction that occurs simultaneously, the time of operation, and the distance between construction equipment and receptors.

Noise receptors near the project area include the single-family homes south of Trott Brook Crossing, the Brookside Elementary School east of the site, and rural residential homes north and west of the site. Residences near the project site will experience elevated noise levels at various times during construction compared to existing noise levels. Grading and excavation will require heavy equipment, such as scrapers, bulldozers, and other excavating equipment.

The project is expected to minimize disturbances caused by construction noise and conform to Minnesota noise rules and standards. These rules require noise to stay within specified levels depending on the land use and the time of day or night.

Noise generated by construction equipment and building construction will be limited primarily to daylight hours when noise levels are commonly higher than at night. Contractors will be required to minimize noise impacts by maintaining equipment properly, including the use of mufflers and other noise controls as specified by manufacturers.

18. Transportation

a. Describe traffic-related aspects of project construction and operation. Include: 1) existing and proposed additional parking spaces, 2) estimated total average daily traffic generated, 3) estimated maximum peak hour traffic generated and time of occurrence, 4) indicate source of trip generation rates used in the estimates, and 5) availability of transit and/or other alternative transportation modes.

S^2 Traffic Solutions, LLC (SSTS) completed a Traffic Impact Study to estimate the trips generated by the proposed project and evaluate the potential need for transportation or roadway improvements. The complete Traffic Study is included in **Appendix G**.

Existing and Proposed Parking Spaces

The project area includes three existing homes, outbuildings, and a small number of parking stalls in garages, driveways, and residential yards. The proposed 270 single-family homes will include off-street parking and garages.

Estimated Traffic Generation

SSTS prepared a Traffic Impact Study for 270 single-family homes (**Figure 3**). The Traffic Study assumed full development of the site by 2026. The complete Traffic Impact Study is included in **Appendix G**.

Trip generation was estimated using the methodology outlined in the Institute of Transportation Engineers (ITE) Trip Generation Manual, 10th Edition (2017). The proposed project is expected to generate about 2,593 vehicle trips per day. Within the PM peak hour, the project is expected to generate 264 trips, consisting of 166 entering vehicles and 98 exiting vehicles (**Table 13**). The Traffic Study included in **Appendix G** provides a full description and analysis of the peak hour traffic and traffic recommendations.

Table 12. Project Trip Generation Estimates

Land Use	ITE Code	No. of Units	Daily Trips	AM Peak Hour Trips			PM Peak Hour Trips		
				In	Out	Total	In	Out	Total
Single-family homes/Detached Townhomes	210	270	2,593	49	147	196	166	98	264
Total			2,593	49	147	196	166	98	264

Availability of Transit and Alternative Transportation

Metro Transit provides transit services to the City of Ramsey. The nearest transit facility is a transit stop and North Star Commuter Train Station, 4 miles south of site.

Anoka County Transit provides Transit Link dial-a-ride transit service in conjunction with Metropolitan Council. This is a public transportation service that operates using accessible buses where regular fixed-route transit is unavailable.

Metro Mobility service is also available in Anoka County. This is a shared public transportation service for certified riders who are unable to used regular fixed-route bus due to a disability or health condition.

Trails and sidewalks provide another alternative approach for local travel. The project will include sidewalks along some residential streets and trails that link to the Trott Brook Recreational Trail which runs along the southern border of the property.

b. *Discuss the effect on traffic congestion on affected roads and describe any traffic improvements necessary. The analysis must discuss the project's impact on the regional transportation system. If the peak hour traffic generated exceeds 250 vehicles or the total daily trips exceeds 2,500, a traffic impact study must be prepared as part of the EAW. Use the format and procedures described in the Minnesota Department of Transportation's Access Management Manual, Chapter 5 (available at: http://www.dot.state.mn.us/accessmanagement/resources.html) or a similar local guidance.*

SSTS documented existing conditions of the nearby roadways with a field inventory during the week of July 25, 2021. The study focused on the following intersections:

1. Variolite Street NW and Alpine Drive
2. Variolite Street NW and 161st Avenue NW

3. Variolite Street NW and 173rd Avenue NW
4. Nowthen Boulevard NW and Ramsey Boulevard NW
5. Nowthen Boulevard NW and 167th Avenue NW
6. Nowthen Boulevard NW and 173rd Avenue NW
7. Nowthen Boulevard NW and 175th Avenue NW

Peak hour turning movement counts were conducted at the above intersections on July 28th, 2021 and indicate the AM peak hour occurs at 7:00 AM – 8:00 AM, and the PM peak hour occurs at 4:30 PM to 5:30 PM.

SSTS analyzed intersection operations using Synchro/Simtraffic, 11th Edition for the 2026 Build out year and for the 2040 Planning Horizon year. There are no improvement projects planned for the study area roadways and none were assumed for the No-Build or Build conditions.

Effects on Traffic and Roadways

The results of the analysis show that all intersections are expected to operate at acceptable LOS C or better with manageable vehicle queues for both the No-Build and Build conditions. However, the eastbound movement at the intersection of Ramsey Boulevard NW and Nowthen Boulevard NW will experience long delays during the 2040 PM peak time. Preliminary review of Peak Hour signal warrants and roundabout suggest they may be satisfied in the 2040 timeline. Further, preliminary safety analysis indicates this intersection has a higher crash rate than similar intersections in Minnesota. It is suggested this intersection be monitored to determine if safety improvements or traffic control changes should occur by 2040. Details are included in **Appendix G**.

c. Identify measures that will be taken to minimize or mitigate project related transportation effects.

As mentioned, the traffic analysis considered full build out by 2026 and evaluated conditions in 2026 and 2040. It is recommended 173rd Avenue NW include a dedicated right turn lane at its intersection with Nowthen Boulevard NW, and that the new intersection at 170th Avenue NW and Variolite Street NW include a northbound right turn lane and a southbound left turn by-pass lane. No other improvement or mitigation are necessary to provide adequate operations at the study area intersections. The site access is already provided with a northbound left turn by-pass lane and southbound right turn lanes from Nowthen Boulevard NW, and similar geometrics (northbound designated right turn lane and southbound left turn by-pass lane) are planned for the new access intersection to Variolite Street NW. The transportation system serving the area will have sufficient capacity to include traffic from the proposed project as well as other anticipated projects.

19. Cumulative Potential Effects

Preparers can leave this item blank if cumulative potential effects are addressed under the applicable EAW Items.

a. Describe the geographic scales and timeframes of the project related environmental effects that could combine with other environmental effects resulting in cumulative potential effects.

It is anticipated that the project area will develop over approximately the next seven years, but the actual timing of development could vary depending on the demand for housing and market conditions. Fourteen other projects proposed in the City of Ramsey are expected to develop during this time period. These projects and their geographic locations are described under **Item 19.b** below.

b. Describe any reasonably foreseeable future projects (for which a basis of expectation has been laid) that may interact with environmental effects of the proposed project within the geographic scales and timeframes identified above.

The City of Ramsey is reviewing and has recently approved other development projects that are located within 3.6 miles from the Trott Brook Crossing development site (**Table 13**). These projects include single-family homes, industrial buildings and commercial buildings. Projects in close proximity to Trott Brook Crossing could potentially interact to result in cumulative effects.

Table 13. Other Projects in the City of Ramsey

Name	Description	Status	Distance/Direction from Trott Brook Crossing
Williams Woods	9 rural residential homes	Under review	0.25 miles north
Hunt Property	79 single-family homes	Under review	Adjacent to the northeast portion of Trott Brook Crossing
Knoll Properties 2nd Addition	65,000 square foot industrial building with planned 52,000 square foot second phase	Under review	3.6 miles south
Riverstone South	243 single-family homes	Under review	2.8 miles southwest
Storyteller Café	6,892 square foot mixed use building	Approved	2.9 miles south
Garden View Villas	18 single-family homes	Approved	2.4 miles south
Bunker Lake Industrial Park	Multi-phase industrial park	Approved	2.8 miles south
GiGi's Salon and Spa	9,706 sf commercial building	Approved	2.6 miles south
Northfork Meadows	88 single-family homes	Approved	2.3 miles southwest
O'Reilly Auto Parts – Java Properties	7,453 sf commercial building	Approved	2.9 miles south
Oppidan Industrial Proposal	3 building industrial project	Approved	2.5 miles south
The Preserve at Northfork	29 single-family homes and 61 villa homes	Approved	2.7 miles southwest
Ramsey Villas North	3 single-family homes	Approved	3.4 miles southeast
West Armstrong Retail	15,000 square foot multi-tenant retail	Approved	2.8 miles south

c. Discuss the nature of the cumulative potential effects and summarize any other available information relevant to determining whether there is potential for significant environmental effects due to these cumulative effects.

Reasonably foreseeable future projects may combine with the proposed project to result in cumulative effects on municipal infrastructure and natural resources. The potential for cumulative

effects varies with the type of resource affected and the geographic area of impact. Geographic separation between projects serves to reduce the potential for cumulative effects.

Potential cumulative effects on public infrastructure relate to municipal water supply systems, sanitary sewer conveyance and treatment systems, stormwater management systems, and traffic and transportation systems. The City of Ramsey has planned for continued growth and expanded infrastructure system capacity to address these effects and serve anticipated future projects. The City of Ramsey will consider the timing and staging of other development proposals within the context of the Comprehensive Plan and related growth management tools. Cumulative effects on public infrastructure are not expected to be significant.

Potential cumulative effects of known and anticipated future projects on natural resources depend on the type, density, and location of future developments. Effects on natural resources such as wetlands and wildlife habitat vary with project location and biological diversity. Project effects on natural resources may combine with effects of nearby concurrent projects to result in subtle local cumulative effects, such as habitat fragmentation. Requirements for stormwater management and erosion and sediment control are expected to minimize cumulative effects of post-development runoff on downstream waters. Policies and regulations of the City of Ramsey, the Lower Rum River Watershed Management Organization, and other government agencies require the stormwater mitigation measures discussed in this EAW. These mitigation measures will minimized potential cumulative effects on the environment.

The project will contribute to and be affected by cumulative effects related to climate change. In Minnesota, climate change has already caused increased extreme heat, large precipitation events, flooding, annual precipitation, and growing season days. These trends will continue and increase until climate change is reversed. Effects of climate change on future project area residents could include flooding; increased maintenance of roadways, storm sewers, and drainage routes; increased human heat stress and health issues, high pollen counts; and decreased need for irrigation. Increased heat could also affect construction practices such as roofing and outdoor activities such as summer and winter sports. Snow skiing and snowmobiling could be impacted due to lack of snow and warmer temperatures. Undesirable pests such as deer ticks and fungal infections could increase as a result of climate change. Some climate change impacts, such as extreme drought, coastal flooding, and shortages of food and water, are expected to affect other parts of the planet more severely than the project area.

Climate change impacts are incremental and cumulative in nature. Just as the project will be impacted by climate change, the project will also make an incremental contribution to climate change impacts through the emission of greenhouse gases.

20. Other Potential Environmental Effects

If the project may cause any additional environmental effects not addressed by items 1 to 19, describe the effects here, discuss the how the environment will be affected, and identify measures that will be taken to minimize and mitigate these effects.

No other additional environmental effects are anticipated as a result of development of the project area. All potential environmental effects have been addressed in **Items 1** through **19**.

RGU CERTIFICATION.

(The Environmental Quality Board will only accept SIGNED Environmental Assessment Worksheets for public notice in the EQB Monitor.)

I hereby certify that:

- *The information contained in this document is accurate and complete to the best of my knowledge.*
- *The EAW describes the complete project; there are no other projects, stages or components other than those described in this document, which are related to the project as connected actions or phased actions, as defined at Minnesota Rules, parts 4410.0200, subparts 9c and 60, respectively.*
- *Copies of this EAW are being sent to the entire EQB distribution list.*

Signature _____ Date _____

Title _____

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Figures 1 – 7

Trott Brook Crossing EAW

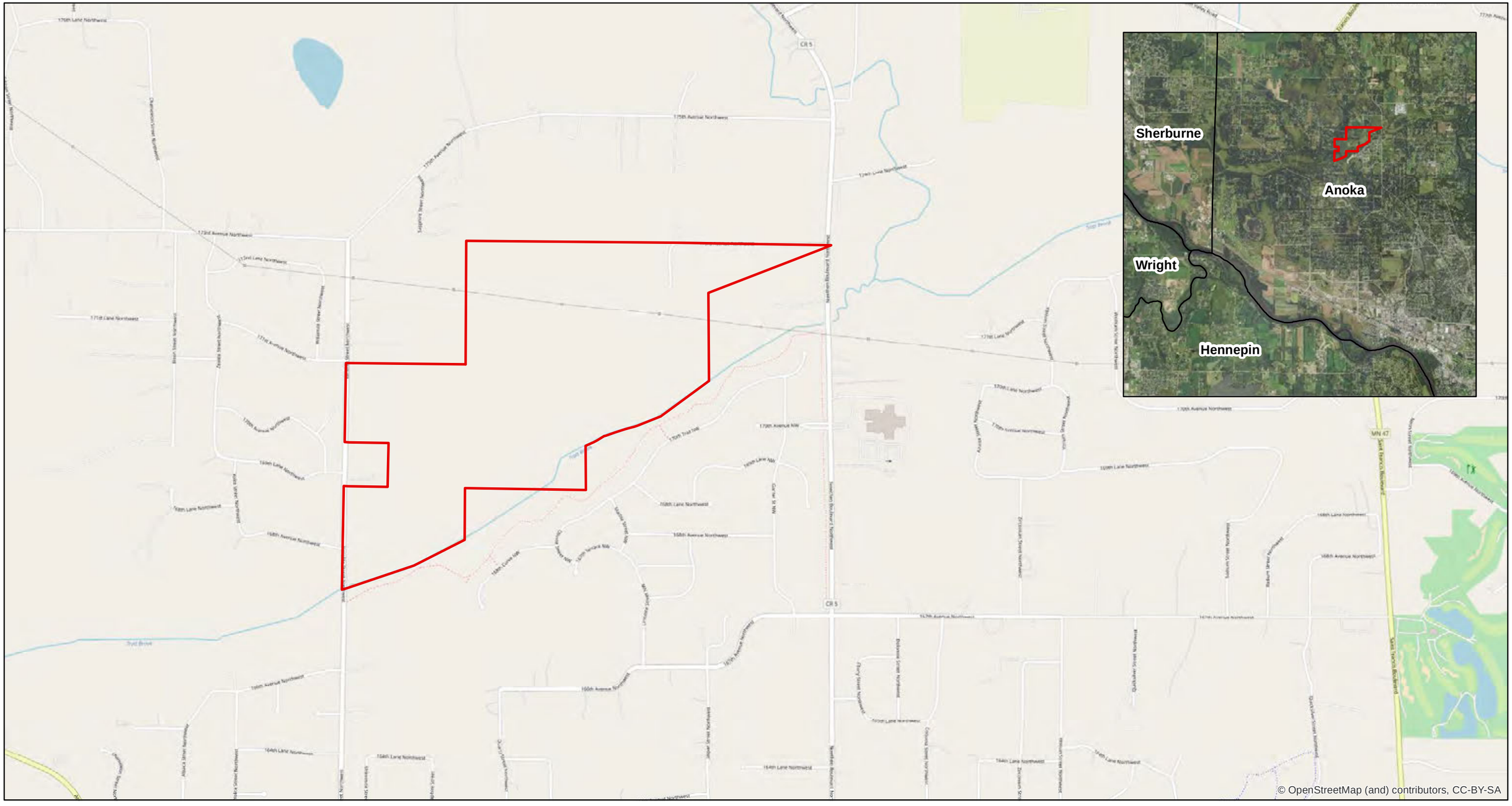

Figure 1 - Site Location

N

0 1,000 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: ESRI Streets and NatGeo Basemaps

Project Boundary

Trott Brook EAW (KES 2021-109)
Ramsey, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.

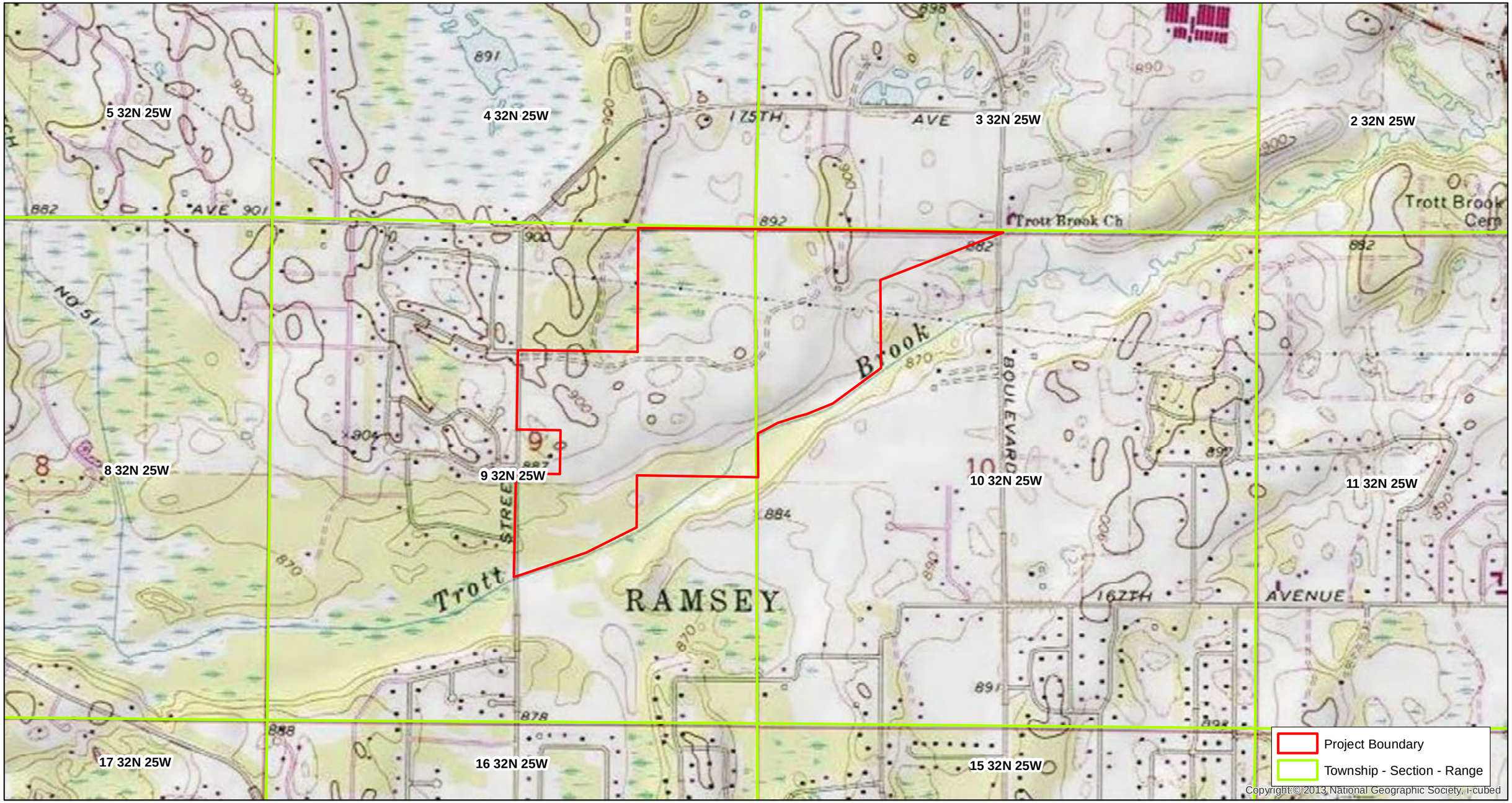

Figure 2 - USGS Topography

N

0 1,000 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MNGEO, USGS

Trott Brook EAW (KES 2021-109)
Ramsey, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.

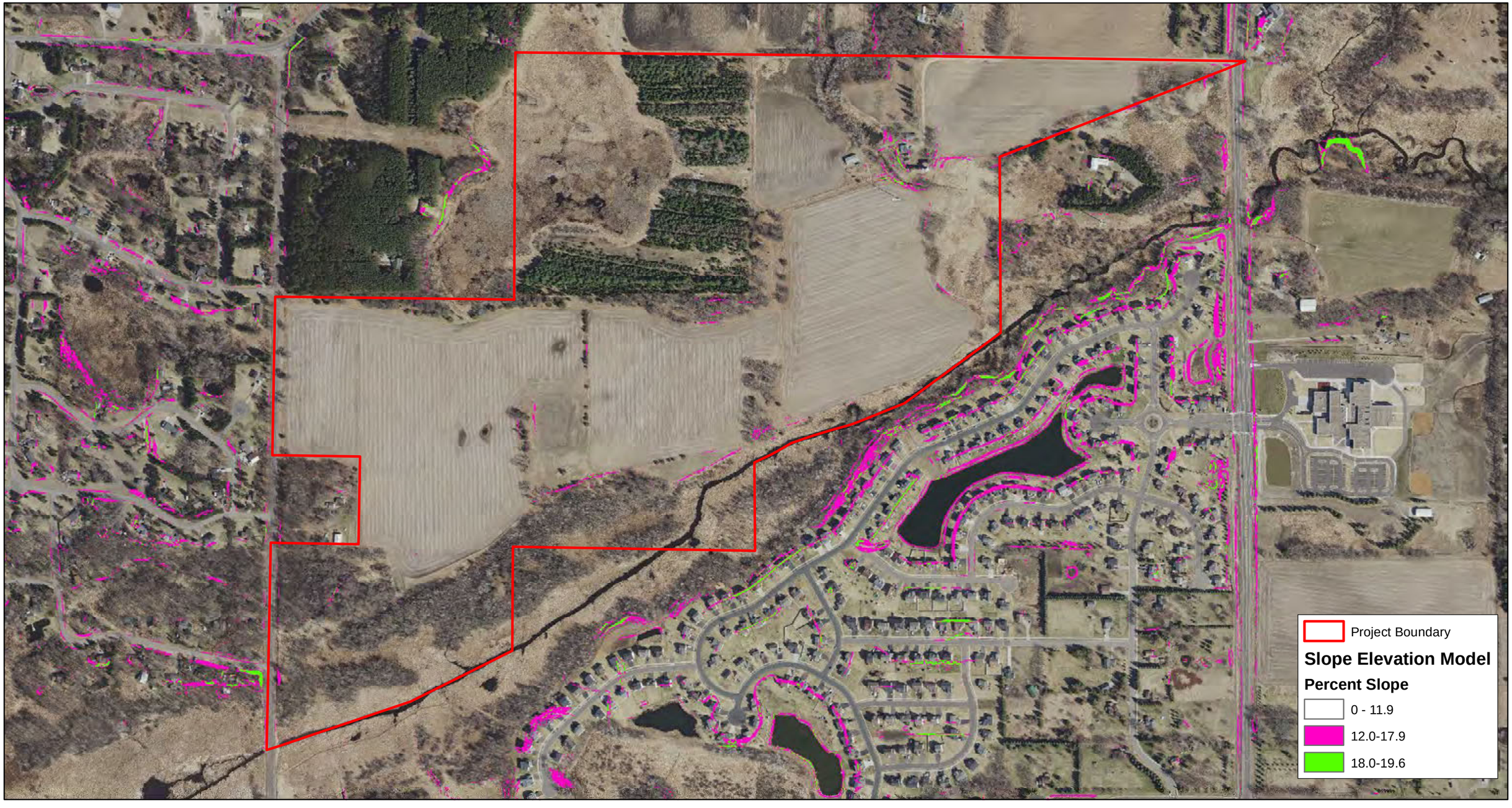

Figure 3 - Slopes

N

0 500 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MNGEO

Trott Brook EAW (KES 2021-109)
Ramsey, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.

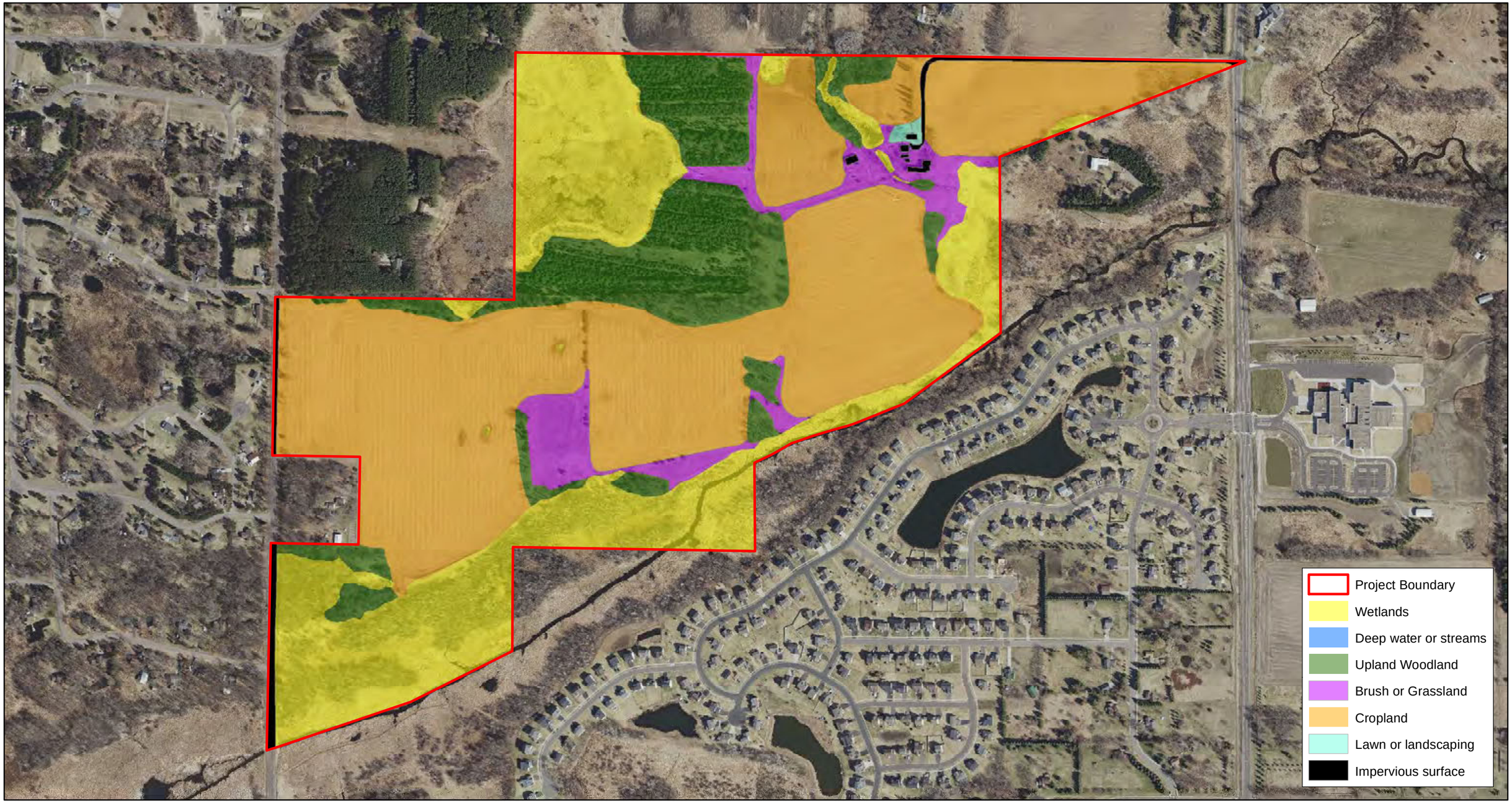

Figure 4 - Existing Cover Types

N

0 500 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MNGEO

Trott Brook EAW (KES 2021-109)
Ramsey, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.

Figure 5 - Surrounding Land Use

N

0 1,000 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MNGEO

Trott Brook EAW (KES 2021-109)
Ramsey, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.

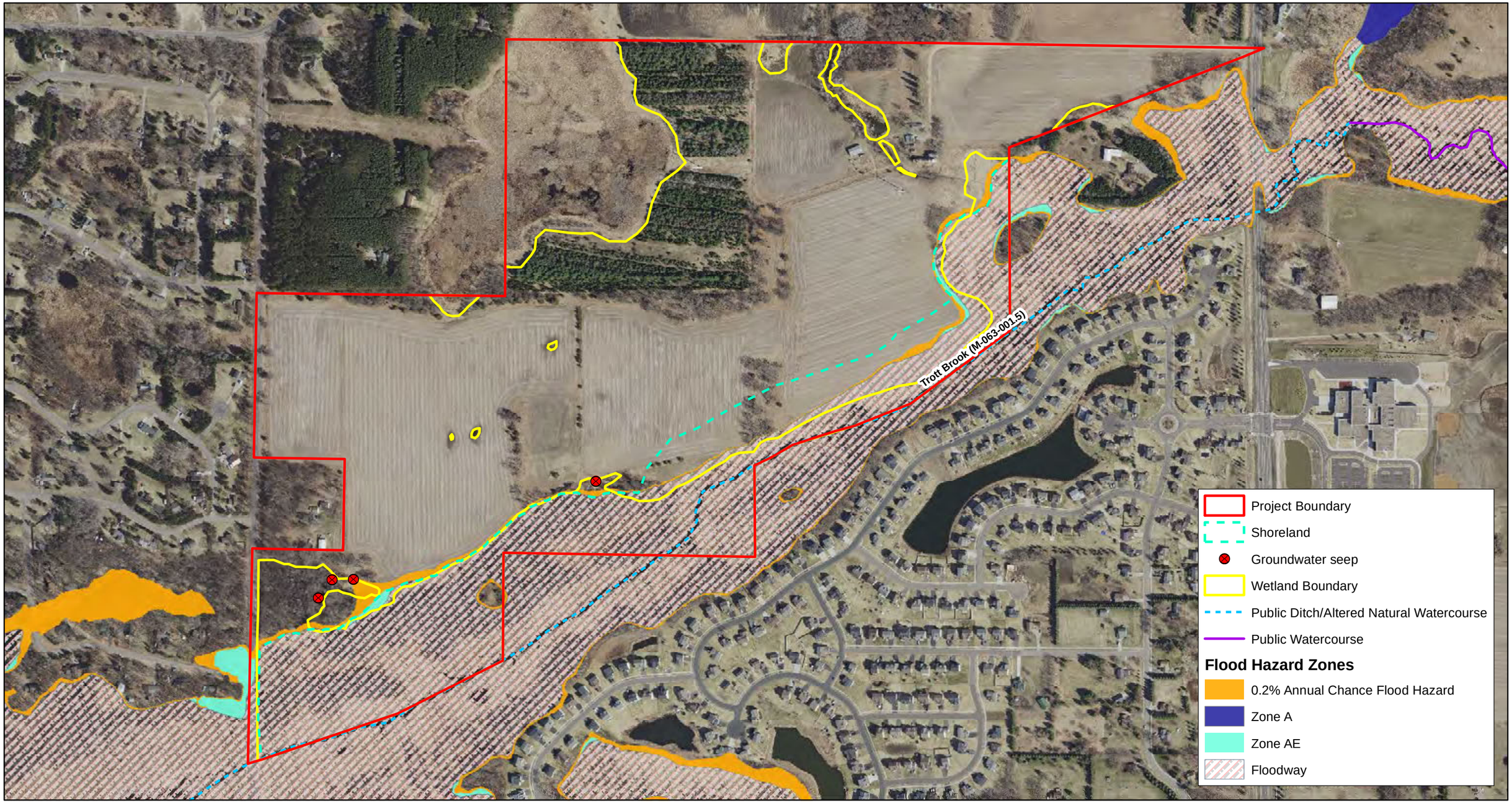

Figure 6 - Floodplain, Wetlands, Shoreland, DNR Public Waterways

N

0 500 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MNGEO, FEMA

Trott Brook EAW (KES 2021-109)
Ramsey, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.

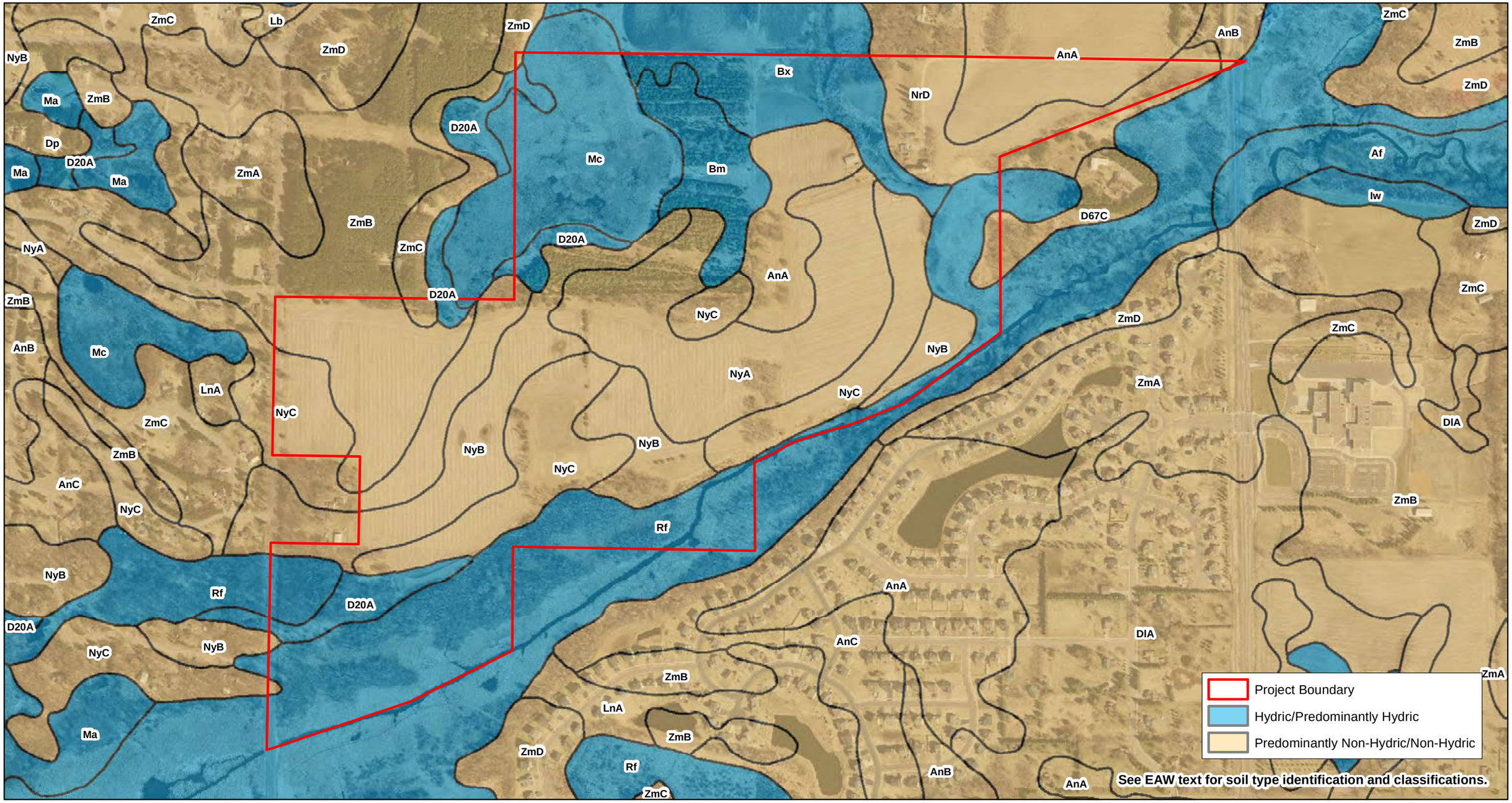

Figure 7 - Soil Types

N

0 500 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MNGEO, Web Soil Survey

Trott Brook EAW (KES 2021-109)
Ramsey, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.

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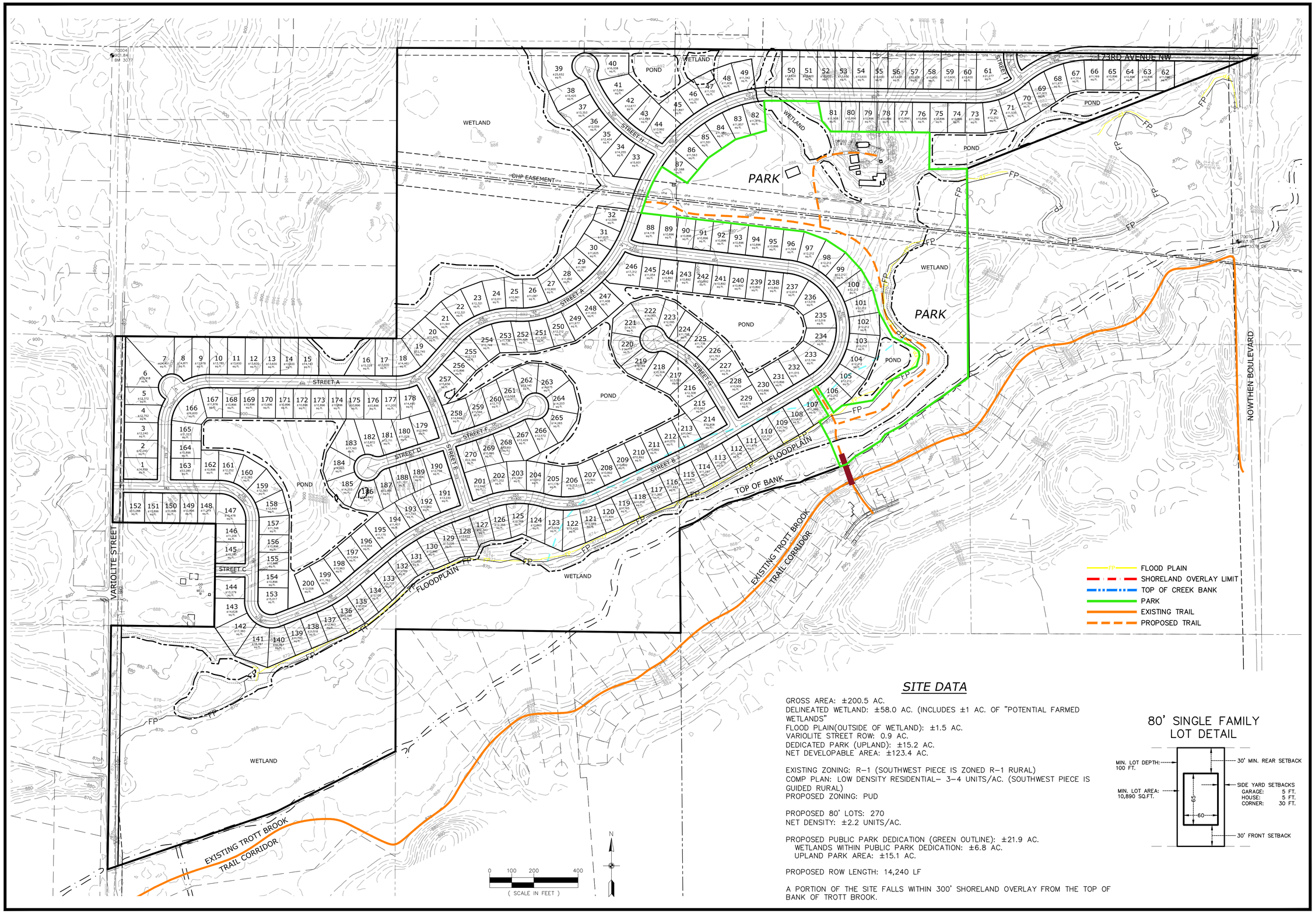
Appendix A
Site Concept Plan

Trott Brook Crossing EAW



SITE DATA

GROSS AREA: ±200.5 AC.
DELINEATED WETLAND: ±58.0 AC. (INCLUDES ±1 AC. OF "POTENTIAL FARMED WETLANDS"
FLOOD PLAIN(OUTSIDE OF WETLAND): ±1.5 AC.
VARIOLITE STREET ROW: 0.9 AC.
DEDICATED PARK (UPLAND): ±15.2 AC.
NET DEVELOPABLE AREA: ±123.4 AC.

EXISTING ZONING: R-1 (SOUTHWEST PIECE IS ZONED R-1 RURAL)
COMP PLAN: LOW DENSITY RESIDENTIAL- 3-4 UNITS/AC. (SOUTHWEST PIECE IS GUIDED RURAL)
PROPOSED ZONING: PUD

PROPOSED 80' LOTS: 270
NET DENSITY: ±2.2 UNITS/AC.

PROPOSED PUBLIC PARK DEDICATION (GREEN OUTLINE): ±21.9 AC.
WETLANDS WITHIN PUBLIC PARK DEDICATION: ±6.8 AC.
UPLAND PARK AREA: ±15.1 AC.

PROPOSED ROW LENGTH: 14,240 LF

A PORTION OF THE SITE FALLS WITHIN 300' SHORELAND OVERLAY FROM THE TOP OF BANK OF TROTT BROOK.

80' SINGLE FAMILY LOT DETAIL

CARLSON McCAIN
ENGINEERING
SURVEYING
ENVIRONMENTAL
3890 PHEASANT RIDGE DRIVE NE, SUITE 100, BLAINE, MN 55449
TEL 763.489.7900 \ FAX 763.489.7959 \ CARLSONMCCAIN.COM

CONCEPT PLAN

TROTT BROOK PROPERTY
Ramsey, Minnesota

SONTARRA, LLC
1660 Hwy 100 South, Suite 400
St. Louis Park, Minnesota 55416

REVISIONS
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Appendix B
Wetland Delineation Report

Trott Brook Crossing EAW

Trott Brook North Property

Ramsey, Anoka County, Minnesota

Wetland Delineation Report

Prepared for

TEG Land Holdings, LLC

by

Kjolhaug Environmental Services Company, Inc.
(KES Project No. 2021-108)

July 26, 2021

Trott Brook North Property

Ramsey, Anoka County, Minnesota

Wetland Delineation Report

TABLE OF CONTENTS

FIGURES

APPENDICES

Trott Brook North Property

Ramsey, Anoka County, Minnesota

Wetland Delineation Report

1. WETLAND DELINEATION SUMMARY

- The 197.12-acre Trott Brook North site was inspected on June 2, 2021 for the presence and extent of wetland.
- The National Wetlands Inventory (NWI) map showed two PEM1Af wetlands, one PEM1C/PFO1A/PEM1A wetland, one PEM1Ad/PABG wetland and one R2UBFx/PFO1A/d/PEM1Cd/PSS1A/PABG wetland complex within site boundaries.
- The soil survey showed Blomford, Brickton, Isan-Isan, Marsh, and Rifle as the mapped hydric soil types within site boundaries.
- The DNR Public Waters Inventory showed DNR Public Wetland 2-319W (unnamed) within site boundaries, and Trott Brook (DNR Public Ditch/Altered Natural Watercourse M-063-001.5) along the much of the south site boundary.
- The National Hydrography Dataset showed one Lake/Pond surface water feature within site boundaries and one Stream/River along much of the south site boundary.
- Eight (8) wetlands were delineated onsite as summarized in **Table 3** on **Page 6** of this report.

2. OVERVIEW

The 197.12-acre Trott Brook North site was inspected on June 2, 2021 for the presence and extent of wetland. The property was located in Sections 9 & 10, Township 32 North, Range 25 West, City of Ramsey, Anoka County, Minnesota. The site was located south of 173rd Ave NW, west of Nowthen Boulevard NW, and east of Variolite St NW (**Figure 1**). The property corresponded to the Anoka County PIDs listed in **Table 1 on the following page**.

A farmstead was located in the northcentral portion of the site, and a mining area was located in the southcentral portion of the site. The majority of the site was cropland planted to corn for the 2021 growing season, and a mature pine plantation was located in the northwest portion of the site. Trott Brook was located along the south site boundary and was bordered by wooded/scrub-shrub floodplain.

Table 1. Site PIDs - Trott Brook North

Parcel ID	Address	Size (ac)
10-32-25-21-0002	--	7.01
10-32-25-22-0002	7040 173rd Ave NW	7.46
10-32-25-22-0003	--	48.74
09-32-25-11-0001	--	38.3
09-32-25-14-0001	--	38.78
09-32-25-13-0001	--	32.69
09-32-25-42-0003	--	24.14
Total		**197.12**

Eight (8) wetlands were delineated within the site boundaries. The delineated wetland boundaries and existing conditions are shown on **Figure 2**. Figure 2 does not represent and official survey.

Appendix A of this report includes a Joint Application Form for Activities Affecting Water Resources in Minnesota, which is submitted in request for: (1) a wetland boundary and type determination approval from the Lower Rum River WMO under the Minnesota Wetland Conservation Act (WCA), and (2) delineation concurrence under Section 404 of the Federal Clean Water Act from the U.S. Army Corps of Engineers (USACE) along with Approved Jurisdictional Determinations (AJDs) for Wetlands 1, 2, 3, 7, 7A, 7b, and 8 and the ephemeral gully.

3. METHODS

Wetlands were identified using the Routine Determination method described in the Corps of Engineers Wetlands Delineation Manual (Waterways Experiment Station, 1987) and the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region (Version 2.0) as required under Section 404 of the Clean Water Act and the Minnesota Wetland Conservation Act.

Wetland boundaries were identified as the upper-most extent of wetland that met criteria for hydric soils, hydrophytic vegetation, and wetland hydrology. Wetland-upland boundaries were marked with pin flags that were subsequently located by surveyors with Carlson McCain. Figure 2 does not constitute an official survey product.

Soils, vegetation, and hydrology were documented at a representative location along the wetland-upland boundary. Plant species dominance was estimated based on the percent aerial or basal coverage visually estimated within a 30-foot radius for trees and vines, a 15-foot radius for the shrub layer, and a 5-foot radius for the herbaceous layer within the community type sampled.

Soils were characterized to a minimum depth of 24 inches (unless otherwise noted) using a Munsell Soil Color Book and standard soil texturing methodology. Hydric soil indicators used are from Field Indicators of Hydric Soils in the United States (USDA Natural Resources

Conservation Service (NRCS) in cooperation with the National Technical Committee for Hydric Soils, Version 8.1, 2017).

Mapped soils are separated into five classes based on the composition of hydric components and the Hydric Rating by Map Unit color classes utilized on Web Soil Survey. The five classes include Hydric (100 percent hydric components), Predominantly Hydric (66 to 99 percent hydric components), Partially Hydric (33 to 65 percent hydric components), Predominantly Non-Hydric (1 to 32 percent hydric components), and Non-Hydric (less than one percent hydric components).

Plants were identified using standard regional plant keys. Taxonomy and indicator status of plant species was taken from the 2018 National Wetland Plant List (U.S. Army Corps of Engineers 2018. National Wetland Plant List, version 3.3, Engineer Research and Development Center, Cold Regions Research and Engineering Laboratory, Hanover, NH).

4. RESULTS

4.1 Review of NWI, Soils, Public Waters, and NHD Information

The National Wetlands Inventory (NWI) (Minnesota Geospatial Commons 2009-2014 and U.S. Fish and Wildlife Service) showed two PEM1Af wetlands, one PEM1C/PFO1A/PEM1A wetland, one PEM1Ad/PABG wetland and one R2UBFx/PFO1A/d/PEM1Cd/PSS1A/PABG wetland complex within site boundaries (**Figure 3**).

The Soil Survey (USDA NRCS 2015) showed Blomford, Brickton, Isan-Isan, Marsh, and Rifle as the mapped hydric soil types within site boundaries. Soil types mapped on the property are listed in **Table 2** and a map showing soil types is included in **Figure 4**.

Table 2. Soil types mapped on the Trott Brook North site.

Symbol	Soil Name	Acres	% of Area	% Hydric	Hydric Category
AnA	Anoka loamy fine sand, 0 to 2 percent slopes	16.4	8.20%	0	Not Hydric
AnB	Anoka loamy fine sand, 2 to 6 percent slopes	0	0.00%	0	Not Hydric
Bm	Blomford loamy fine sand	8.4	4.20%	95	Predominantly Hydric
Bx	Brickton silt loam	12	6.00%	93	Predominantly Hydric
D20A	Isan-Isan, frequently ponded, complex, 0 to 2 percent slopes	6.4	3.20%	95	Predominantly Hydric
D67C	Hubbard loamy sand, 2 to 12 percent slopes	1.1	0.50%	0	Not Hydric
D90B	Nymore loamy sand, 1 to 6 percent slopes	22.5	11.20%	3	Predominantly Non-Hydric
Mc	Marsh	16	8.00%	100	Hydric
NrD	Nymore loamy coarse sand, 12 to 25 percent slopes	9.8	4.90%	0	Not Hydric

Table 2. Soil types mapped on the Trott Brook North site.

Symbol	Soil Name	Acres	% of Area	% Hydric	Hydric Category
NyA	Nymore loamy sand, 0 to 2 percent slopes	26.9	13.40%	0	Not Hydric
NyB	Nymore loamy sand, 1 to 6 percent slopes	34	17.00%	0	Not Hydric
NyC	Nymore loamy sand, 6 to 12 percent slopes	34	17.00%	0	Not Hydric
Rf	Rifle mucky peat	32.9	16.40%	100	Hydric
ZmB	Zimmerman fine sand, 1 to 6 percent slopes	13	6.50%	2	Predominantly Non-Hydric
ZmC	Zimmerman fine sand, 6 to 12 percent slopes	0.6	0.30%	4	Predominantly Non-Hydric
ZmD	Zimmerman fine sand, 12 to 24 percent slopes	0	0.00%	2	Predominantly Non-Hydric

The Minnesota DNR Public Waters Inventory (Minnesota Department of Natural Resources 2015) showed DNR Public Wetland 2-319W (unnamed) within site boundaries, and Trott Brook (DNR Public Ditch/Altered Natural Watercourse M-063-001.5) along the much of the south site boundary (**Figure 5**).

The National Hydrography Dataset (U.S. Geological Survey 2015) showed one Lake/Pond surface water feature within site boundaries and one Stream/River along much of the south site boundary (**Figure 6**).

4.2 Wetland Determinations and Delineations

Potential wetlands were evaluated during field observations on June 2, 2021. Eight (8) wetlands were identified and delineated on the property (**Figure 2**). Corresponding data forms are included in **Appendix B**. The following description of the wetlands and their adjacent upland reflects conditions observed at the time of the field visit. At that time, the crop field had been planted to corn and vegetation was actively growing in natural areaa on the site. Precipitation conditions were normal (typical) based on the three-month antecedent precipitation data and drier than the normal range based on the 30-day rolling total (**Appendix C**). Delineated wetland characteristics are summarized in **Table 3** (**see page 6**).

4.3 Aerial Review for Offsite Hydrology Determinations

Methods

Areas in agricultural cropland that exhibited potential wetland signatures on aerial photography and with low or depressional topography were reviewed generally following methods described in Using Aerial Imagery to Assess Wetland Hydrology (Minnesota Board of Water and Soil Resources (BWSR) 2010) and Guidance for Submittal of Delineation Reports to the St. Paul District Corps of Engineers and Wetland Conservation Act Local Governmental Units in Minnesota, Version 2.0 (USACE 2015).

Table 3. Summary of Delineated Wetlands - Trott Brook North, Ramsey

WL ID	Wetland Area (acres)	Circular 39	Cowardin	Eggers and Reed	Vegetation	Adjacent Upland Vegetation	Observed Drainage Features	Observed Hydrology Indicator/s	Mapped NWI Wetland	Wetland Mapped Soil Type & Observed Hydric Indicator
1	0.03	Type 1	PEMAf	Farmed, seasonally flooded basin	Sparse manna grass	Healthy corn	None. Isolated depression surrounded by upland.	Surface soils cracks; Geomorphic position & FAC-Neutral Test; offsite hydrology signatures Area E 100% normal years	PEM1Af	Nymore loamy sand; redox dark surface
2	0.03	Type 1	PEMAf	Farmed, seasonally flooded basin	Healthy corn with ag weeds (yellow rocket, cinquefoil)	Healthy corn	None. Isolated depression surrounded by upland.	Water at 6"; Geomorphic position & FAC-Neutral Test; offsite hydrology signatures Area D 100% normal years	--	Nymore loamy sand; redox dark surface
3	0.006	Type 1	PEMAf	Farmed, seasonally flooded basin	Sparse groundsel	Healthy corn	None. Isolated depression surrounded by upland.	Surface soils cracks; Geomorphic position & FAC-Neutral Test; offsite hydrology signatures Area F 100% normal years	PEM1Af	Nymore loamy sand; depleted below dark surface, redox dark surface
4	17.99 (onsite)	Type 3/2/1	PEMC/B/A	Shallow marsh, sedge meadow, and wet meadow	Sedges interior with fringe of cattail and lake sedge, with outer perimeter of reed canary grass	Kentucky bluegrass, smooth brome and cedar trees with lesser yarrow, common plantain, asters, and Canada thistle	Wetland extends offsite to west and north	Geomorphic position and FAC-Neutral Test	PEM1C/PEM1A/ PFO1A	Blomford, Marsh, Isan-Isan; depleted below dark surface, redox dark surface
5	38.08 (onsite)	Type 3/2/1/6	PEMC/B/A/ PSS1A/ PFO1A	Shallow marsh, sedge meadow, wet meadow and deciduous forested and scrub-shrub floodplain	Sedge dominated fringe with lesser reed canary grass, transitioning to nanny berry, dogwood, green ash floodplain (see footnote)	Primarily corn; SW upland basswood, red oak, bur oak, common buckthorn, Virginia creeper and honeysuckle	Wetland located along the edge of Trott Brook	Geomorphic position and FAC-Neutral Test; water at surface at seep areas	R2UBFx/PEM1Cd/ PFO1A/PEM1Ad/ PSS1A	Rifle, Isan-Isan; histosol
6	0.31 (onsite)	Type 3/2	PEMC/B	Shallow marsh and wet meadow	Cattail center with reed canary grass fringe with lesser lake sedge, giant goldenrod, and willow shrubs	Pine and spruce canopy with Kentucky bluegrass, Canada goldenrod, smooth brome, Canada goldenrod understory	Wetland connects to offsite wetland bordering Trott Brook	Geomorphic position and FAC-Neutral Test; water at 6 inches	PEM1C/PEM1A/ PFO1A	Nymore transition to Rifle; loamy mucky mineral
7, 7a, 7b	0.96, 0.11, 0.02	Type 5/3/1	PUBGx/ PEMC/PEMA	Excavated shallow open water, shallow marsh, and wet meadow	Open water, cattail, reed canary grass	Quaking aspen, common buckthorn, brome, hog peanut, Virginia creeper, white snakeroot, geranium	Wetland drains to Wetland 5 via ephemeral gully	Geomorphic position and FAC-Neutral Test; ponded water and saturation at soil surface	PABG/PEM1Ad	Brickton; loamy mucky mineral
8	0.43	Type 2/1	PEMB/Af	Wet meadow and seasonally flooded basin (farmed edge)	Cattail, reed canary grass, farmed edge	Healthy corn	None. Isolated depression surrounded by upland.	Surface soils cracks; Geomorphic position & FAC-Neutral Test	--	Brickton silt loam; depleted matrix, redox dark surface
WL5 Footnote	The SW portion of Wetland 5 was a hillslope seep with a canopy of American elm, black ash, yellow birch, basswood, green ash, and paper birch with common buckthorn in the understory. The majority of Wetland 5 was wet meadow next to the floodplain of Trott Brook. Species observed included wood nettle Jack in the pulpit, white snakeroot, sedges, burdock, enchanter's nightshade, sweet cicely, bedstraw, sensitive fern, lady fern, violet, geranium, jewelweed, meadowrue, reed canary grass, manna grass, bugleweed, and horsetail.									

Signatures at locations of potential wetlands on aerial photographs were interpreted and classified using seven codes (**Table 4**).

Table 4. Aerial photograph interpretation codes

Code	Classification
CS	Crop stress
DO	Drowned out
NC	Not cropped
SW	Standing water
WS	Wetland signature
AP	Altered pattern
NV	Normal vegetation

This analysis used only aerial photographs taken following periods of average normal antecedent precipitation within the normal range as determined using the Wetland Delineation Precipitation Data Retrieval tool (Minnesota Climatology Office 2015). This tool classifies antecedent precipitation as Normal (N), Wet (W) or Dry (D) by comparing precipitation during the three months preceding the estimated date of aerial photography to the 30-year average from 1981-2010.

All available Google Earth and MnGEO FSA photo years were assessed for wet/normal/dry climatic conditions using the Wetland Delineation Precipitation Data Retrieval tool as summarized in **Table 5 below**. Based on the results of Table 5, available aerial photographs from the 5 most recent and available normal year photos (2015, 2017, 2018, 2019, and 2020) were used for the offsite hydrology review.

Table 5. Decision matrix for offsite hydrology review.

Source	Photo Date	Date Used for Climate Assessment	Climatic Conditions	Result
Google Earth	10/9/2020	10/9/2020	Normal	Used (1)
Maxar Tech.	10/25/2019	11/1/2019	Wet	Most recent wet year used to ID signature areas
FSA	7/1/2019	7/1/2019	Normal	Used (2)
Google Earth	4/28/2018	5/1/2018	Normal	Used (3)
FSA	8/31/2017	9/1/2017	Normal	Used (4)
Google Earth	4/5/2017	4/5/2017	Dry	Not used, dry conditions
Google Earth	3/11/2016	3/11/2016	Normal	Not used, prior to growing season
FSA	9/15/2015	10/1/2015	Normal	Used (5)

[1] 2019 metadata NA; date of 7-1-2019 assumed.

Results
Six areas showing a wet signature on the 10-25-2020 Maxar Technologies photo (most recent "wet" photo) were included in the review. The locations of ***Area A through Area F*** are shown on **Figure 7**. Photographs for each year of review and the Wetland Hydrology Recording from Aerial Imagery - Recording Form are included in **Appendix D**.

Area A required field verification based on the recording form decision matrix**.** In the field, Area A was a slight depression planted with corn. Other than geomorphic position, no other hydrology indicators were observed. Data sheets for a sample point taken in Area A (SP-A) is included in **Appendix B**. Area A was determined to be non-wetland based on the lack of one primary or two secondary indicators of wetland hydrology and a dominance of upland plant species.

Areas B and C did not require field verification and are not wetland based on the recording form decision matrix. Data sheets for a sample point taken in Areas B and C are included in **Appendix B**. SP-B and SP-C were similar to Area A. These areas were slight depressions planted with corn; however, no hydrology signatures were observed in these areas on normal climatic photos and these areas lacked hydric soil indictors.

Areas D, E, and F did not require field verification and are wetland based on the recording form decision matrix. These areas correspond to Wetlands 2, 1, and 3.

4.4 Other Areas

The NWI map showed ***Area G*** (**Figure 2**) as a horseshoe shaped PEM1A wetland in the south-central part of the site (**Figure 3**). In the field, the NWI mapped wetland was the sloping outer edge of a previously mined area that was higher than the area within the horseshoe shape which was flat. Species within the mined area included pineapple weed, crabgrass, common mullein, Siberian elm saplings, spotted knapweed and yarrow.

A large are mapped with hydric soil (Blomford) was shown to the east of Wetland 4. In the field, this area was a pine plantation that lacked a hydrophytic plant community.

An ephemeral gully was observed at the southern edge of Wetland 7b (**Figure 2**). In the field this feature was a narrow gully, on sloping topography with a parabolic bottom that was partially vegetated except where eroding.

No other depressional areas with hydrophytic vegetation or wetland hydrology were observed on the site. No other areas were shown as hydric soil on the soil survey or as wetland on the NWI map.

4.5 Request for Wetland Boundary and Jurisdictional Determination

Appendix A of this report includes a Joint Application Form for Activities Affecting Water Resources in Minnesota, which is submitted in request for: (1) a wetland boundary and type determination approval from the Lower Rum River WMO under the Minnesota Wetland Conservation Act (WCA), and (2) delineation concurrence under Section 404 of the Federal Clean Water Act from the U.S. Army Corps of Engineers (USACE) along with Approved Jurisdictional Determinations (AJDs) for Wetlands 1, 2, 3, 7, 7A, 7b, and 8 and the ephemeral gully.

5. CERTIFICATION OF DELINEATION

The procedures utilized in the described delineation are based on the U.S. Army Corps of Engineers 1987 Wetlands Delineation Manual as required under Section 404 of the Clean Water Act and the Minnesota Wetland Conservation Act. This wetland delineation and report were prepared in compliance with the regulatory standards in place at the time the work was performed.

Site boundaries indicated on figures within this report are approximate and do not constitute an official survey product.

Delineation completed by: Kyle Uhler, GIS Specialist
Minnesota Certified Wetland Delineator No. 1353

Adam Cameron, Wetland Ecologist
Minnesota Certified Wetland Delineator No. 1321

Will Effertz, Wetland Specialist In Training for Minnesota
Certified Wetland Delineator Certification

Report prepared by: Melissa Lauterbach-Barrett, Wetland Specialist
Minnesota Certified Wetland Delineator No. 1085

Report reviewed by: _____ Date: July 26, 2021

Mark Kjolhaug, Professional Wetland Scientist No. 000845

Trott Brook North Property, Ramsey

Wetland Delineation Report

FIGURES

1. Site Location
2. Existing Conditions
3. National Wetlands Inventory
4. Soil Survey
5. DNR Protected Waters Inventory
6. National Hydrography Dataset
7. Offsite Hydrology Assessment Areas

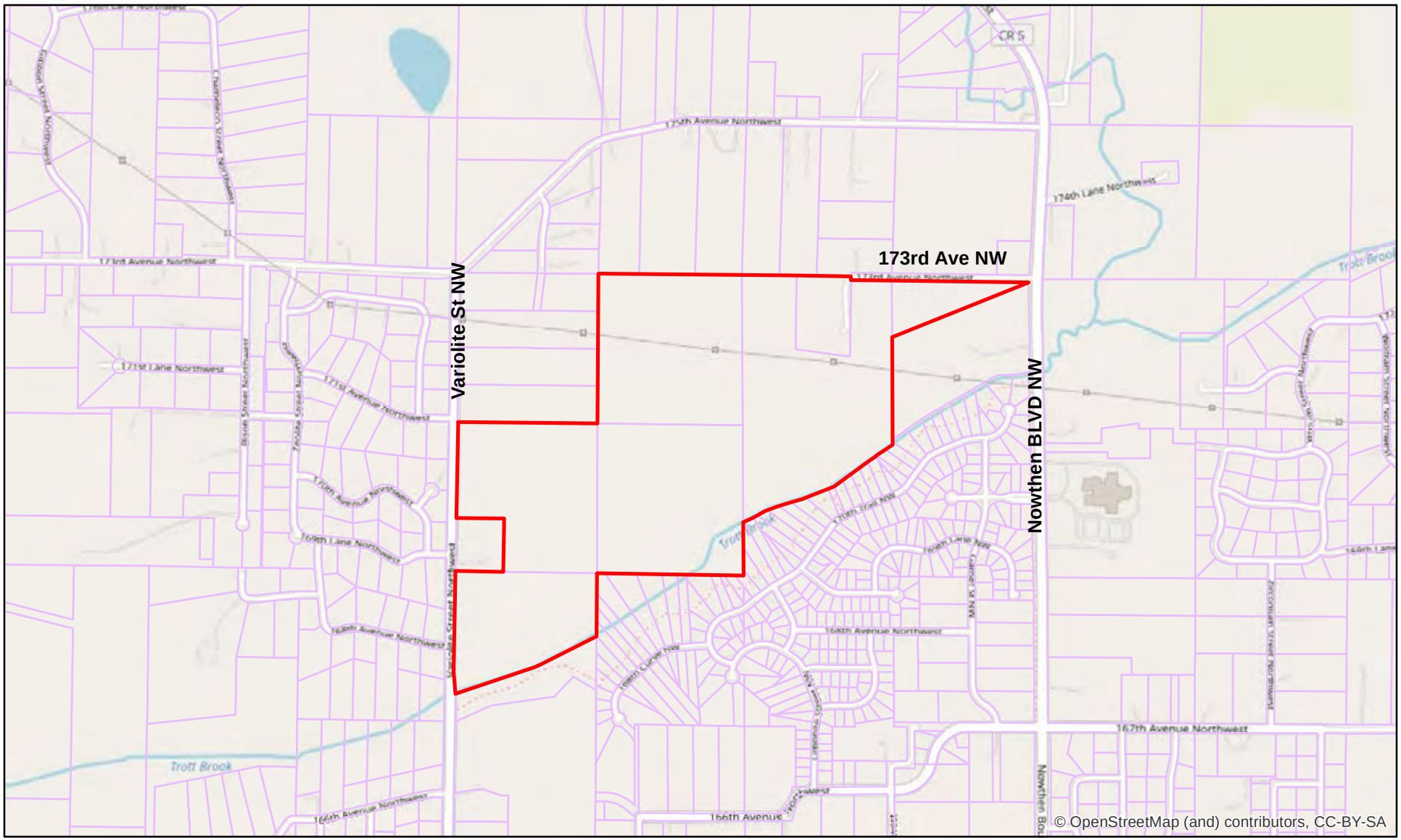


Figure 1 - Site Location

N

0 2,000 Feet

Site Boundary

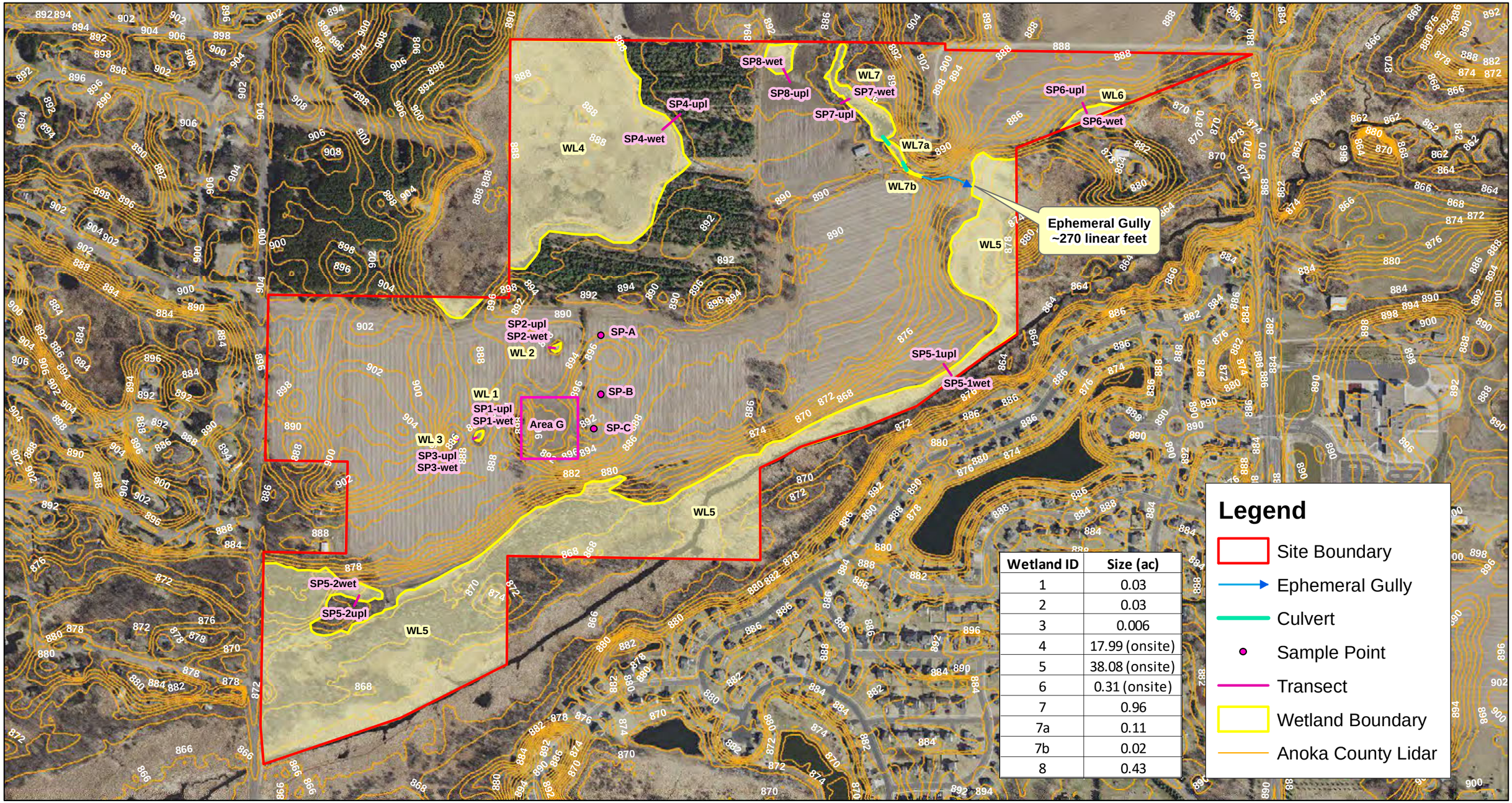
Parcels

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: ESRI Streets Basemap

Trott Brook North Property (KES 2021-108)
Ramsey, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.



Wetland ID	Size (ac)
1	0.03
2	0.03
3	0.006
4	17.99 (onsite)
5	38.08 (onsite)
6	0.31 (onsite)
7	0.96
7a	0.11
7b	0.02
8	0.43

Figure 2 - Existing Conditions (2020 Metro Photo)

N

0 1,500 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Trott Brook North Property (KES 2021-108)
Ramsey, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.

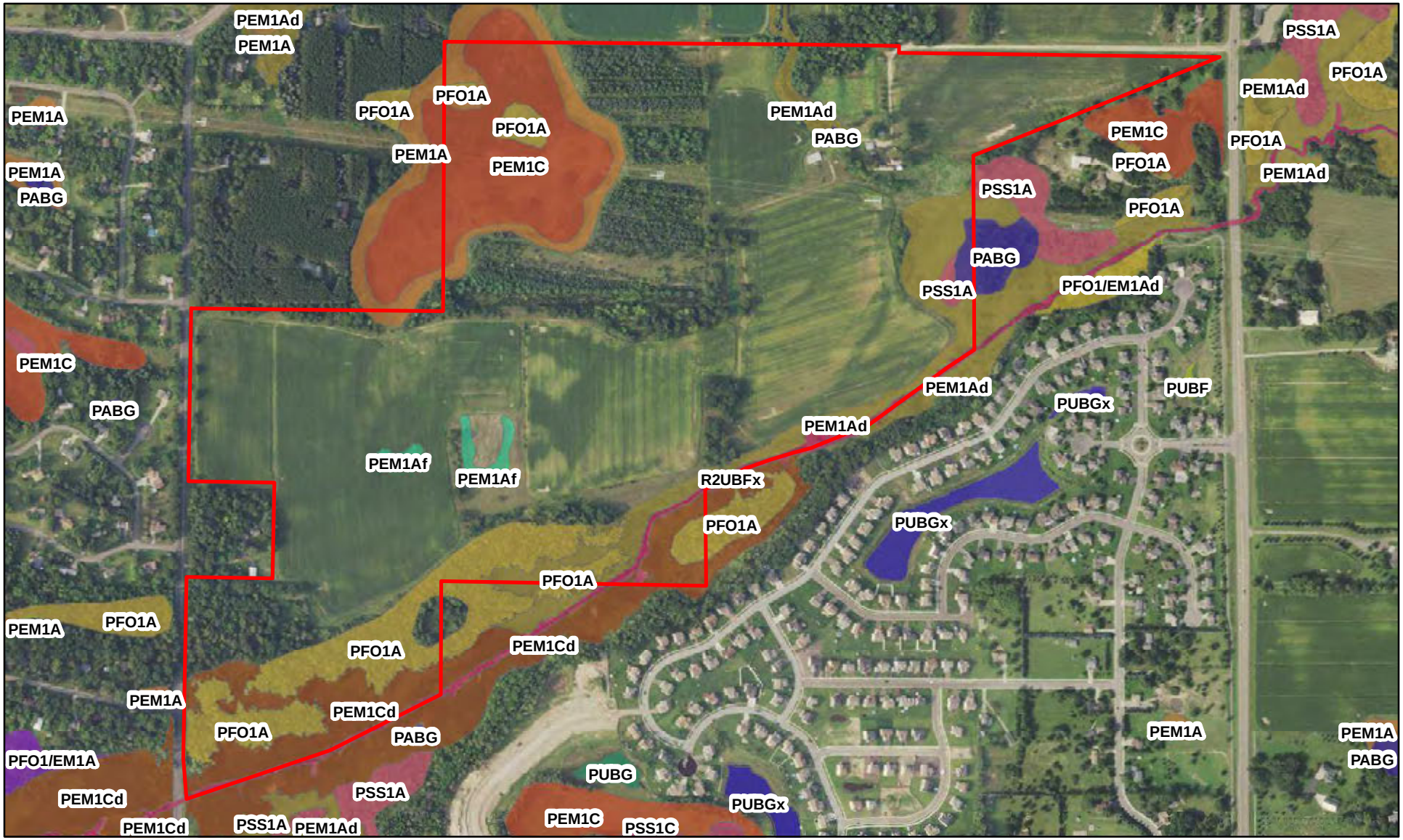


Figure 3 - National Wetlands Inventory

N

0 1,500 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MNGEO Spatial Commons, USFWS

Trott Brook North Property (KES 2021-108)
Ramsey, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.

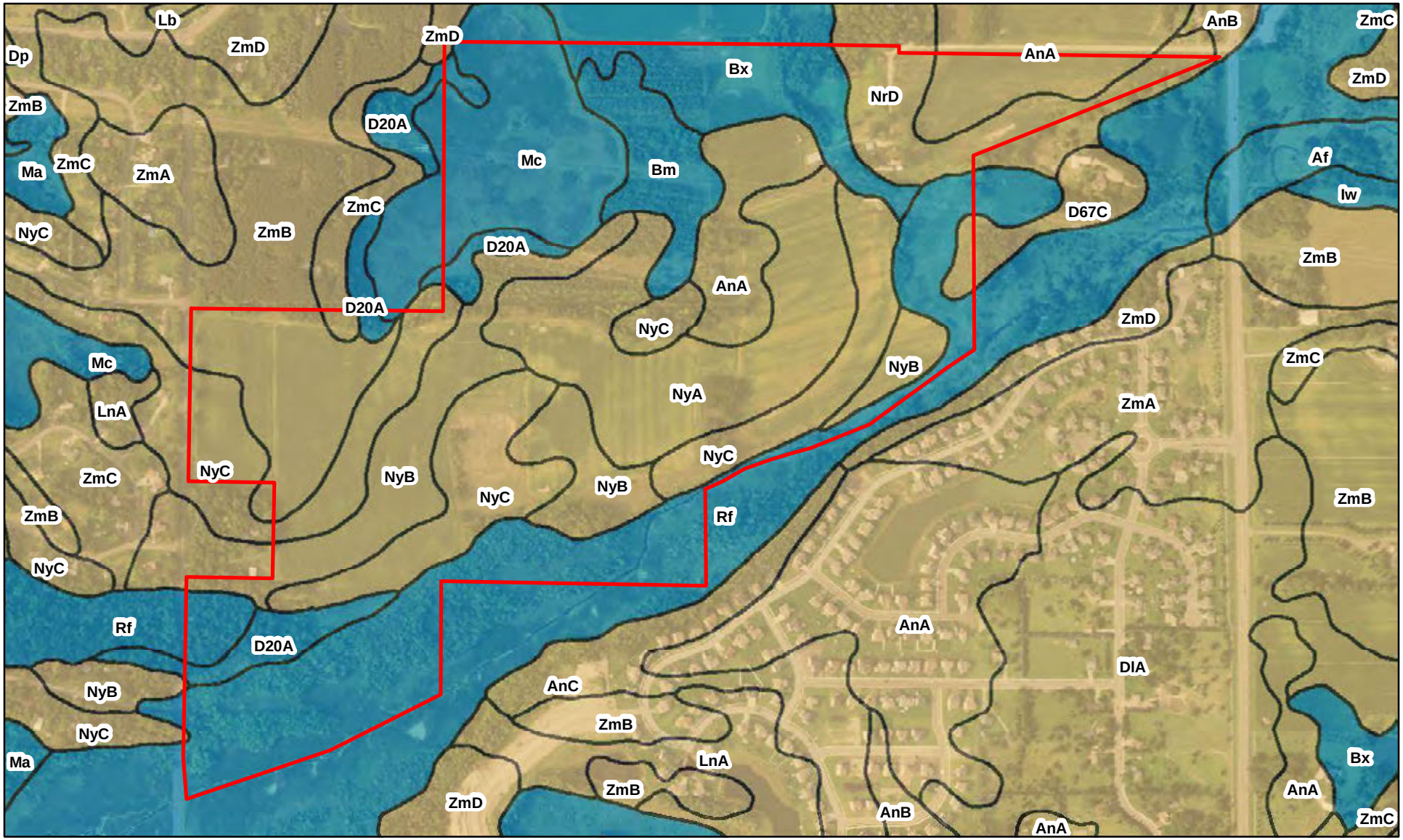


Figure 4 - Soil Survey

N

0 1,500 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MNGEO Spatial Commons, USDA, NRCS

Site Boundary

Hydric/Predominantly Hydric

Predominantly Non-Hydric/Non-Hydric

Trott Brook North Property (KES 2021-108)
Ramsey, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.

Figure 5 - DNR Public Waters Inventory

N

0 1,500 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MNGEO Spatial Commons, MN DNR

Site Boundary

Public Waters

Public Ditch/Altered Natural Watercourse

Trott Brook North Property (KES 2021-108)
Ramsey, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.

Figure 6 - National Hydrography Dataset

N

0 1,500 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MNGEO Spatial Commons, USGS

Site Boundary

Hydro Junction

Stream/River

Lake/Pond

Trott Brook North Property (KES 2021-108)
Ramsey, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.

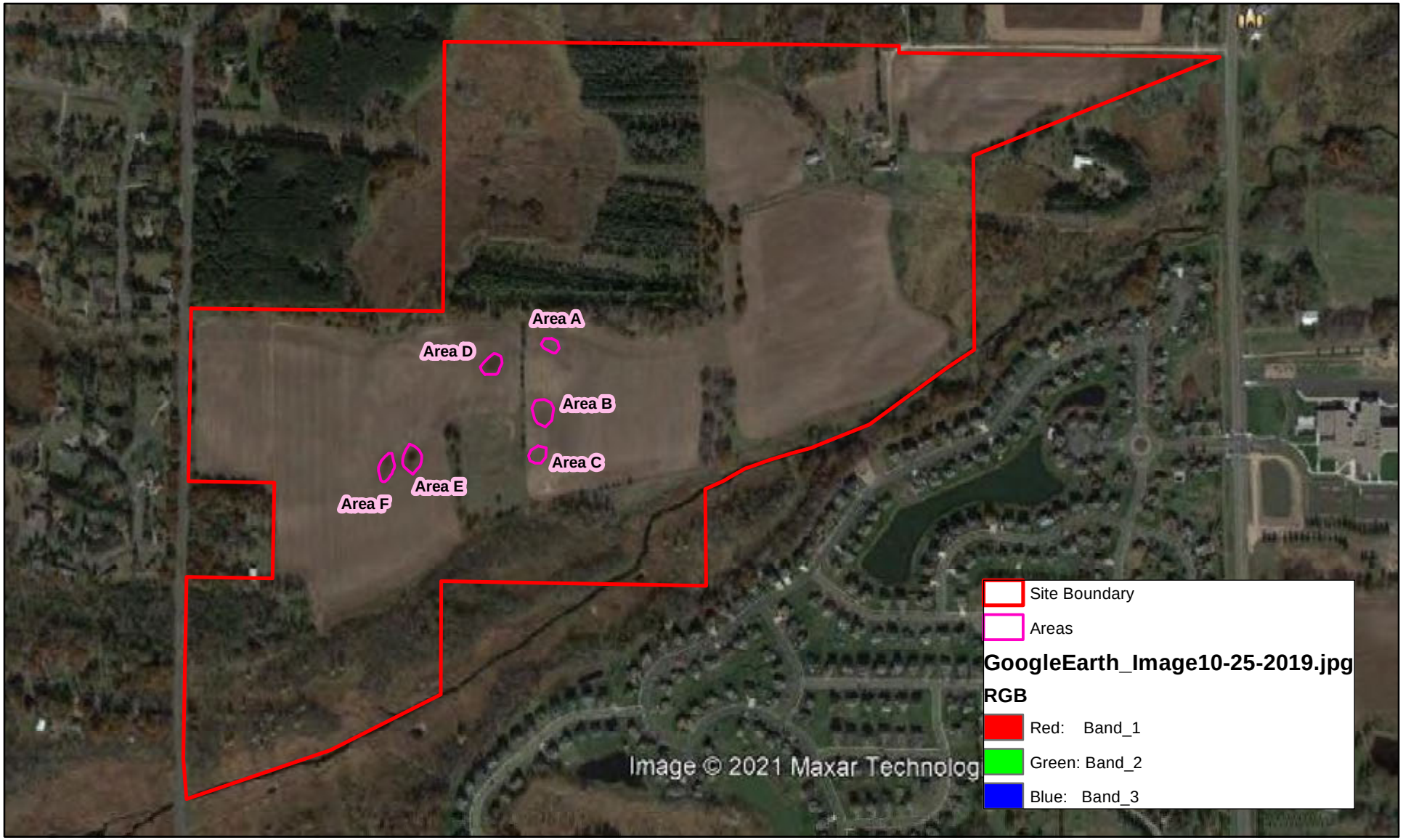


Figure 7 - Offsite Hydrology Assessment Areas (10-25-2019 GoogleMaxar Tech Photo - Most recent Wet Photo)

N

0 2,000 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MNGEO Spatial Commons

Trott Brook North Property (KES 2021-108)
Ramsey, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.

Trott Brook North Property, Ramsey

Wetland Delineation Report

APPENDIX A

Joint Application Form for Activities Affecting Water Resources in Minnesota

PART ONE: Applicant Information

If applicant is an entity (company, government entity, partnership, etc.), an authorized contact person must be identified. If the applicant is using an agent (consultant, lawyer, or other third party) and has authorized them to act on their behalf, the agent's contact information must also be provided.

Applicant/Landowner Name: Ben Schmidt and Tracey Rust, TEG Land Holdings, LLC
Mailing Address: 1660 Highway 100 S, Suite 400, St. Louis Park, MN 55416
Phone: 612.716.3047
E-mail Address: ben.schmidt@sotarra.com;Tracey.Rust@Sotarra.com

Authorized Contact (do not complete if same as above):
Mailing Address:
Phone:
E-mail Address:

Agent Name: Melissa Barrett, Kjolhaug Environmental Services
Mailing Address: 2500 Shadywood Road, Suite 130, Orono, MN 55331
Phone: 952-388-3752
E-mail Address: melissa@kjolhuagenv.com

PART TWO: Site Location Information

County: Anoka **City/Township: Ramsey**
Parcel ID and/or Address: 10-32-25-21-0002, 10-32-25-22-0002, 10-32-25-22-0003, 09-32-25-11-0001, 09-32-25-14-0001, 32-25-13-0001, 09-32-25-42-0003
Legal Description (Section, Township, Range): Sec 9 & 10, T32, R25
Lat/Long (decimal degrees): 45.28007, -93.4501
Attach a map showing the location of the site in relation to local streets, roads, highways.
Approximate size of site (acres) or if a linear project, length (feet): 197.12-ac

If you know that your proposal will require an individual Permit from the U.S. Army Corps of Engineers, you must provide the names and addresses of all property owners adjacent to the project site. This information may be provided by attaching a list to your application or by using block 25 of the Application for Department of the Army permit which can be obtained at:

http://www.mvp.usace.army.mil/Portals/57/docs/regulatory/RegulatoryDocs/engform_4345_2012oct.pdf

PART THREE: General Project/Site Information

If this application is related to a delineation approval, exemption determination, jurisdictional determination, or other correspondence submitted ***prior to*** this application then describe that here and provide the Corps of Engineers project number.

Describe the project that is being proposed, the project purpose and need, and schedule for implementation and completion. The project description must fully describe the nature and scope of the proposed activity including a description of all project elements that effect aquatic resources (wetland, lake, tributary, etc.) and must also include plans and cross section or profile drawings showing the location, character, and dimensions of all proposed activities and aquatic resource impacts.

Application is for delineation concurrence/approval, and AJDs for Wetlands 1, 2, 3, 7, 7a, and 7b, and 8.

PART FOUR: Aquatic Resource Impact[1] Summary

If your proposed project involves a direct or indirect impact to an aquatic resource (wetland, lake, tributary, etc.) identify each impact in the table below. Include all anticipated impacts, including those expected to be temporary. Attach an overhead view map, aerial photo, and/or drawing showing all of the aquatic resources in the project area and the location(s) of the proposed impacts. Label each aquatic resource on the map with a reference number or letter and identify the impacts in the following table.

Aquatic Resource ID (as noted on overhead view)	**Aquatic Resource Type** (wetland, lake, tributary etc.)	**Type of Impact** (fill, excavate, drain, or remove vegetation)	**Duration of Impact** Permanent (P) or Temporary (T)[1]	**Size of Impact**[2]	**Overall Size of Aquatic Resource** [3]	**Existing Plant Community Type(s)** in Impact Area[4]	**County, Major Watershed #, and Bank Service Area #** of Impact Area[5]

[1]If impacts are temporary; enter the duration of the impacts in days next to the "T". For example, a project with a temporary access fill that would be removed after 220 days would be entered "T (220)".
[2]Impacts less than 0.01 acre should be reported in square feet. Impacts 0.01 acre or greater should be reported as acres and rounded to the nearest 0.01 acre. Tributary impacts must be reported in linear feet of impact and an area of impact by indicating first the linear feet of impact along the flowline of the stream followed by the area impact in parentheses). For example, a project that impacts 50 feet of a stream that is 6 feet wide would be reported as 50 ft (300 square feet).
[3]This is generally only applicable if you are applying for a de minimis exemption under MN Rules 8420.0420 Subp. 8, otherwise enter "N/A".
[4]Use *Wetland Plants and Plant Community Types of Minnesota and Wisconsin* 3rd Ed. as modified in MN Rules 8420.0405 Subp. 2.
[5]Refer to Major Watershed and Bank Service Area maps in MN Rules 8420.0522 Subp. 7.

If any of the above identified impacts have already occurred, identify which impacts they are and the circumstances associated with each:

PART FIVE: Applicant Signature

☐ Check here if you are requesting a pre-application consultation with the Corps and LGU based on the information you have provided. Regulatory entities will not initiate a formal application review if this box is checked.

By signature below, I attest that the information in this application is complete and accurate. I further attest that I possess the authority to undertake the work described herein.

TEC Land Holdings, LLC

Signature: _____ Date: 7/20/21

I hereby authorize _____ to act on my behalf as my agent in the processing of this application and to furnish, upon request, supplemental information in support of this application.

[1] **The term "impact" as used in this joint application form is a generic term used for disclosure purposes to identify activities that may require approval from one or more regulatory agencies. For purposes of this form it is not meant to indicate whether or not those activities may require mitigation/replacement.**

Attachment A
Request for Delineation Review, Wetland Type Determination, or Jurisdictional Determination

By submission of the enclosed wetland delineation report, I am requesting that the U.S. Army Corps of Engineers, St. Paul District (Corps) and/or the Wetland Conservation Act Local Government Unit (LGU) provide me with the following (check all that apply):

☒ **Wetland Type Confirmation**

☒ **Delineation Concurrence**. Concurrence with a delineation is a written notification from the Corps and a decision from the LGU concurring, not concurring, or commenting on the boundaries of the aquatic resources delineated on the property. Delineation concurrences are generally valid for five years unless site conditions change. Under this request alone, the Corps will not address the jurisdictional status of the aquatic resources on the property, only the boundaries of the resources within the review area (including wetlands, tributaries, lakes, etc.).

☐ **Preliminary Jurisdictional Determination**. A preliminary jurisdictional determination (PJD) is a non-binding written indication from the Corps that waters, including wetlands, identified on a parcel may be waters of the United States. For purposes of computation of impacts and compensatory mitigation requirements, a permit decision made on the basis of a PJD will treat all waters and wetlands in the review area as if they are jurisdictional waters of the U.S. PJDs are advisory in nature and may not be appealed.

☒ **Approved Jurisdictional Determination**. An approved jurisdictional determination (AJD) is an official Corps determination that jurisdictional waters of the United States are either present or absent on the property. AJDs can generally be relied upon by the affected party for five years. An AJD may be appealed through the Corps administrative appeal process.

AJD requested for Wetlands 1, 2, 3, 7, 7a, and 7b, and 8 and the ephemeral gully.

In order for the Corps and LGU to process your request, the wetland delineation must be prepared in accordance with the 1987 Corps of Engineers Wetland Delineation Manual, any approved Regional Supplements to the 1987 Manual, and the *Guidelines for Submitting Wetland Delineations in Minnesota* (2013).
http://www.mvp.usace.army.mil/Missions/Regulatory/DelineationJDGuidance.aspx

Trott Brook North Property, Ramsey

Wetland Delineation Report

APPENDIX B

Wetland Delineation Data Forms

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Trott Brook North City/County: Ramsey/Anoka Sampling Date: 6-2-2021
Applicant/Owner: TEG State: MN Sampling Point: SP1-upl
Investigator(s): A. Cameron, W. Effertz Section, Township, Range: Sec 9&10, T32, R25
Landform (hillslope, terrace, etc.): hillslope Local relief (concave, convex, none): linear
Slope (%): 1-6 Lat.: Long.: Datum:
Soil Map Unit Name: Nymore loamy sand NWI Classification: none
Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)
Are vegetation X, soil , or hydrology significantly disturbed? Are "normal
Are vegetation , soil , or hydrology naturally problematic? circumstances" present? No
(If needed, explain any answers in remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	N	**Is the sampled area within a wetland?**	N
Hydric soil present?	Y		
Indicators of wetland hydrology present?	N	If yes, optional wetland site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)

Climatic conditions normal (typical) based on gridded database method. Cropland = disturbed vegetation; not normal circumstances.

HYDROLOGY

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Microtopographic Relief (D4)

Field Observations:

Surface water present?	Yes		No	X	Depth (inches):
Water table present?	Yes		No	X	Depth (inches):
Saturation present? (includes capillary fringe)	Yes		No	X	Depth (inches):

Indicators of wetland hydrology present? N

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Dry to 24 inches.

VEGETATION - Use scientific names of plants

Sampling Point: SP1-upl

Tree Stratum	Plot Size (30)	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0	= Total Cover	

Sapling/Shrub Stratum	Plot Size (15)	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0	= Total Cover	

Herb Stratum	Plot Size (5)	Absolute % Cover	Dominant Species	Indicator Status
1	*Zea mays*	10	Y	UPL
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
		10	= Total Cover	

Woody Vine Stratum	Plot Size (30)	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
		0	= Total Cover	

50/20 Thresholds

	20%	50%
Tree Stratum	0	0
Sapling/Shrub Stratum	0	0
Herb Stratum	2	5
Woody Vine Stratum	0	0

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across all Strata: 1 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 0.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	10	x 5 =	50
Column totals	10 (A)		50 (B)

Prevalence Index = B/A = 5.00

Hydrophytic Vegetation Indicators:

___ Rapid test for hydrophytic vegetation

___ Dominance test is >50%

___ Prevalence index is ≤3.0*

___ Morphological adaptations* (provide supporting data in Remarks or on a separate sheet)

___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic vegetation present? N

Remarks: (Include photo numbers here or on a separate sheet)

Healthy corn

SOIL **Sampling Point:** SP1-upl

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-4	10YR 3/1	100					sandy loam	
4-13	10YR 3/1	85	10YR 4/6	15	C	M	sandy loam	
13-24	10YR 2/1	100					sandy loam	

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains
**Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- X Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: _____
Depth (inches): _____

Hydric soil present? Y

Remarks:

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Trott Brook North City/County: Ramsey/Anoka Sampling Date: 6-2-2021
Applicant/Owner: TEG State: MN Sampling Point: SP1-wet
Investigator(s): A. Cameron, W. Effertz Section, Township, Range: Sec 9&10, T32, R25
Landform (hillslope, terrace, etc.): slight depression Local relief (concave, convex, none): concave
Slope (%): 1-6 Lat.: Long.: Datum:
Soil Map Unit Name: Nymore loamy sand NWI Classification: none
Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)
Are vegetation X, soil , or hydrology significantly disturbed? Are "normal
Are vegetation , soil , or hydrology naturally problematic? circumstances" present? No
(If needed, explain any answers in remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	Y	**Is the sampled area within a wetland?**	Y
Hydric soil present?	Y		
Indicators of wetland hydrology present?	Y	If yes, optional wetland site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)

Climatic conditions normal (typical) based on gridded database method. Cropland = disturbed vegetation; not normal circumstances.

HYDROLOGY

Primary Indicators (minimum of one is required; check all that apply)
- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- X Other (Explain in Remarks)

Secondary Indicators (minimum of two required)
- X Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ___ Microtopographic Relief (D4)

Field Observations:

Surface water present?	Yes		No	X	Depth (inches):
Water table present?	Yes		No	X	Depth (inches):
Saturation present? (includes capillary fringe)	Yes		No	X	Depth (inches):

Indicators of wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Dry to 24 inches. Wetland corresponds to offsite review Area E with signatures in 100% normal climatic photos.

VEGETATION - Use scientific names of plants

Sampling Point: SP1-wet

Tree Stratum	Plot Size (30)	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0	= Total Cover	

Sapling/Shrub Stratum	Plot Size (15)	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0	= Total Cover	

Herb Stratum	Plot Size (5)	Absolute % Cover	Dominant Species	Indicator Status
1	*Glyceria striata*	15	Y	OBL
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
		15	= Total Cover	

Woody Vine Stratum	Plot Size (30)	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
		0	= Total Cover	

50/20 Thresholds

	20%	50%
Tree Stratum	0	0
Sapling/Shrub Stratum	0	0
Herb Stratum	3	8
Woody Vine Stratum	0	0

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across all Strata: 1 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	15	x 1 =	15
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column totals	15 (A)		15 (B)

Prevalence Index = B/A = 1.00

Hydrophytic Vegetation Indicators:

- ___ Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- ___ Morphological adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

SOIL **Sampling Point:** SP1-wet

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-4	10YR 2/1	100					loam	
4-10	10YR 2/1	90	10YR 4/6	10	C	M	loam	
10-24	10YR 2/1	100					sandy loam	

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains
**Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Dark Surface (S7) (**LRR R, MLRA 149B**)
___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**
___ Loamy Mucky Mineral (F1) (**LRR K, L**)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
X Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**
___ Coast Prairie Redox (A16) (**LRR K, L, R**)
___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
___ Dark Surface (S7) (**LRR K, L**
___ Polyvalue Below Surface (S8) (**LRR K, L**)
___ Thin Dark Surface (S9) (**LRR K, L**)
___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
___ Red Parent Material (F21)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: _____
Depth (inches): _____

Hydric soil present? Y

Remarks:

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Trott Brook North City/County: Ramsey/Anoka Sampling Date: 6-2-2021
Applicant/Owner: TEG State: MN Sampling Point: SP2-upl
Investigator(s): A. Cameron, W. Effertz Section, Township, Range: Sec 9&10, T32, R25
Landform (hillslope, terrace, etc.): hillslope Local relief (concave, convex, none): linear
Slope (%): 1-6 Lat.: Long.: Datum:
Soil Map Unit Name: Nymore loamy sand NWI Classification: none
Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)
Are vegetation X, soil , or hydrology significantly disturbed? Are "normal
Are vegetation , soil , or hydrology naturally problematic? circumstances" present? No
(If needed, explain any answers in remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	N	**Is the sampled area within a wetland?**	N
Hydric soil present?	Y		
Indicators of wetland hydrology present?	N	If yes, optional wetland site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)

Climatic conditions normal (typical) based on gridded database method. Cropland = disturbed vegetation; not normal circumstances.

HYDROLOGY

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Microtopographic Relief (D4)

Field Observations:

Surface water present?	Yes		No	X	Depth (inches):	
Water table present?	Yes	X	No		Depth (inches):	23
Saturation present? (includes capillary fringe)	Yes	X	No		Depth (inches):	23

Indicators of wetland hydrology present? N

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION - Use scientific names of plants

Sampling Point: SP2-upl

Tree Stratum	Plot Size (30)	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0	= Total Cover	

Sapling/Shrub Stratum	Plot Size (15)	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0	= Total Cover	

Herb Stratum	Plot Size (5)	Absolute % Cover	Dominant Species	Indicator Status
1	*Zea mays*	20	Y	UPL
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
		20	= Total Cover	

Woody Vine Stratum	Plot Size (30)	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
		0	= Total Cover	

50/20 Thresholds

	20%	50%
Tree Stratum	0	0
Sapling/Shrub Stratum	0	0
Herb Stratum	4	10
Woody Vine Stratum	0	0

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across all Strata: 1 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 0.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	20	x 5 =	100
Column totals	20 (A)		100 (B)

Prevalence Index = B/A = 5.00

Hydrophytic Vegetation Indicators:

___ Rapid test for hydrophytic vegetation
___ Dominance test is >50%
___ Prevalence index is ≤3.0*
___ Morphological adaptations* (provide supporting data in Remarks or on a separate sheet)
___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic vegetation present? N

Remarks: (Include photo numbers here or on a separate sheet)

SOIL **Sampling Point:** SP2-upl

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-8	10YR 3/2	80	10YR 4/6	20	C	M	sand	
8-24	10YR 4/2	95	10YR 4/6	5	C	M	sand	

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains
**Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Dark Surface (S7) (**LRR R, MLRA 149B**)
___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**
___ Loamy Mucky Mineral (F1) (**LRR K, L**)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
X Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**
___ Coast Prairie Redox (A16) (**LRR K, L, R**)
___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
___ Dark Surface (S7) (**LRR K, L**
___ Polyvalue Below Surface (S8) (**LRR K, L**)
___ Thin Dark Surface (S9) (**LRR K, L**)
___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
___ Red Parent Material (F21)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: _____
Depth (inches): _____

Hydric soil present? Y

Remarks:

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Trott Brook North City/County: Ramsey/Anoka Sampling Date: 6-2-2021
Applicant/Owner: TEG State: MN Sampling Point: SP2-wet
Investigator(s): A. Cameron, W. Effertz Section, Township, Range: Sec 9&10, T32, R25
Landform (hillslope, terrace, etc.): slight depression Local relief (concave, convex, none): concave
Slope (%): 1-6 Lat.: Long.: Datum:
Soil Map Unit Name: Nymore loamy sand NWI Classification: none
Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)
Are vegetation X, soil , or hydrology significantly disturbed? Are "normal
Are vegetation , soil , or hydrology naturally problematic? circumstances" present? No
(If needed, explain any answers in remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	Y	**Is the sampled area within a wetland?**	Y
Hydric soil present?	Y		
Indicators of wetland hydrology present?	Y	If yes, optional wetland site ID:	Wetland 2

Remarks: (Explain alternative procedures here or in a separate report.)

Climatic conditions normal (typical) based on gridded database method. Cropland = disturbed vegetation; not normal circumstances.

HYDROLOGY

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- X Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ___ Microtopographic Relief (D4)

Field Observations:

Surface water present?	Yes		No	X	Depth (inches):	
Water table present?	Yes	X	No		Depth (inches):	6
Saturation present? (includes capillary fringe)	Yes	X	No		Depth (inches):	6

Indicators of wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Wetland corresponds to offsite review Area D with signatures in 100% normal climatic photos.

VEGETATION - Use scientific names of plants

Sampling Point: SP2-wet

Tree Stratum	Plot Size (30)	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0	= Total Cover	

Sapling/Shrub Stratum	Plot Size (15)	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0	= Total Cover	

Herb Stratum	Plot Size (5)	Absolute % Cover	Dominant Species	Indicator Status
1	*Zea mays*	20	Y	UPL
2	*Plantago major*	5	N	FACU
3	*Barbarea vulgaris*	5	N	FAC
4	*Potentilla norvegica*	5	N	FAC
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
		35	= Total Cover	

Woody Vine Stratum	Plot Size (30)	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
		0	= Total Cover	

50/20 Thresholds

	20%	50%
Tree Stratum	0	0
Sapling/Shrub Stratum	0	0
Herb Stratum	7	18
Woody Vine Stratum	0	0

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across all Strata: 1 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 0.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	10	x 3 =	30
FACU species	5	x 4 =	20
UPL species	20	x 5 =	100
Column totals	35 (A)		150 (B)

Prevalence Index = B/A = 4.29

Hydrophytic Vegetation Indicators:

___ Rapid test for hydrophytic vegetation

___ Dominance test is >50%

___ Prevalence index is ≤3.0*

___ Morphological adaptations* (provide supporting data in Remarks or on a separate sheet)

___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

Assumed hydrophytic with undisturbed conditions based on offsite review results.

SOIL **Sampling Point:** SP2-wet

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-8	10YR 3/2	80	10YR 4/6	20	C	M	sand	
8-24	10YR 4/3	60	10YR 4/6	20	C	M	sand	
			10YR 4/1	20	D	M		
24-26	10YR 5/1	98	10YR 4/6	2	C	M	loamy sand	

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains
**Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- X Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: _____
Depth (inches): _____

Hydric soil present? Y

Remarks:

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Trott Brook North City/County: Ramsey/Anoka Sampling Date: 6-2-2021
Applicant/Owner: TEG State: MN Sampling Point: SP3-upl
Investigator(s): A. Cameron, W. Effertz Section, Township, Range: Sec 9&10, T32, R25
Landform (hillslope, terrace, etc.): hillslope Local relief (concave, convex, none): linear
Slope (%): 1-6 Lat.: Long.: Datum:
Soil Map Unit Name: Nymore loamy sand NWI Classification: none
Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)
Are vegetation X, soil , or hydrology significantly disturbed? Are "normal
Are vegetation , soil , or hydrology naturally problematic? circumstances" present? No
(If needed, explain any answers in remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	N	**Is the sampled area within a wetland?**	N
Hydric soil present?	Y		
Indicators of wetland hydrology present?	N	If yes, optional wetland site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)

Climatic conditions normal (typical) based on gridded database method. Cropland = disturbed vegetation; not normal circumstances.

HYDROLOGY

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Microtopographic Relief (D4)

Field Observations:

Surface water present?	Yes		No	X	Depth (inches):
Water table present?	Yes		No	X	Depth (inches):
Saturation present? (includes capillary fringe)	Yes		No	X	Depth (inches):

Indicators of wetland hydrology present? N

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Dry to 24 inches.

VEGETATION - Use scientific names of plants

Sampling Point: SP3-upl

Tree Stratum	Plot Size (30)	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0	= Total Cover	

Sapling/Shrub Stratum	Plot Size (15)	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0	= Total Cover	

Herb Stratum	Plot Size (5)	Absolute % Cover	Dominant Species	Indicator Status
1	*Zea mays*	10	Y	UPL
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
		10	= Total Cover	

Woody Vine Stratum	Plot Size (30)	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
		0	= Total Cover	

50/20 Thresholds

	20%	50%
Tree Stratum	0	0
Sapling/Shrub Stratum	0	0
Herb Stratum	2	5
Woody Vine Stratum	0	0

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across all Strata: 1 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 0.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	10	x 5 =	50
Column totals	10 (A)		50 (B)

Prevalence Index = B/A = 5.00

Hydrophytic Vegetation Indicators:

___ Rapid test for hydrophytic vegetation

___ Dominance test is >50%

___ Prevalence index is ≤3.0*

___ Morphological adaptations* (provide supporting data in Remarks or on a separate sheet)

___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic vegetation present? N

Remarks: (Include photo numbers here or on a separate sheet)

Healthy corn

SOIL **Sampling Point:** SP3-upl

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-4	10YR 2/1	100					sandy loam	
4-11	10YR 2/1	95	10YR 4/6	5	C	M	sandy loam	
11-24	10YR 4/1	98	10YR 4/6	2	C	M	sandy loam	

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains
**Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- _X_ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- _X_ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: _____
Depth (inches): _____

Hydric soil present? ___Y___

Remarks:

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Trott Brook North City/County: Ramsey/Anoka Sampling Date: 6-2-2021
Applicant/Owner: TEG State: MN Sampling Point: SP3-wet
Investigator(s): A. Cameron, W. Effertz Section, Township, Range: Sec 9&10, T32, R25
Landform (hillslope, terrace, etc.): slight depression Local relief (concave, convex, none): concave
Slope (%): 0-2 Lat.: Long.: Datum:
Soil Map Unit Name: Nymore loamy sand NWI Classification: none
Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)
Are vegetation X, soil , or hydrology significantly disturbed? Are "normal
Are vegetation , soil , or hydrology naturally problematic? circumstances" present? No
(If needed, explain any answers in remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	Y	**Is the sampled area within a wetland?**	Y
Hydric soil present?	Y		
Indicators of wetland hydrology present?	Y	If yes, optional wetland site ID:	Wetland 3

Remarks: (Explain alternative procedures here or in a separate report.)

Climatic conditions normal (typical) based on gridded database method. Cropland = disturbed vegetation; not normal circumstances.

HYDROLOGY

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- X Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- X Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ___ Microtopographic Relief (D4)

Field Observations:

Surface water present?	Yes		No	X	Depth (inches):
Water table present?	Yes		No	X	Depth (inches):
Saturation present? (includes capillary fringe)	Yes		No	X	Depth (inches):

Indicators of wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Dry to 24 inches. Wetland corresponds to offsite review Area F with signatures in 100% normal climatic photos.

VEGETATION - Use scientific names of plants

Sampling Point: SP3-wet

Tree Stratum	Plot Size (30)	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0	= Total Cover	

Sapling/Shrub Stratum	Plot Size (15)	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0	= Total Cover	

Herb Stratum	Plot Size (5)	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
		0	= Total Cover	

Woody Vine Stratum	Plot Size (30)	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
		0	= Total Cover	

50/20 Thresholds

	20%	50%
Tree Stratum	0	0
Sapling/Shrub Stratum	0	0
Herb Stratum	0	0
Woody Vine Stratum	0	0

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across all Strata: 0 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 0.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column totals	0 (A)		0 (B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

___ Rapid test for hydrophytic vegetation
___ Dominance test is >50%
___ Prevalence index is ≤3.0*
___ Morphological adaptations* (provide supporting data in Remarks or on a separate sheet)
___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

Primarily unvegetated, sparse groundsel.

SOIL **Sampling Point:** SP3-wet

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-10	10YR 2/1	100					sandy loam	
10-24	10YR 4/1	98	10YR 4/6	2	C	M	sandy loam	

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains
**Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: _____
Depth (inches): _____

Hydric soil present? Y

Remarks:

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Trott Brook North City/County: Ramsey/Anoka Sampling Date: 6-2-2021
Applicant/Owner: TEG State: MN Sampling Point: SP4-upl
Investigator(s): A. Cameron, W. Effertz Section, Township, Range: Sec 9&10, T32, R25
Landform (hillslope, terrace, etc.): slight hillslope Local relief (concave, convex, none): linear to flat
Slope (%): 0-2 Lat.: Long.: Datum:
Soil Map Unit Name: Blomford loamy fine sand NWI Classification: none
Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)
Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal
Are vegetation ____, soil ____, or hydrology ____ naturally problematic? circumstances" present? Yes
(If needed, explain any answers in remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	N	**Is the sampled area within a wetland?**	N
Hydric soil present?	Y		
Indicators of wetland hydrology present?	N	If yes, optional wetland site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)

Climatic conditions normal (typical) based on gridded database method.

HYDROLOGY

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Microtopographic Relief (D4)

Field Observations:

Surface water present?	Yes	____	No	X	Depth (inches): ____
Water table present?	Yes	____	No	X	Depth (inches): ____
Saturation present? (includes capillary fringe)	Yes	____	No	X	Depth (inches): ____

Indicators of wetland hydrology present? N

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Dry to 30 inches.

VEGETATION - Use scientific names of plants

Sampling Point: SP4-upl

Tree Stratum	Plot Size (30)	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0	= Total Cover	

Sapling/Shrub Stratum	Plot Size (15)	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0	= Total Cover	

Herb Stratum	Plot Size (5)	Absolute % Cover	Dominant Species	Indicator Status
1	*Poa pratensis*	80	Y	FACU
2	*Achillea millefolium*	15	N	FACU
3	*Plantago major*	5	N	FACU
4	*Cirsium arvense*	5	N	FACU
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
		105	= Total Cover	

Woody Vine Stratum	Plot Size (30)	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
		0	= Total Cover	

50/20 Thresholds

	20%	50%
Tree Stratum	0	0
Sapling/Shrub Stratum	0	0
Herb Stratum	21	53
Woody Vine Stratum	0	0

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across all Strata: 1 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 0.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	105	x 4 =	420
UPL species	0	x 5 =	0
Column totals	105 (A)		420 (B)

Prevalence Index = B/A = 4.00

Hydrophytic Vegetation Indicators:

___ Rapid test for hydrophytic vegetation
___ Dominance test is >50%
___ Prevalence index is ≤3.0*
___ Morphological adaptations* (provide supporting data in Remarks or on a separate sheet)
___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic vegetation present? N

Remarks: (Include photo numbers here or on a separate sheet)

SOIL **Sampling Point:** SP4-upl

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-8	10YR 2/1	100					loamy sand	
8-28	10YR 2/1	97	10YR 4/6	3	C	M	clay loam	
28-30	10YR 4/1	97	10YR 4/6	3	C	M	clay loam	

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains
**Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ Depleted Below Dark Surface (A11)
X Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Dark Surface (S7) (**LRR R, MLRA 149B**)
___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**
___ Loamy Mucky Mineral (F1) (**LRR K, L**)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**
___ Coast Prairie Redox (A16) (**LRR K, L, R**)
___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
___ Dark Surface (S7) (**LRR K, L**
___ Polyvalue Below Surface (S8) (**LRR K, L**)
___ Thin Dark Surface (S9) (**LRR K, L**)
___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
___ Red Parent Material (F21)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: _____
Depth (inches): _____

Hydric soil present? Y

Remarks:

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Trott Brook North City/County: Ramsey/Anoka Sampling Date: 6-2-2021
Applicant/Owner: TEG State: MN Sampling Point: SP4-wet
Investigator(s): A. Cameron, W. Effertz Section, Township, Range: Sec 9&10, T32, R25
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): concave
Slope (%): 0-2 Lat.: Long.: Datum:
Soil Map Unit Name: Blomford loamy fine sand NWI Classification: PEM1A/PEM1C
Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)
Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal
Are vegetation ____, soil ____, or hydrology ____ naturally problematic? circumstances" present? Yes
(If needed, explain any answers in remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	Y	**Is the sampled area within a wetland?**	Y
Hydric soil present?	Y		
Indicators of wetland hydrology present?	Y	If yes, optional wetland site ID:	Wetland 4

Remarks: (Explain alternative procedures here or in a separate report.)

Climatic conditions normal (typical) based on gridded database method.

HYDROLOGY

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ___ Microtopographic Relief (D4)

Field Observations:

Surface water present?	Yes		No	X	Depth (inches):	
Water table present?	Yes	X	No		Depth (inches):	23
Saturation present? (includes capillary fringe)	Yes	X	No		Depth (inches):	23

Indicators of wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION - Use scientific names of plants

Sampling Point: SP4-wet

Tree Stratum	Plot Size (30)	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0	= Total Cover	

Sapling/Shrub Stratum	Plot Size (15)	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0	= Total Cover	

Herb Stratum	Plot Size (5)	Absolute % Cover	Dominant Species	Indicator Status
1	*Phalaris arundinacea*	90	Y	FACW
2	*Cirsium arvense*	5	N	FACU
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
		95	= Total Cover	

Woody Vine Stratum	Plot Size (30)	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
		0	= Total Cover	

50/20 Thresholds

	20%	50%
Tree Stratum	0	0
Sapling/Shrub Stratum	0	0
Herb Stratum	19	48
Woody Vine Stratum	0	0

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across all Strata: 1 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0
FACW species	90	x 2 =	180
FAC species	0	x 3 =	0
FACU species	5	x 4 =	20
UPL species	0	x 5 =	0
Column totals	95 (A)		200 (B)

Prevalence Index = B/A = 2.11

Hydrophytic Vegetation Indicators:

- ___ Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- ___ Morphological adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

SOIL **Sampling Point:** SP4-wet

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-6	10YR 2/1	97	10YR 4/6	3	C	M	loam	
6-18	10YR 3/1	85	10YR 4/6	5	C	M	clay loam	
			10YR 5/1	10	D	M		
18-24	10YR 5/1	97	10YR 4/6	3	C	M	clay loam	

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains
**Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- _X_ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- _X_ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: _____
Depth (inches): _____

Hydric soil present? ___Y___

Remarks:

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Trott Brook North City/County: Ramsey/Anoka Sampling Date: 6-2-2021
Applicant/Owner: TEG State: MN Sampling Point: SP5-1upl
Investigator(s): A. Cameron, W. Effertz Section, Township, Range: Sec 9&10, T32, R25
Landform (hillslope, terrace, etc.): hillslope Local relief (concave, convex, none): linear
Slope (%): 1-6 Lat.: Long.: Datum:
Soil Map Unit Name: Nymore loamy sand NWI Classification: none
Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)
Are vegetation X, soil , or hydrology significantly disturbed? Are "normal
Are vegetation , soil , or hydrology naturally problematic? circumstances" present? No
(If needed, explain any answers in remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	N	**Is the sampled area within a wetland?**	N
Hydric soil present?	Y		
Indicators of wetland hydrology present?	N	If yes, optional wetland site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)

Climatic conditions normal (typical) based on gridded database method. Cropland = disturbed vegetation; not normal circumstances.

HYDROLOGY

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Microtopographic Relief (D4)

Field Observations:

Surface water present?	Yes		No	X	Depth (inches):
Water table present?	Yes		No	X	Depth (inches):
Saturation present? (includes capillary fringe)	Yes		No	X	Depth (inches):

Indicators of wetland hydrology present? N

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Dry to 24 inches.

VEGETATION - Use scientific names of plants

Sampling Point: SP5-1upl

Tree Stratum	Plot Size (30)	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0	= Total Cover	

Sapling/Shrub Stratum	Plot Size (15)	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0	= Total Cover	

Herb Stratum	Plot Size (5)	Absolute % Cover	Dominant Species	Indicator Status
1	*Zea mays*	10	Y	UPL
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
		10	= Total Cover	

Woody Vine Stratum	Plot Size (30)	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
		0	= Total Cover	

50/20 Thresholds

	20%	50%
Tree Stratum	0	0
Sapling/Shrub Stratum	0	0
Herb Stratum	2	5
Woody Vine Stratum	0	0

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across all Strata: 1 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 0.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	10	x 5 =	50
Column totals	10 (A)		50 (B)

Prevalence Index = B/A = 5.00

Hydrophytic Vegetation Indicators:

___ Rapid test for hydrophytic vegetation

___ Dominance test is >50%

___ Prevalence index is ≤3.0*

___ Morphological adaptations* (provide supporting data in Remarks or on a separate sheet)

___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic vegetation present? N

Remarks: (Include photo numbers here or on a separate sheet)

Healthy corn

SOIL **Sampling Point:** SP5-1upl

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-4	10YR 3/1	100					sandy loam	
4-13	10YR 3/1	85	10YR 4/6	15	C	M	sandy loam	
13-24	10YR 2/1	100					sandy loam	

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains
**Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- X Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: _____
Depth (inches): _____

Hydric soil present? Y

Remarks:

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Trott Brook North City/County: Ramsey/Anoka Sampling Date: 6-2-2021
Applicant/Owner: TEG State: MN Sampling Point: SP5-1wet
Investigator(s): A. Cameron, W. Effertz Section, Township, Range: Sec 9&10, T32, R25
Landform (hillslope, terrace, etc.): toeslope Local relief (concave, convex, none): concave
Slope (%): 3-5 Lat.: Long.: Datum:
Soil Map Unit Name: Rifle mucky peat NWI Classification: PEM1Ad
Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)
Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal
Are vegetation ____, soil ____, or hydrology ____ naturally problematic? circumstances" present? Yes
(If needed, explain any answers in remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	Y	**Is the sampled area within a wetland?**	Y
Hydric soil present?	Y		
Indicators of wetland hydrology present?	Y	If yes, optional wetland site ID:	Wetland 5

Remarks: (Explain alternative procedures here or in a separate report.)

Climatic conditions normal (typical) based on gridded database method.

HYDROLOGY

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ___ Microtopographic Relief (D4)

Field Observations:

Surface water present?	Yes ____	No X	Depth (inches):		
Water table present?	Yes ____	No X	Depth (inches):		
Saturation present? (includes capillary fringe)	Yes ____	No X	Depth (inches):	12	

Indicators of wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION - Use scientific names of plants

Sampling Point: SP5-1wet

Tree Stratum	Plot Size (30)	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0	= Total Cover	

Sapling/Shrub Stratum	Plot Size (15)	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0	= Total Cover	

Herb Stratum	Plot Size (5)	Absolute % Cover	Dominant Species	Indicator Status
1	*Carex sp.*	70	Y	OBL
2	*Phalaris arundinacea*	15	N	FACW
3	*Verbena hastata*	5	N	FACW
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
		90	= Total Cover	

Woody Vine Stratum	Plot Size (30)	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
		0	= Total Cover	

50/20 Thresholds

	20%	50%
Tree Stratum	0	0
Sapling/Shrub Stratum	0	0
Herb Stratum	18	45
Woody Vine Stratum	0	0

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across all Strata: 1 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	70	x 1 =	70
FACW species	20	x 2 =	40
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column totals	90 (A)		110 (B)

Prevalence Index = B/A = 1.22

Hydrophytic Vegetation Indicators:

- ___ Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- ___ Morphological adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

SOIL **Sampling Point:** SP5-1wet

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-36	N 2.5/	100					peat/muck	

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains
**Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

- X Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: _____
Depth (inches): _____

Hydric soil present? Y

Remarks:

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Trott Brook North City/County: Ramsey/Anoka Sampling Date: 6-2-2021
Applicant/Owner: TEG State: MN Sampling Point: SP5-2upl
Investigator(s): A. Cameron, W. Effertz Section, Township, Range: Sec 9&10, T32, R25
Landform (hillslope, terrace, etc.): Local relief (concave, convex, none):
Slope (%): 1-6 Lat.: Long.: Datum:
Soil Map Unit Name: Isan-Isan, frequently ponded NWI Classification: PFO1A/PEM1C
Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)
Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal
Are vegetation ____, soil ____, or hydrology ____ naturally problematic? circumstances" present? Yes
(If needed, explain any answers in remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	N	**Is the sampled area within a wetland?**	N
Hydric soil present?	N		
Indicators of wetland hydrology present?	N	If yes, optional wetland site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)

Climatic conditions normal (typical) based on gridded database method.

HYDROLOGY

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Microtopographic Relief (D4)

Field Observations:

Surface water present?	Yes	____	No	X	Depth (inches): ____
Water table present?	Yes	____	No	X	Depth (inches): ____
Saturation present? (includes capillary fringe)	Yes	____	No	X	Depth (inches): ____

Indicators of wetland hydrology present? N

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Dry to 24 inches.

VEGETATION - Use scientific names of plants

Sampling Point: SP5-2upl

Tree Stratum	Plot Size (30)	Absolute % Cover	Dominant Species	Indicator Status
1	*Tilia americana*	20	Y	FACU
2	*Quercus macrocarpa*	20	Y	FACU
3				
4				
5				
6				
7				
8				
9				
10				
		40	= Total Cover	

Sapling/Shrub Stratum	Plot Size (15)	Absolute % Cover	Dominant Species	Indicator Status
1	*Rhamnus cathartica*	70	Y	FAC
2	*Lonicera tatarica*	10	N	FACU
3				
4				
5				
6				
7				
8				
9				
10				
		80	= Total Cover	

Herb Stratum	Plot Size (5)	Absolute % Cover	Dominant Species	Indicator Status
1	*Osmorhiza claytonii*	25	Y	FACU
2	*Circaea lutetiana*	25	Y	none
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
		50	= Total Cover	

Woody Vine Stratum	Plot Size (30)	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
		0	= Total Cover	

50/20 Thresholds

	20%	50%
Tree Stratum	8	20
Sapling/Shrub Stratum	16	40
Herb Stratum	10	25
Woody Vine Stratum	0	0

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across all Strata: 5 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 20.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	70	x 3 =	210
FACU species	75	x 4 =	300
UPL species	0	x 5 =	0
Column totals	145 (A)		510 (B)

Prevalence Index = B/A = 3.52

Hydrophytic Vegetation Indicators:

___ Rapid test for hydrophytic vegetation
___ Dominance test is >50%
___ Prevalence index is ≤3.0*
___ Morphological adaptations* (provide supporting data in Remarks or on a separate sheet)
___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic vegetation present? N

Remarks: (Include photo numbers here or on a separate sheet)

SOIL **Sampling Point:** SP5-2upl

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-8	10YR 3/2	100					sandy loam	
8-24	10YR 3/3	80	10YR 4/6	20	C	M	sandy loam	

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains
**Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Dark Surface (S7) (**LRR R, MLRA 149B**)
___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**
___ Loamy Mucky Mineral (F1) (**LRR K, L**)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**
___ Coast Prairie Redox (A16) (**LRR K, L, R**)
___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
___ Dark Surface (S7) (**LRR K, L**
___ Polyvalue Below Surface (S8) (**LRR K, L**)
___ Thin Dark Surface (S9) (**LRR K, L**)
___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
___ Red Parent Material (F21)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: _____
Depth (inches): _____

Hydric soil present? N

Remarks:

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Trott Brook North City/County: Ramsey/Anoka Sampling Date: 6-2-2021
Applicant/Owner: TEG State: MN Sampling Point: SP5-2wet
Investigator(s): A. Cameron, W. Effertz Section, Township, Range: Sec 9&10, T32, R25
Landform (hillslope, terrace, etc.): hillslope seep Local relief (concave, convex, none): linear
Slope (%): 5-15 Lat.: Long.: Datum:
Soil Map Unit Name: Rifle mucky peat NWI Classification: PFO1A/PEM1Cd
Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)
Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal
Are vegetation ____, soil ____, or hydrology ____ naturally problematic? circumstances" present? Yes
(If needed, explain any answers in remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	Y	**Is the sampled area within a wetland?**	Y
Hydric soil present?	Y		
Indicators of wetland hydrology present?	Y	If yes, optional wetland site ID:	Wetland 5

Remarks: (Explain alternative procedures here or in a separate report.)

Climatic conditions normal (typical) based on gridded database method.

HYDROLOGY

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ___ Microtopographic Relief (D4)

Field Observations:

Surface water present?	Yes		No	X	Depth (inches):	
Water table present?	Yes	X	No		Depth (inches):	0
Saturation present? (includes capillary fringe)	Yes	X	No		Depth (inches):	0

Indicators of wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Hillside seep

VEGETATION - Use scientific names of plants

Sampling Point: SP5-2wet

Tree Stratum	Plot Size (30)	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0	= Total Cover	

Sapling/Shrub Stratum	Plot Size (15)	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0	= Total Cover	

Herb Stratum	Plot Size (5)	Absolute % Cover	Dominant Species	Indicator Status
1	*Carex sp.*	70	Y	OBL
2	*Caltha palustris*	15	N	OBL
3	*Phalaris arundinacea*	15	N	FACW
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
		100	= Total Cover	

Woody Vine Stratum	Plot Size (30)	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
		0	= Total Cover	

50/20 Thresholds

	20%	50%
Tree Stratum	0	0
Sapling/Shrub Stratum	0	0
Herb Stratum	20	50
Woody Vine Stratum	0	0

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across all Strata: 1 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	85	x 1 =	85
FACW species	15	x 2 =	30
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column totals	100 (A)		115 (B)

Prevalence Index = B/A = 1.15

Hydrophytic Vegetation Indicators:

- ___ Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- ___ Morphological adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

SOIL **Sampling Point:** SP5-2wet

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-36	N 2.5/	100					peat/muck	

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains
**Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

- X Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: _____
Depth (inches): _____

Hydric soil present? Y

Remarks:

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Trott Brook North City/County: Ramsey/Anoka Sampling Date: 6-2-2021
Applicant/Owner: TEG State: MN Sampling Point: SP6-upl
Investigator(s): A. Cameron, W. Effertz Section, Township, Range: Sec 9&10, T32, R25
Landform (hillslope, terrace, etc.): hillslope Local relief (concave, convex, none): linear
Slope (%): 12-25 Lat.: Long.: Datum:
Soil Map Unit Name: Nymore loamy coarse sand NWI Classification:
Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)
Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal
Are vegetation ____, soil ____, or hydrology ____ naturally problematic? circumstances" present? Yes
(If needed, explain any answers in remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	N	**Is the sampled area within a wetland?**	N
Hydric soil present?	N		
Indicators of wetland hydrology present?	N	If yes, optional wetland site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)

Climatic conditions normal (typical) based on gridded database method.

HYDROLOGY

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Microtopographic Relief (D4)

Field Observations:

Surface water present?	Yes	____	No	X	Depth (inches): ____
Water table present?	Yes	____	No	X	Depth (inches): ____
Saturation present? (includes capillary fringe)	Yes	____	No	X	Depth (inches): ____

Indicators of wetland hydrology present? N

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION - Use scientific names of plants

Sampling Point: SP6-upl

Tree Stratum	Plot Size (30)	Absolute % Cover	Dominant Species	Indicator Status
1	*Pinus sylvestris*	70	Y	none
2				
3				
4				
5				
6				
7				
8				
9				
10				
		70	= Total Cover	

Sapling/Shrub Stratum	Plot Size (15)	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0	= Total Cover	

Herb Stratum	Plot Size (5)	Absolute % Cover	Dominant Species	Indicator Status
1	*Poa pratensis*	20	Y	FACU
2	*Solidago canadensis*	15	Y	FACU
3	*Achillea millefolium*	10	Y	FACU
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
		45	= Total Cover	

Woody Vine Stratum	Plot Size (30)	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
		0	= Total Cover	

50/20 Thresholds

	20%	50%
Tree Stratum	14	35
Sapling/Shrub Stratum	0	0
Herb Stratum	9	23
Woody Vine Stratum	0	0

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across all Strata: 4 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 0.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	45	x 4 =	180
UPL species	0	x 5 =	0
Column totals	45 (A)		180 (B)

Prevalence Index = B/A = 4.00

Hydrophytic Vegetation Indicators:

___ Rapid test for hydrophytic vegetation

___ Dominance test is >50%

___ Prevalence index is ≤3.0*

___ Morphological adaptations* (provide supporting data in Remarks or on a separate sheet)

___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic vegetation present? N

Remarks: (Include photo numbers here or on a separate sheet)

SOIL **Sampling Point:** SP6-upl

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-12	10YR 3/2	100					loamy sand	
12-24	10YR 4/3	100					sand	

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains
**Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: _____
Depth (inches): _____

Hydric soil present? N

Remarks:

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Trott Brook Norh City/County: Ramsey/Anoka Sampling Date: 6-2-2021
Applicant/Owner: TEG State: MN Sampling Point: SP6-wet
Investigator(s): A. Cameron, W. Effertz Section, Township, Range: Sec 9&10, T32, R25
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): concave
Slope (%): 0-2 Lat.: Long.: Datum:
Soil Map Unit Name: Nymore loamy coarse sand NWI Classification: PEM1C (offsite)
Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)
Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal
Are vegetation ____, soil ____, or hydrology ____ naturally problematic? circumstances" present? Yes
(If needed, explain any answers in remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	Y	**Is the sampled area within a wetland?**	Y
Hydric soil present?	Y		
Indicators of wetland hydrology present?	Y	If yes, optional wetland site ID:	Wetland 6

Remarks: (Explain alternative procedures here or in a separate report.)

Climatic conditions normal (typical) based on gridded database method.

HYDROLOGY

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ___ Microtopographic Relief (D4)

Field Observations:

Surface water present?	Yes		No	X	Depth (inches):	
Water table present?	Yes	X	No		Depth (inches):	0
Saturation present? (includes capillary fringe)	Yes	X	No		Depth (inches):	6

Indicators of wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION - Use scientific names of plants

Sampling Point: SP6-wet

Tree Stratum	Plot Size (30)	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0	= Total Cover	

Sapling/Shrub Stratum	Plot Size (15)	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0	= Total Cover	

Herb Stratum	Plot Size (5)	Absolute % Cover	Dominant Species	Indicator Status
1	*Phalaris arundinacea*	85	Y	FACW
2	*Typha x glauca*	15	N	OBL
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
		100	= Total Cover	

Woody Vine Stratum	Plot Size (30)	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
		0	= Total Cover	

50/20 Thresholds

	20%	50%
Tree Stratum	0	0
Sapling/Shrub Stratum	0	0
Herb Stratum	20	50
Woody Vine Stratum	0	0

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across all Strata: 1 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	15	x 1 =	15
FACW species	85	x 2 =	170
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column totals	100 (A)		185 (B)

Prevalence Index = B/A = 1.85

Hydrophytic Vegetation Indicators:

- ___ Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- ___ Morphological adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

SOIL **Sampling Point:** SP6-wet

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-12	N 2.5/	100					mucky loam	
12-20	10YR 4/1	100					sand	

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains
**Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**
- X Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: _____
Depth (inches): _____

Hydric soil present? Y

Remarks:

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Trott Brook North City/County: Ramsey/Anoka Sampling Date: 6-2-2021
Applicant/Owner: TEG State: MN Sampling Point: SP7-upl
Investigator(s): A. Cameron, W. Effertz Section, Township, Range: Sec 9&10, T32, R25
Landform (hillslope, terrace, etc.): hillslope Local relief (concave, convex, none): linear
Slope (%): 1-3 Lat.: Long.: Datum:
Soil Map Unit Name: Brickton silt loam NWI Classification: none
Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)
Are vegetation X, soil , or hydrology significantly disturbed? Are "normal
Are vegetation , soil , or hydrology naturally problematic? circumstances" present? No
(If needed, explain any answers in remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	N	**Is the sampled area within a wetland?**	N
Hydric soil present?	N		
Indicators of wetland hydrology present?	N	If yes, optional wetland site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)

Climatic conditions normal (typical) based on gridded database method. Cropland = disturbed vegetation; not normal circumstances.

HYDROLOGY

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Microtopographic Relief (D4)

Field Observations:

Surface water present?	Yes		No	X	Depth (inches):
Water table present?	Yes		No	X	Depth (inches):
Saturation present? (includes capillary fringe)	Yes		No	X	Depth (inches):

Indicators of wetland hydrology present? N

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Dry to 24 inches.

VEGETATION - Use scientific names of plants

Sampling Point: SP7-upl

Tree Stratum	Plot Size (30)	Absolute % Cover	Dominant Species	Indicator Status
1	*populus tremuloides*	60	Y	FAC
2				
3				
4				
5				
6				
7				
8				
9				
10				
		60	= Total Cover	

Sapling/Shrub Stratum	Plot Size (15)	Absolute % Cover	Dominant Species	Indicator Status
1	*Phalaris arundinacea*	40	Y	FACW
2				
3				
4				
5				
6				
7				
8				
9				
10				
		40	= Total Cover	

Herb Stratum	Plot Size (5)	Absolute % Cover	Dominant Species	Indicator Status
1	*Parthenocissus quinquefolia*	15	Y	FACU
2	*Ageratina altissima*	10	Y	FACU
3	*Geranium maculatum*	10	Y	FACU
4	*Bromus inermis*	10	Y	UPL
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
		45	= Total Cover	

Woody Vine Stratum	Plot Size (30)	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
		0	= Total Cover	

50/20 Thresholds

	20%	50%
Tree Stratum	12	30
Sapling/Shrub Stratum	8	20
Herb Stratum	9	23
Woody Vine Stratum	0	0

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across all Strata: 6 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 33.33% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0
FACW species	40	x 2 =	80
FAC species	60	x 3 =	180
FACU species	35	x 4 =	140
UPL species	10	x 5 =	50
Column totals	145 (A)		450 (B)

Prevalence Index = B/A = 3.10

Hydrophytic Vegetation Indicators:

___ Rapid test for hydrophytic vegetation
___ Dominance test is >50%
___ Prevalence index is ≤3.0*
___ Morphological adaptations* (provide supporting data in Remarks or on a separate sheet)
___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic vegetation present? N

Remarks: (Include photo numbers here or on a separate sheet)

SOIL **Sampling Point:** SP7-upl

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-16	10YR 2/1	100					loam	
16-20	10YR 3/1	100					clay loam	
20-24	10YR 4/1	100					clay loam	

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains
**Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: _____
Depth (inches): _____

Hydric soil present? N

Remarks:

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Trott Brook North City/County: Ramsey/Anoka Sampling Date: 6-2-2021
Applicant/Owner: TEG State: MN Sampling Point: SP7-wet
Investigator(s): A. Cameron, W. Effertz Section, Township, Range: Sec 9&10, T32, R25
Landform (hillslope, terrace, etc.): depression/swale Local relief (concave, convex, none): concave
Slope (%): 0-2 Lat.: Long.: Datum:
Soil Map Unit Name: Brickton silt loam NWI Classification: PEM1Ad/PABG
Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)
Are vegetation X, soil , or hydrology significantly disturbed? Are "normal
Are vegetation , soil , or hydrology naturally problematic? circumstances" present? No
(If needed, explain any answers in remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	Y	**Is the sampled area within a wetland?**	Y
Hydric soil present?	Y		
Indicators of wetland hydrology present?	Y	If yes, optional wetland site ID:	Wetland 7

Remarks: (Explain alternative procedures here or in a separate report.)

Climatic conditions normal (typical) based on gridded database method. Cropland = disturbed vegetation; not normal circumstances.

HYDROLOGY

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ___ Microtopographic Relief (D4)

Field Observations:

Surface water present?	Yes		No	X	Depth (inches):	
Water table present?	Yes	X	No		Depth (inches):	2
Saturation present? (includes capillary fringe)	Yes	X	No		Depth (inches):	0

Indicators of wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION - Use scientific names of plants

Sampling Point: SP7-wet

Tree Stratum	Plot Size (30)	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0	= Total Cover	

Sapling/Shrub Stratum	Plot Size (15)	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0	= Total Cover	

Herb Stratum	Plot Size (5)	Absolute % Cover	Dominant Species	Indicator Status
1	*Phalaris arundinacea*	50	Y	FACW
2	*Typha x glauca*	30	Y	OBL
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
		80	= Total Cover	

Woody Vine Stratum	Plot Size (30)	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
		0	= Total Cover	

50/20 Thresholds

	20%	50%
Tree Stratum	0	0
Sapling/Shrub Stratum	0	0
Herb Stratum	16	40
Woody Vine Stratum	0	0

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across all Strata: 2 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	30	x 1 =	30
FACW species	50	x 2 =	100
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column totals	80 (A)		130 (B)

Prevalence Index = B/A = 1.63

Hydrophytic Vegetation Indicators:

- ___ Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- ___ Morphological adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

SOIL **Sampling Point:** SP7-wet

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-6	10YR 2/1	100					mucky loam	
6-12	10YR 5/1	100					sandy loam	

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains
**Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- _X_ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**
- _X_ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: _____
Depth (inches): _____

Hydric soil present? ___Y___

Remarks:

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Trott Brook North City/County: Ramsey/Anoka Sampling Date: 6-2-2021
Applicant/Owner: TEG State: MN Sampling Point: SP8-upl
Investigator(s): A. Cameron, W. Effertz Section, Township, Range: Sec 9&10, T32, R25
Landform (hillslope, terrace, etc.): flat to sloping cropplan Local relief (concave, convex, none): linear
Slope (%): 01-3 Lat.: Long.: Datum:
Soil Map Unit Name Brickton silt loam NWI Classification: none
Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)
Are vegetation X , soil , or hydrology significantly disturbed? Are "normal
Are vegetation , soil , or hydrology naturally problematic? circumstances" present? No
(If needed, explain any answers in remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	N	**Is the sampled area within a wetland?**	N
Hydric soil present?	Y		
Indicators of wetland hydrology present?	N	If yes, optional wetland site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)

Climatic conditions normal (typical) based on gridded database method. Cropland = disturbed vegetation; not normal circumstances.

HYDROLOGY

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Microtopographic Relief (D4)

Field Observations:

Surface water present?	Yes		No	X	Depth (inches):
Water table present?	Yes		No	X	Depth (inches):
Saturation present? (includes capillary fringe)	Yes		No	X	Depth (inches):

Indicators of wetland hydrology present? N

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Dry to 24 inches.

VEGETATION - Use scientific names of plants

Sampling Point: SP8-upl

Tree Stratum	Plot Size (30)	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0	= Total Cover	

Sapling/Shrub Stratum	Plot Size (15)	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0	= Total Cover	

Herb Stratum	Plot Size (5)	Absolute % Cover	Dominant Species	Indicator Status
1	*Zea mays*	20	Y	UPL
2	*Chenopodium album*	5	N	FACU
3	*Rumex crispus*	5	N	FAC
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
		30	= Total Cover	

Woody Vine Stratum	Plot Size (30)	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
		0	= Total Cover	

50/20 Thresholds

	20%	50%
Tree Stratum	0	0
Sapling/Shrub Stratum	0	0
Herb Stratum	6	15
Woody Vine Stratum	0	0

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across all Strata: 1 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 0.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0	
FACW species	0	x 2 =	0	
FAC species	5	x 3 =	15	
FACU species	5	x 4 =	20	
UPL species	20	x 5 =	100	
Column totals	30	(A)	135	(B)

Prevalence Index = B/A = 4.50

Hydrophytic Vegetation Indicators:

___ Rapid test for hydrophytic vegetation

___ Dominance test is >50%

___ Prevalence index is ≤3.0*

___ Morphological adaptations* (provide supporting data in Remarks or on a separate sheet)

___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic vegetation present? N

Remarks: (Include photo numbers here or on a separate sheet)

SOIL **Sampling Point:** SP8-upl

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-5	10YR 3/1	97	10YR 4/6	3	C	M	loam	
5-18	10YR 3/1	95	10YR 4/6	5	C	M	clay loam	
18-24	10YR 5/2	90	10YR 4/6	10	C	M	clay loam	

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains
**Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Dark Surface (S7) (**LRR R, MLRA 149B**)
___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**
___ Loamy Mucky Mineral (F1) (**LRR K, L**)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
X Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**
___ Coast Prairie Redox (A16) (**LRR K, L, R**)
___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
___ Dark Surface (S7) (**LRR K, L**
___ Polyvalue Below Surface (S8) (**LRR K, L**)
___ Thin Dark Surface (S9) (**LRR K, L**)
___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
___ Red Parent Material (F21)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: _____
Depth (inches): _____

Hydric soil present? Y

Remarks:

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Trott Brook North City/County: Ramsey/Anoka Sampling Date: 6-2-2021
Applicant/Owner: TEG State: MN Sampling Point: SP8-wet
Investigator(s): A. Cameron, W. Effertz Section, Township, Range: Sec 9&10, T32, R25
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): concave
Slope (%): 0-3 Lat.: Long.: Datum:
Soil Map Unit Name: Brickton silt loam NWI Classification: none
Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)
Are vegetation X, soil , or hydrology significantly disturbed? Are "normal
Are vegetation , soil , or hydrology naturally problematic? circumstances" present? No
(If needed, explain any answers in remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	Y	**Is the sampled area within a wetland?**	Y
Hydric soil present?	Y		
Indicators of wetland hydrology present?	Y	If yes, optional wetland site ID:	Wetland 8

Remarks: (Explain alternative procedures here or in a separate report.)

Climatic conditions normal (typical) based on gridded database method. Cropland = disturbed vegetation; not normal circumstances.

HYDROLOGY

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- X Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ___ Microtopographic Relief (D4)

Field Observations:

Surface water present?	Yes		No	X	Depth (inches):
Water table present?	Yes		No	X	Depth (inches):
Saturation present? (includes capillary fringe)	Yes		No	X	Depth (inches):

Indicators of wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Dry to 24 inches.

VEGETATION - Use scientific names of plants

Sampling Point: SP8-wet

Tree Stratum	Plot Size (30)	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0	= Total Cover	

Sapling/Shrub Stratum	Plot Size (15)	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0	= Total Cover	

Herb Stratum	Plot Size (5)	Absolute % Cover	Dominant Species	Indicator Status
1	*Phalaris arundinacea*	5	Y	FACW
2	*Rumex crispus*	5	Y	FAC
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
		10	= Total Cover	

Woody Vine Stratum	Plot Size (30)	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
		0	= Total Cover	

50/20 Thresholds

	20%	50%
Tree Stratum	0	0
Sapling/Shrub Stratum	0	0
Herb Stratum	2	5
Woody Vine Stratum	0	0

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across all Strata: 2 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0
FACW species	5	x 2 =	10
FAC species	5	x 3 =	15
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column totals	10 (A)		25 (B)

Prevalence Index = B/A = 2.50

Hydrophytic Vegetation Indicators:

- ___ Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- ___ Morphological adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

Farmed fringe

SOIL **Sampling Point:** SP8-wet

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-2	10YR 3/1	85	10YR 4/6	15	C	M	clay loam	
2-16	10YR 4/1	85	10YR 4/6	15	C	M	clay loam	
16-24	10YR 6/1	95	10YR 4/6	5	C	M	clay loam	

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains
**Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Dark Surface (S7) (**LRR R, MLRA 149B**)
___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**
___ Loamy Mucky Mineral (F1) (**LRR K, L**)
___ Loamy Gleyed Matrix (F2)
X Depleted Matrix (F3)
X Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**
___ Coast Prairie Redox (A16) (**LRR K, L, R**)
___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
___ Dark Surface (S7) (**LRR K, L**
___ Polyvalue Below Surface (S8) (**LRR K, L**)
___ Thin Dark Surface (S9) (**LRR K, L**)
___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
___ Red Parent Material (F21)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: _____
Depth (inches): _____

Hydric soil present? ___Y___

Remarks:

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Trott Brook North City/County: Ramsey/Anoka Sampling Date: 6-2-2021
Applicant/Owner: TEG State: MN Sampling Point: SP-A
Investigator(s): A. Cameron, W. Effertz Section, Township, Range: Sec 9&10, T32, R25
Landform (hillslope, terrace, etc.): Slight depression Local relief (concave, convex, none): concave to flat
Slope (%): 12-Jun Lat.: Long.: Datum:
Soil Map Unit Name: Nymore loamy sand NWI Classification: none
Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)
Are vegetation X, soil , or hydrology significantly disturbed? Are "normal
Are vegetation , soil , or hydrology naturally problematic? circumstances" present? No
(If needed, explain any answers in remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	N	**Is the sampled area within a wetland?**	N
Hydric soil present?	Y		
Indicators of wetland hydrology present?	N	If yes, optional wetland site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)

Climatic conditions normal (typical) based on gridded database method. Cropland = disturbed vegetation; not normal circumstances.

HYDROLOGY

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Microtopographic Relief (D4)

Field Observations:

Surface water present?	Yes		No	X	Depth (inches):
Water table present?	Yes		No	X	Depth (inches):
Saturation present? (includes capillary fringe)	Yes		No	X	Depth (inches):

Indicators of wetland hydrology present? N

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No water to 24 inches.

VEGETATION - Use scientific names of plants

Sampling Point: SP-A

Tree Stratum	Plot Size (30)	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0	= Total Cover	

Sapling/Shrub Stratum	Plot Size (15)	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0	= Total Cover	

Herb Stratum	Plot Size (5)	Absolute % Cover	Dominant Species	Indicator Status
1	*Zea mays*	20	Y	UPL
2	*Chenopodium album*	5	N	FACU
3	*Digitaria sanguinalis*	5	N	FACU
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
		30	= Total Cover	

Woody Vine Stratum	Plot Size (30)	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
		0	= Total Cover	

50/20 Thresholds

	20%	50%
Tree Stratum	0	0
Sapling/Shrub Stratum	0	0
Herb Stratum	6	15
Woody Vine Stratum	0	0

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across all Strata: 1 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 0.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0	
FACW species	0	x 2 =	0	
FAC species	0	x 3 =	0	
FACU species	10	x 4 =	40	
UPL species	20	x 5 =	100	
Column totals	30 (A)		140	(B)

Prevalence Index = B/A = 4.67

Hydrophytic Vegetation Indicators:

___ Rapid test for hydrophytic vegetation

___ Dominance test is >50%

___ Prevalence index is ≤3.0*

___ Morphological adaptations* (provide supporting data in Remarks or on a separate sheet)

___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic vegetation present? N

Remarks: (Include photo numbers here or on a separate sheet)

SOIL **Sampling Point:** SP-A

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-7	10YR 2/2	100					loamy sand	
7-16	10YR 3/1	90	10YR 4/6	5	C	M	sandy loam	
			10YR 4/1	5	D	M		
16-24	10YR 4/1	97	10YR 4/6	3	C	M	loamy sand	

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains
**Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Dark Surface (S7) (**LRR R, MLRA 149B**)
___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**
___ Loamy Mucky Mineral (F1) (**LRR K, L**)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
X Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**
___ Coast Prairie Redox (A16) (**LRR K, L, R**)
___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
___ Dark Surface (S7) (**LRR K, L**
___ Polyvalue Below Surface (S8) (**LRR K, L**)
___ Thin Dark Surface (S9) (**LRR K, L**)
___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
___ Red Parent Material (F21)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: _____
Depth (inches): _____

Hydric soil present? Y

Remarks:

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Trott Brook North City/County: Ramsey/Anoka Sampling Date: 6-2-2021
Applicant/Owner: TEG State: MN Sampling Point: SP-B & C
Investigator(s): A. Cameron, W. Effertz Section, Township, Range: Sec 9&10, T32, R25
Landform (hillslope, terrace, etc.): slight depression Local relief (concave, convex, none): concave
Slope (%): 1-6 Lat.: Long.: Datum:
Soil Map Unit Name: Nymore loamy sand NWI Classification: none
Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)
Are vegetation X, soil , or hydrology significantly disturbed? Are "normal
Are vegetation , soil , or hydrology naturally problematic? circumstances" present? No
(If needed, explain any answers in remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	N	**Is the sampled area within a wetland?**	N
Hydric soil present?	N		
Indicators of wetland hydrology present?	N	If yes, optional wetland site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)

Climatic conditions normal (typical) based on gridded database method. Cropland = disturbed vegetation; not normal circumstances.

HYDROLOGY

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Microtopographic Relief (D4)

Field Observations:

Surface water present?	Yes		No	X	Depth (inches):
Water table present?	Yes		No	X	Depth (inches):
Saturation present? (includes capillary fringe)	Yes		No	X	Depth (inches):

Indicators of wetland hydrology present? N

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Dry to 24 inches.

VEGETATION - Use scientific names of plants

Sampling Point: SP-B & C

Tree Stratum	Plot Size (30)	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0	= Total Cover	

Sapling/Shrub Stratum	Plot Size (15)	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0	= Total Cover	

Herb Stratum	Plot Size (5)	Absolute % Cover	Dominant Species	Indicator Status
1	*Zea mays*	30	Y	UPL
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
		30	= Total Cover	

Woody Vine Stratum	Plot Size (30)	Absolute % Cover	Dominant Species	Indicator Status
1				
2				
3				
4				
5				
		0	= Total Cover	

50/20 Thresholds

	20%	50%
Tree Stratum	0	0
Sapling/Shrub Stratum	0	0
Herb Stratum	6	15
Woody Vine Stratum	0	0

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across all Strata: 1 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 0.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	30	x 5 =	150
Column totals	30 (A)		150 (B)

Prevalence Index = B/A = 5.00

Hydrophytic Vegetation Indicators:

___ Rapid test for hydrophytic vegetation
___ Dominance test is >50%
___ Prevalence index is ≤3.0*
___ Morphological adaptations* (provide supporting data in Remarks or on a separate sheet)
___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic vegetation present? N

Remarks: (Include photo numbers here or on a separate sheet)

Healthy corn

SOIL **Sampling Point:** SP-B & C

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-10	10YR 3/3	100					loamy sand	
10-13	10YR 3/1	100					loamy sand	

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains
**Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Dark Surface (S7) (**LRR R, MLRA 149B**)
___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**
___ Loamy Mucky Mineral (F1) (**LRR K, L**)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**
___ Coast Prairie Redox (A16) (**LRR K, L, R**)
___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
___ Dark Surface (S7) (**LRR K, L**
___ Polyvalue Below Surface (S8) (**LRR K, L**)
___ Thin Dark Surface (S9) (**LRR K, L**)
___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
___ Red Parent Material (F21)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: _____
Depth (inches): _____

Hydric soil present? N

Remarks:

Trott Brook North Property, Ramsey

Wetland Delineation Report

APPENDIX C

Precipitation Data

Minnesota State Climatology Office

State Climatology Office - DNR Division of Ecological and Water Resources

Precipitation Worksheet Using Gridded Database

Precipitation data for target wetland location:

county: **Anoka** township number: **32N**
township name: **Ramsey** range number: **25W**
nearest community: **Nowthen** section number: **9**

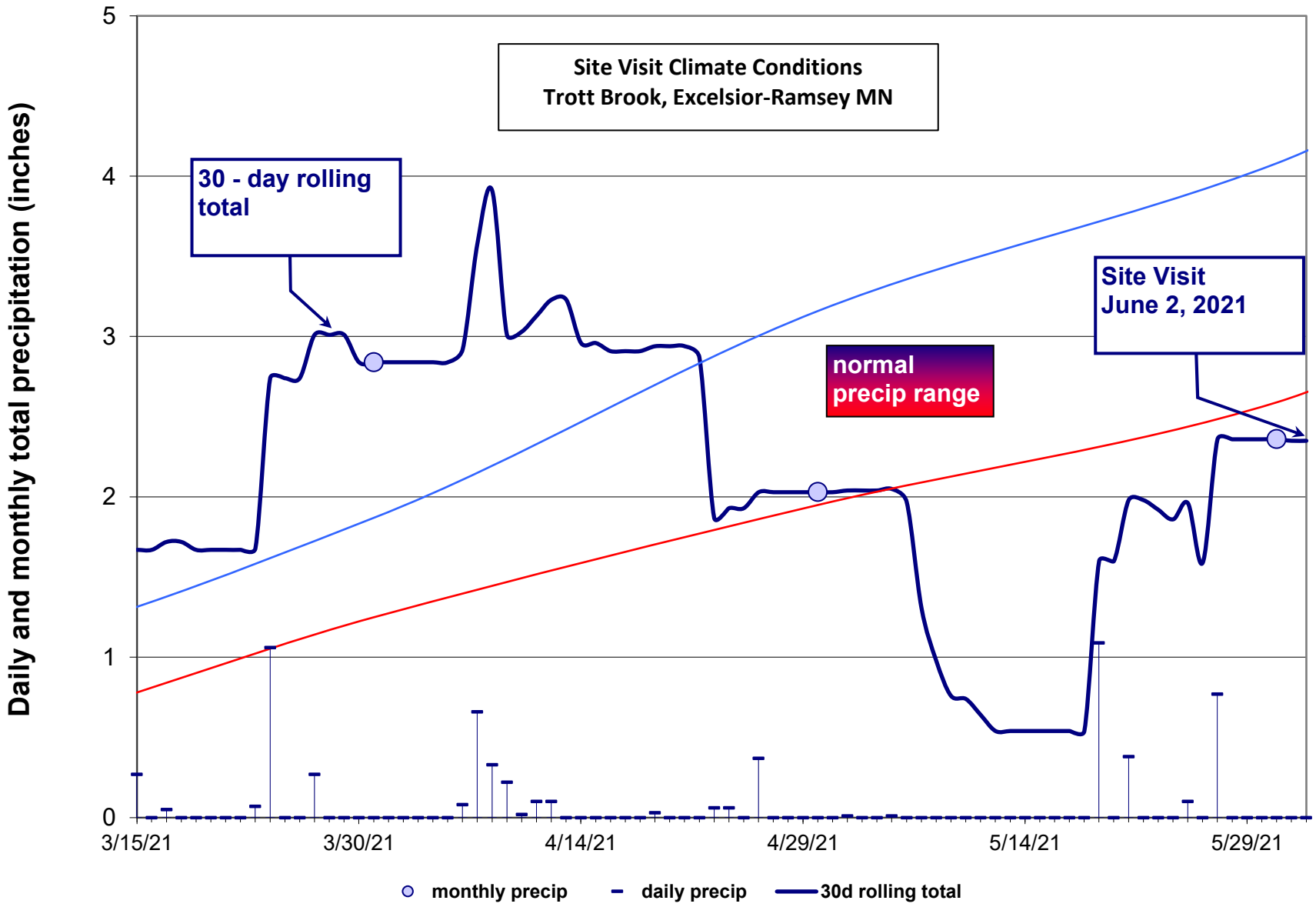
Aerial photograph or site visit date:
Wednesday, June 2, 2021

Score using 1981-2010 normal period

values are in inches A 'R' following a monthly total indicates a provisional value derived from radar-based estimates.	first prior month: **May 2021**	second prior month: **April 2021**	third prior month: **March 2021**
estimated precipitation total for this location:		**2.25R**	**2.78R**
there is a 30% chance this location will have less than:	2.59	1.95	1.25
there is a 30% chance this location will have more than:	4.08	3.16	1.87
type of month: dry normal wet		**normal**	**wet**
monthly score		**2 * 2 = 4**	**1 * 3 = 3**
multi-month score: 6 to 9 (dry) 10 to 14 (normal) 15 to 18 (wet)			

Other Resources:

- retrieve daily precipitation data
- view radar-based precipitation estimates
- view weekly precipitation maps
- *Evaluating Antecedent Precipitation Conditions* (BWSR)


Site Visit Climate Conditions
Trott Brook, Excelsior-Ramsey MN
30 - day rolling total
normal precip range
Site Visit June 2, 2021
Daily and monthly total precipitation (inches)
0
1
2
3
4
5
3/15/21
3/30/21
4/14/21
4/29/21
5/14/21
5/29/21
monthly precip
daily precip
30d rolling total

Trott Brook Site, Excelsior-Ramsey MN: Precipitation Summary
Source: Minnesota Climatology Working Group

Monthly Totals: 2021 latitude: 45.27746 longitude: 93.45999
Target: T32 R25 S9

mon	year	cc	tttN	rrW	ss	nnnn	oooooooo	pre (inches)
Jan	2021	71	33N	26W	33	NWS	ELK RIVE	.65
Feb	2021	27	119N	22W	1	SWCD		.59
Mar	2021	27	119N	22W	1	SWCD		2.84
Apr	2021	2	32N	25W	6	SWCD		2.03
May	2021	27	119N	22W	1	SWCD		2.36
Jun	2021	27	119N	22W	1	SWCD		.95

April/May/June Daily Records

Date	Precip.
Apr 1, 2021	0
Apr 2, 2021	0
Apr 3, 2021	0
Apr 4, 2021	0
Apr 5, 2021	0
Apr 6, 2021	.08
Apr 7, 2021	.66
Apr 8, 2021	.33
Apr 9, 2021	.22
Apr 10, 2021	.02
Apr 11, 2021	.10
Apr 12, 2021	.10
Apr 13, 2021	T
Apr 14, 2021	0
Apr 15, 2021	0
Apr 16, 2021	0
Apr 17, 2021	0
Apr 18, 2021	0
Apr 19, 2021	.03
Apr 20, 2021	0
Apr 21, 2021	0
Apr 22, 2021	0
Apr 23, 2021	.06
Apr 24, 2021	.06
Apr 25, 2021	0
Apr 26, 2021	.37
Apr 27, 2021	T
Apr 28, 2021	0
Apr 29, 2021	0
Apr 30, 2021	0

Date	Precip.
May 1, 2021	0
May 2, 2021	.01
May 3, 2021	0
May 4, 2021	0
May 5, 2021	.01
May 6, 2021	0
May 7, 2021	0
May 8, 2021	0
May 9, 2021	0
May 10, 2021	T
May 11, 2021	0
May 12, 2021	0
May 13, 2021	0
May 14, 2021	T
May 15, 2021	0
May 16, 2021	0
May 17, 2021	0
May 18, 2021	0
May 19, 2021	1.09
May 20, 2021	0
May 21, 2021	.38
May 22, 2021	0
May 23, 2021	0
May 24, 2021	0
May 25, 2021	.10
May 26, 2021	0
May 27, 2021	.77
May 28, 2021	0
May 29, 2021	0
May 30, 2021	T
May 31, 2021	m

Date	Precip.	
Jun 1, 2021	0	
Jun 2, 2021	T	Site Visit
Jun 3, 2021	0	
Jun 4, 2021	0	
Jun 5, 2021	0	
Jun 6, 2021	0	
Jun 7, 2021	0	
Jun 8, 2021	.14	
Jun 9, 2021	0	
Jun 10, 2021	0	
Jun 11, 2021	0	
Jun 12, 2021	0	
Jun 13, 2021	0	
Jun 14, 2021	0	
Jun 15, 2021	0	
Jun 16, 2021	0	
Jun 17, 2021	0	
Jun 18, 2021	0	
Jun 19, 2021	0	
Jun 20, 2021	.15	
Jun 21, 2021	0	
Jun 22, 2021	0	
Jun 23, 2021	0	
Jun 24, 2021	0	
Jun 25, 2021	0	
Jun 26, 2021	.24	
Jun 27, 2021	0	
Jun 28, 2021	.42	

1981-2010 Summary Statistics

	Jan	*Feb*	*Mar*	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*	*WARM*	*ANN*	*WAT*
30%	0.42	0.42	1.25	1.95	2.59	3.67	2.93	3.66	2.26	1.39	0.96	0.66	16.43	27.57	27.60
70%	1.08	0.96	1.87	3.16	4.08	5.31	4.48	4.76	4.59	3.44	2.37	1.24	22.49	33.73	34.58
mean	0.81	0.75	1.64	2.69	3.52	4.32	4.12	4.22	3.73	2.61	1.72	1.04	19.91	31.17	30.99

Trott Brook North Property, Ramsey

Wetland Delineation Report

APPENDIX D

Offsite Hydrology Review Recording Form and Aerial Photos

Exhibit 1 Field data sheet reference (if applicable):_____

Wetland Hydrology from Aerial Imagery – Recording Form

Project Name: Trott Brook North **Date:** 7-15-2021 **County:** Anoka

Investigator: M. Barrett **Legal Description (S, T, R):** S:9 & 10 T:32N R:25W

Summary Table

Date Image Taken (M-D-Y)	Image Source	Climate Condition (wet, dry, normal)[i]	Image Interpretation(s)				
			Area: A	Area: B	Area: C	Area: D	Area: E
9-15-2015	FSA	Normal	NV	NV	NV	DO (small) (1)	DO (1)
8-31-2017	FSA	Normal	DO (small) (1)	NV	NV	DO (small) (2)	DO (2)
4-28-2018	Google	Normal	NV	NV	NV	DO (3)	DO (3)
7-1-2019	FSA	Normal	DO (small) (2)	NV	NV	DO (4)	DO (4)
10-9-2020	Google	Normal	NV	NV	NV	DO (small) (5)	DO (small) (5)
Number of normal years			5	5	5	5	5
Number with wet signatures			2	0	0	5	5
Percent with wet signatures			40 %	0%	0%	100%	100%
			Area: F				
9-15-2015	FSA	Normal	DO (1)				
8-31-2017	FSA	Normal	DO (2)				
4-28-2018	Google	Normal	DO (3)				
7-1-2019	FSA	Normal	DO (4)				
10-9-2020	Google	Normal	DO (5)				
Number of normal years			5				
Number with wet signatures			5				
Percent with wet signatures			100%				

KEY		
WS - wetland signature	SS - soil wetness signature	CS - crop stress
NC - not cropped	AP - altered pattern	NV - normal vegetative cover
DO - drowned out	SW - standing water	NSS – no soil wetness signature
Other labels or comments:	Washout – Apparent Erosion	

- Use above key to label image interpretations. It is imperative that the reviewer read and understand the guidance associated with the use of these labels. If alternate labels are used, indicate in box above.
- If less than five (5) images taken during normal climate conditions are available, use an equal number of images taken during wet and dry climate conditions and use as many images as you have available. Describe the results using this methodology in your report.

[i] Use MN State Climatology website to determine climate condition

Exhibit 1 Field data sheet reference (if applicable):_____

Wetland Determination from Aerial Imagery – Recording Form

Project Name: Martin Farms Outlots **Date:** 11-11-2020 **County:** Wright

Investigator: M. Barrett **Legal Description (S, T, R):** S:30 T:121N R:23W

Use the Decision Matrix below to complete Table 1.

Hydric Soils present[1]	Identified on NWI or other wetland map[2]	Percent with wet signatures from Exhibit 1	Field verification required[3]	Wetland?
Yes	Yes	>50%	No	Yes
Yes	Yes	30-50%	No	Yes
Yes	Yes	<30%	Yes	Yes, if other hydrology indicators present
Yes	No	>50%	No	Yes
Yes	No	30-50%	Yes	Yes, if other hydrology indicators present
Yes	No	<30%	No	No
No	Yes	>50%	No	Yes
No	Yes	30-50%	No	Yes
No	Yes	<30%	No	No
No	No	>50%	Yes	Yes, if other hydrology indicators present
No	No	30-50%	Yes	Yes, if other hydrology indicators present
No	No	<30%	No	No

[1] The presence of hydric soils can be determined from the "Hydric Rating by Map Unit Feature" under "Land Classifications" from the Web Soil Survey. "Not Hydric" is the only category considered to not have hydric soils. Field sampling for the presence/absence of hydric soil indicators can be used in lieu of the hydric rating if appropriately documented by providing completed field data sheets.

[2] At minimum, the most updated NWI data available for the area must be reviewed for this step. Any and all other local or regional wetland maps that are publicly available should be reviewed.

[3] Area should be reviewed in the field for the presence/absence of wetland hydrology indicators per the applicable 87 Manual Regional Supplement, including the D2 indicator (geomorphic position).

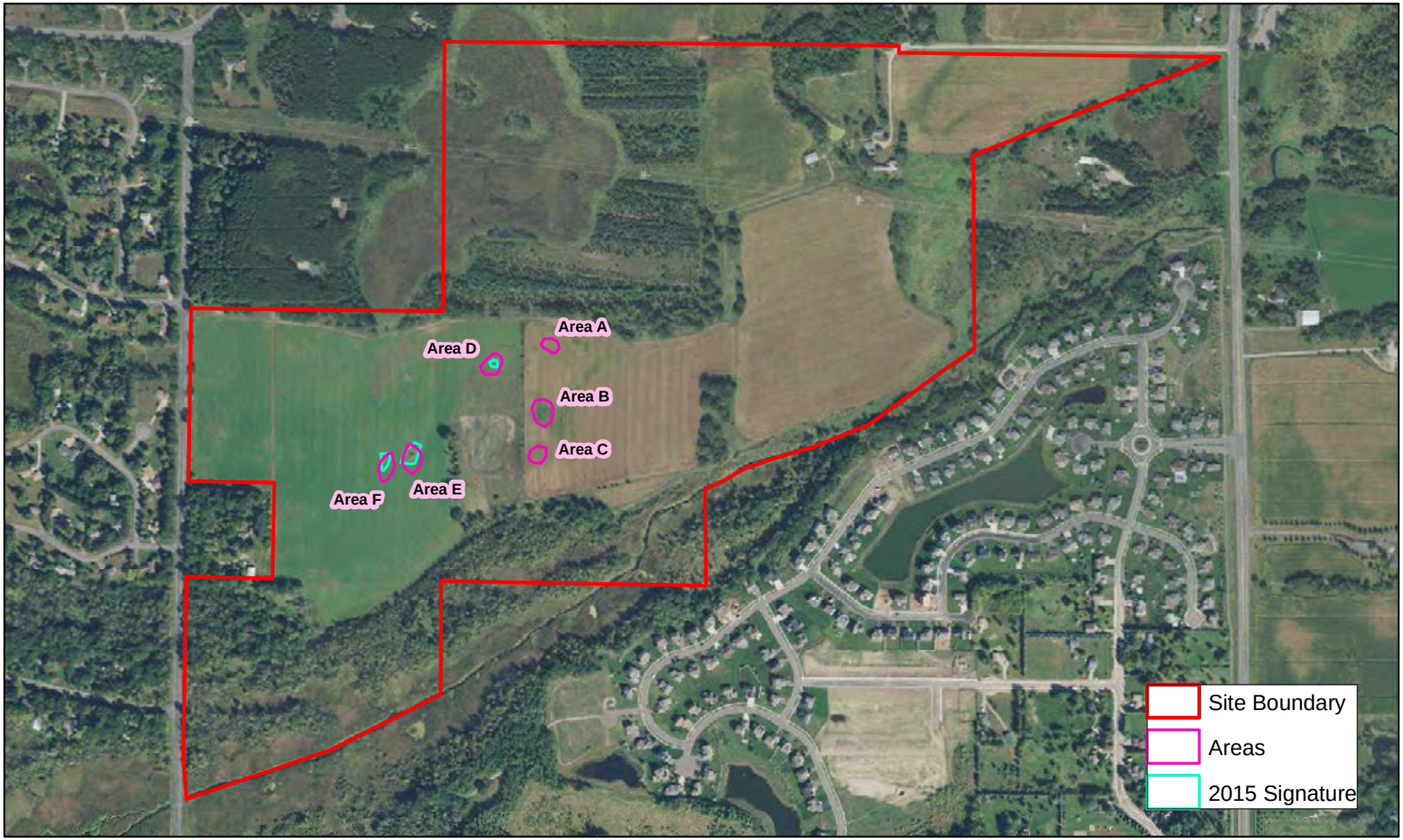
Table 1.

Area	Hydric Soils Present	Identified on NWI or other wetland map	Percent with wet signatures from Exhibit 1	Other hydrology indicators present[1]	Wetland?
A	No	No	40%	Field verification required; no other indicators present	No (SP-A)
B	No	No	0%	Field verification not required	No
C	No	No	0%	Field verification not required	No
D	No	No	100%	Field verification not required	Yes (WL2)
E	No	Yes	100%	Field verification not required	Yes (WL1)
F	No	Yes	100%	Field verification not required	Yes (WL3)

[1] Answer "N/A" if field verification is not required and was not conducted

[2] Soils mapped as partially hydric

[3] FVNR = Field Verification Not Required



9-15-2015 & 9-27-2015 FSA Photo - Normal Conditions

N

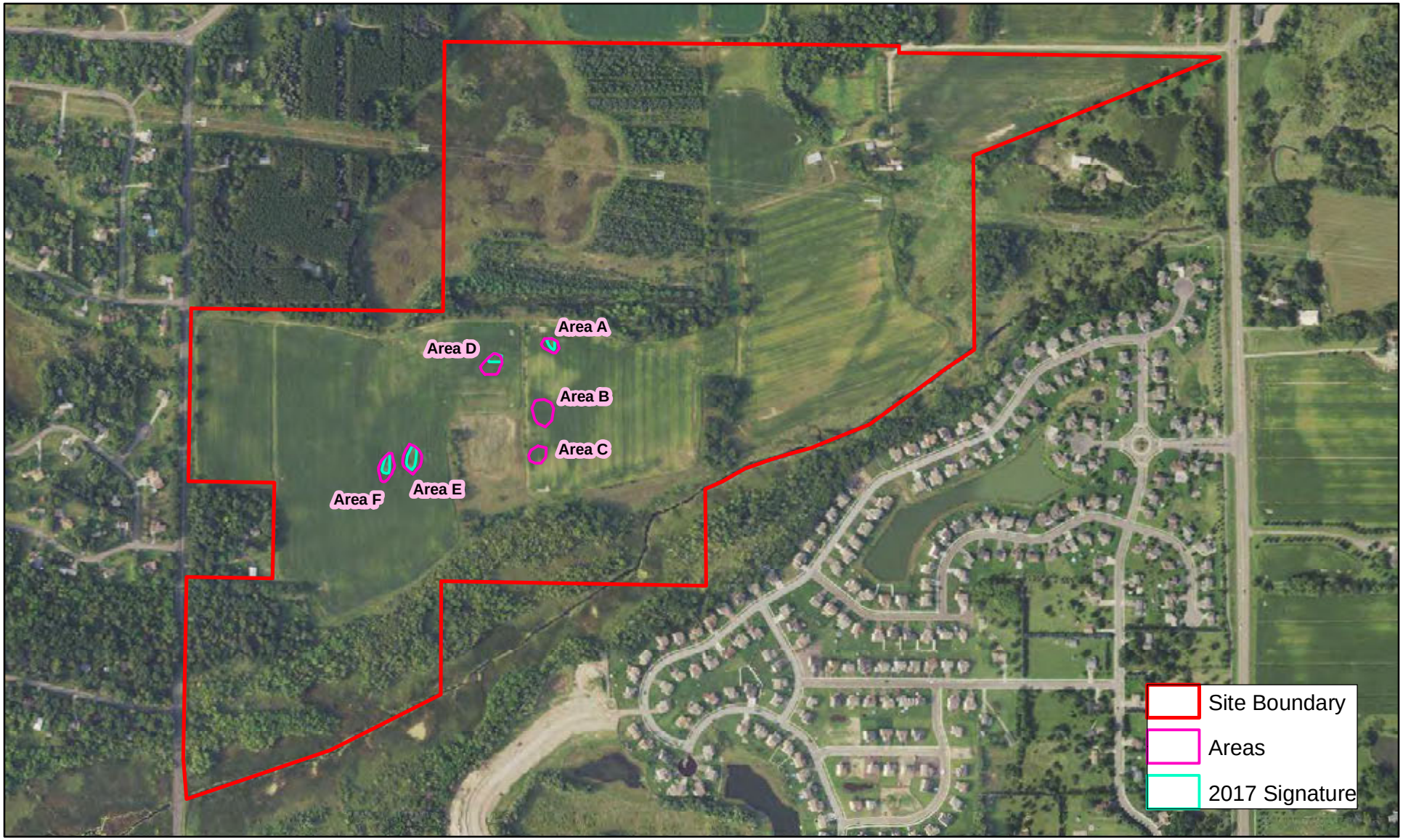
0 2,000 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MNGEO Spatial Commons

Trott Brook North Property (KES 2021-108)
Ramsey, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.



8-31-2017 FSA Photo - Normal Conditions

N

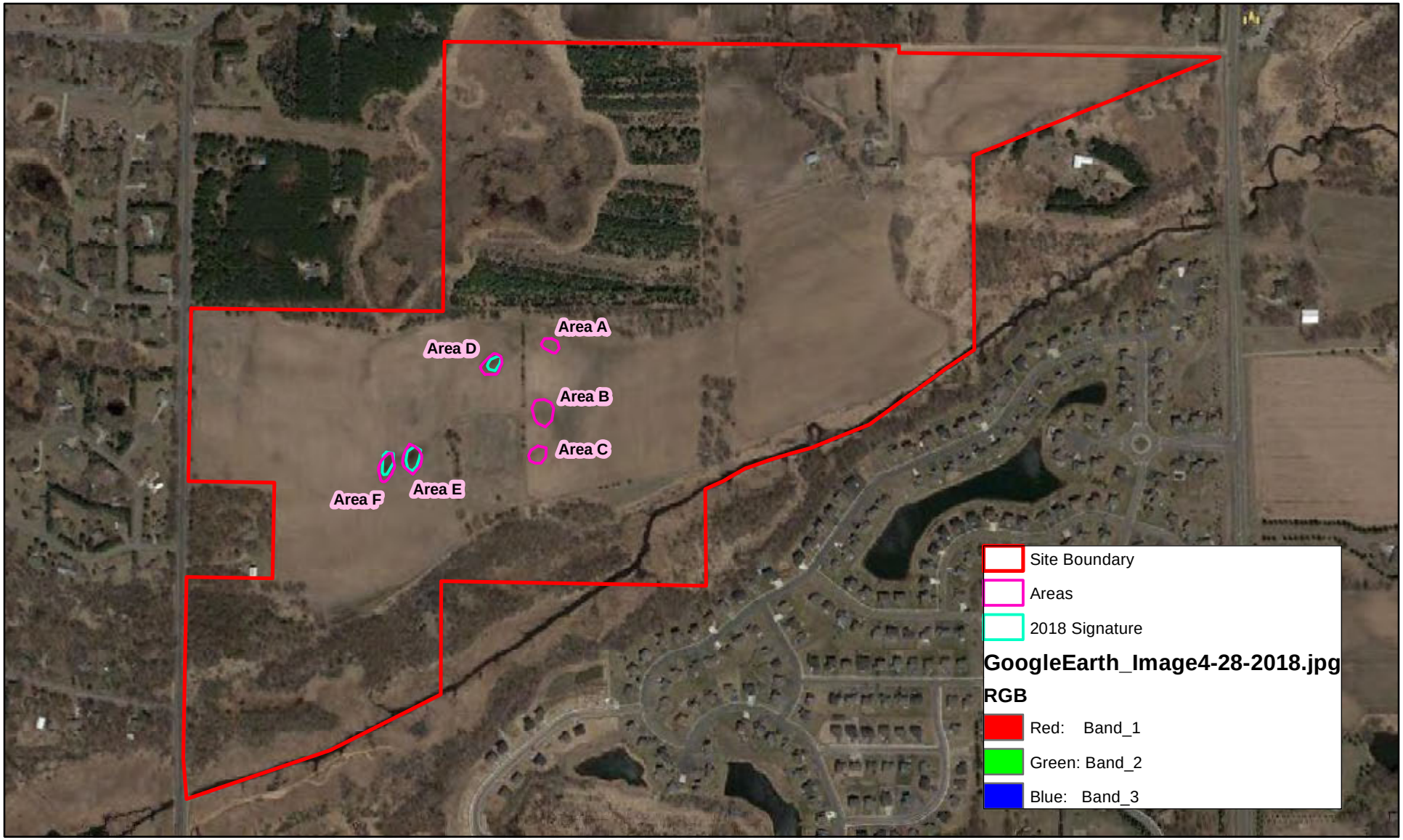
0 2,000 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MNGEO Spatial Commons

Trott Brook North Property (KES 2021-108)
Ramsey, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.



4-28-2018 Google Earth - Normal Conditions

N

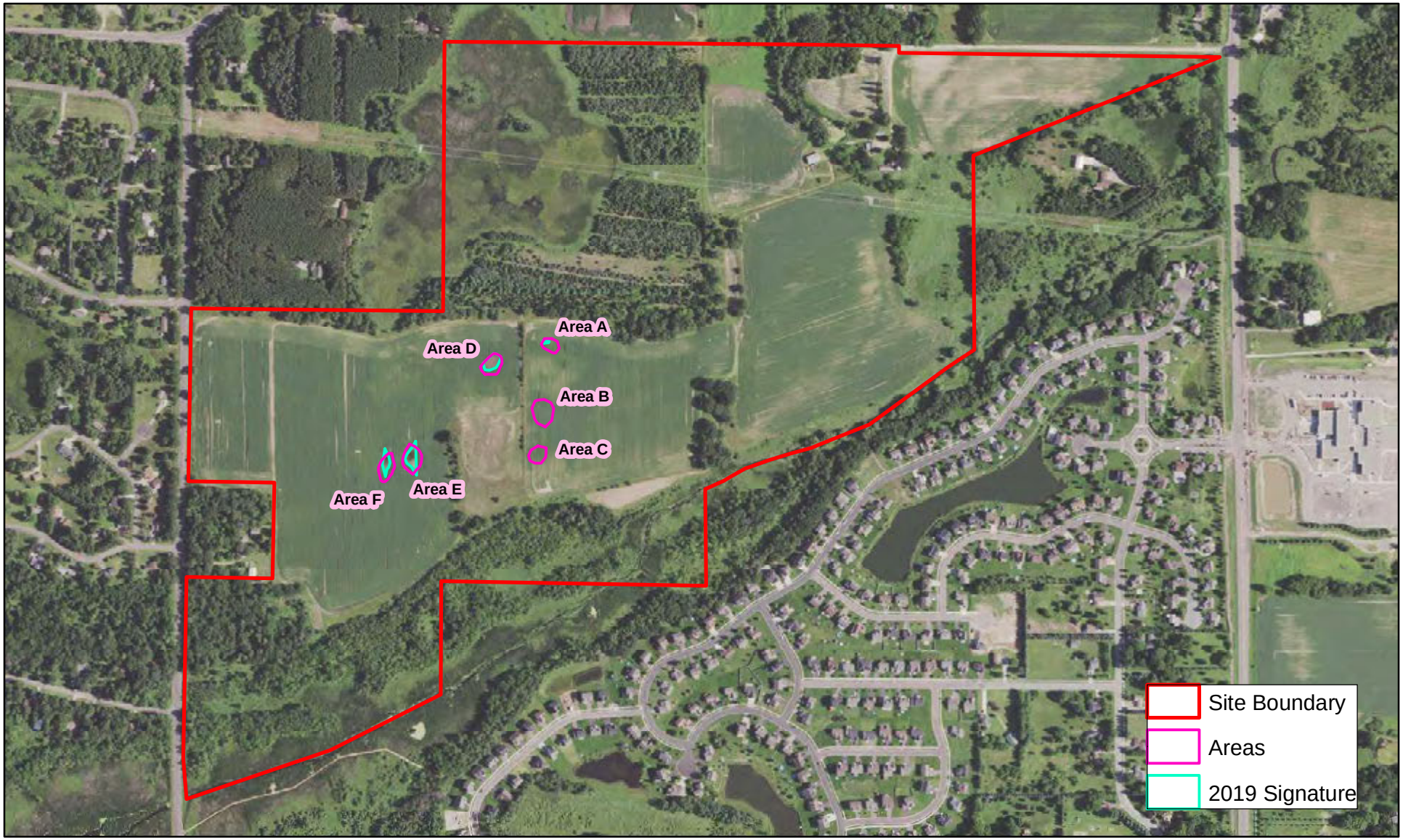
0 2,000 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MNGEO Spatial Commons

Trott Brook North Property (KES 2021-108)
Ramsey, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.



7-1-2019 (assumed) FSA Photo - Normal Conditions

N

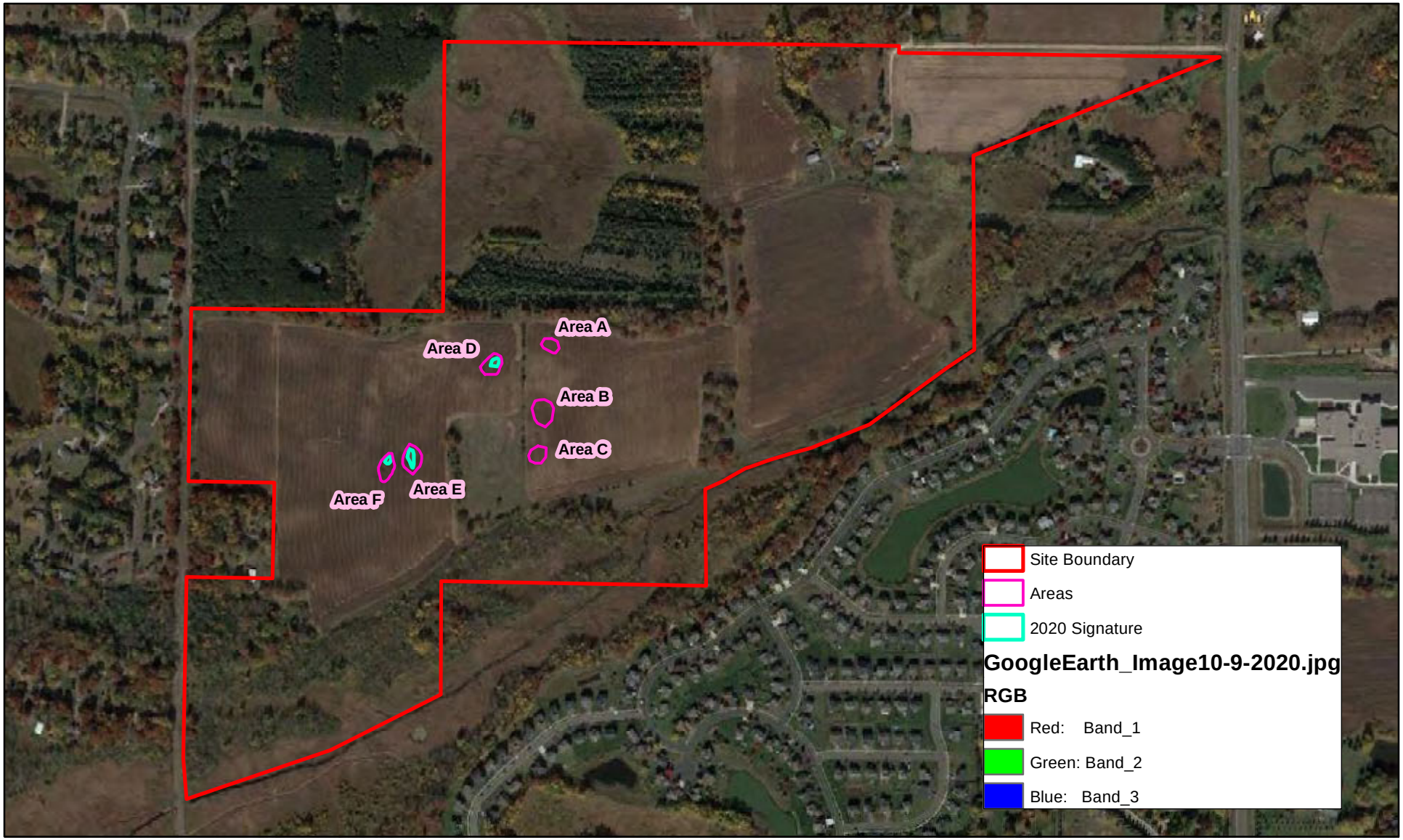
0 2,000 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MNGEO Spatial Commons

Trott Brook North Property (KES 2021-108)
Ramsey, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.



10-9-2020 Google Earth - Normal Conditions

N

0 2,000 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MNGEO Spatial Commons

Trott Brook North Property (KES 2021-108)
Ramsey, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.

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Appendix C

GeoTechnical Boring Report

Trott Brook Crossing EAW

HAUGO GEOTECHNICAL SERVICES

August 6, 2021 HGTS Project Number: 21-0561

Ms. Tracey Rust
The Excelsior Group
1660 Highway 100 South, Suite 400
St. Louis Park, MN 55416

Re: Geotechnical Exploration Report, Proposed Trott Brook Property, Residential Development, West of Nowthen Boulevard NW and North of Trott Brook, Ramsey, Minnesota

Dear Ms. Rust:

We have completed the geotechnical exploration report for the proposed residential development in Ramsey, Minnesota. A brief summary of our results and recommendations is presented below. Specific details regarding our procedures, results and recommendations follow in the attached geotechnical exploration report.

Twelve (12) soil borings were completed for this project that encountered about 1foot of sandy topsoil that was underlain by predominantly sand soils that extended to the termination depths of the borings. Groundwater was encountered in the soil borings at depths ranging from about 7 ½ to 19 ½ feet below the ground surface and to further evaluate groundwater levels three piezometers were installed. Water level measurements are on-going and results will be forwarded as they become available.

The vegetation and topsoil are not suitable for foundation support and will need to be removed from within the proposed building and oversize areas and replaced with suitable compacted engineered fill. In our opinion, the underlying native alluvial soils are generally suitable for foundation support. However, the native sands had a loose relative density and will need to be surface compacted to increase their density to provide adequate foundation support.

With the building pad prepared as recommended it is our opinion that the foundation for the proposed building can be designed for a net allowable soil bearing capacity up to 2,000 pounds per square foot.

Thank you for the opportunity to assist you on this project. If you have any questions or need additional information, please contact Paul Gionfriddo at 612-729-2959.

Sincerely,
Haugo GeoTechnical Services

Nic Alfonso, G.I.T.
Project Geologist

Paul Gionfriddo, P.E.
Senior Engineer

GEOTECHNICAL EXPLORATION REPORT

PROJECT:

Proposed Residential Development
Trott Brook Property
Ramsey, Minnesota

PREPARED FOR:

The Excelsior Group
1660 Highway 100 South, Suite 400
St. Louis Park, MN 55416

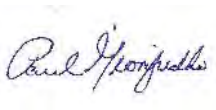
PREPARED BY:

Haugo GeoTechnical Services
2825 Cedar Avenue South
Minneapolis, Minnesota 55407

Haugo GeoTechnical Services Project: 21-0429

August 6, 2021

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Registered Professional Engineer under the laws of the State of Minnesota.



Paul Gionfriddo, P.E.
Senior Engineer
License Number: 23093

Table of Contents

1.0 INTRODUCTION

1.1 Project Description

The Excelsior Group is proposing Tamarack Land Development (Tamarack) is preparing for construction of the Trott Brook Property residential development located west of Nowthen Boulevard and north of Trott Brook in Ramsey, Minnesota. We understand the development will include preparing lots and house pads for about 270 single-family homes along with the associated streets(s), underground utilities and stormwater pond(s).

1.2 Purpose

The Excelsior Group retained Haugo GeoTechnical Services, LLC (HGTS) to perform a geotechnical exploration to evaluate the suitability of site soil and groundwater conditions to support the anticipated residential structures, roadways and underground utilities and provide recommendation for foundation and pavement design and construction.

1.3 Site Description

The project site is located west of Nowthen Boulevard and north of Trott Brook in Ramsey, Minnesota. The overall property is approximately 200 acres with delineated wetlands, dedicated parks and street Right of Ways accounting for about 73 acres yielding about 123 acres of developable land. Except for the wetlands, the majority of the site existed as agricultural lands with wooded areas.

The site topography varied with the ground surface elevations at the soil boring locations ranging from about 875 to 903 feet above mean sea level (MSL).

1.4 Scope of Services

Our services were performed in accordance with the Haugo GeoTechnical Services proposal 21-0429 dated April 8, 2021. Our scope of services was performed under the terms of our General Conditions and limited to the following tasks:

- Completing twelve (12) standard penetration test soil borings and extending each to nominal depths of 20 feet.
- Installing 3 piezometers and constructing them in accordance with Minnesota Department of Health (MDH) requirements.
- Removing the piezometers and sealing the boreholes, upon completion of water level monitoring, in accordance with MDH requirements.
- Obtaining GPS coordinates and ground surface elevations at the soil boring locations.
- Visually/manually classifying samples recovered from the soil borings.
- Performing laboratory tests on selected samples.
- Preparing soil boring logs describing the materials encountered and the results of groundwater level measurements.
- Preparing an engineering report describing current soil and groundwater conditions and providing recommendations for foundation design and construction.

HGTS completed a Phase I Environmental Site Assessment in conjunction with this geotechnical exploration. Results of the Phase I ESA are presented under separate cover under HGTS project number 21-0560.

1.5 Documents Provided

We were provided a site plan titles "Concept Plan 9" (Concept Plan) that as prepared by Pioneer Engineering and was dated October 19, 2019. The Concept Plan was not signed. The Concept Plan showed a layout of the proposed development superimposed onto an aerial photograph that also included topographic contours. The proposed soil boring locations were hand sketched onto the Concept Plan.

We were also provided a topographic map of the project site with some of the surrounding areas also included on the map. The soil boring locations and ground surface elevations at the boring locations were also shown on the map. The map appeared to be a portion of a larger map and was not signed or dated however we understand the map was prepared by Carlson McCain.

Other than the documents described above, specific architectural, structural or civil plans were not provided.

1.6 Locations and Elevations

The soil boring locations was selected and staked in the field by Carlson McCain. The approximate locations of the soil borings are shown on Figure 1, "Soil Boring Location Sketch," in the Appendix. The sketch was prepared by HGTS using an aerial image obtained from Google Earth as a base.

HGTS obtained ground surface elevations and coordinates at the boring locations using GPS technology based on the MN County Coordinate System (Anoka County). GPS coordinates and ground surface elevations are shown on Figure 2 in the Appendix.

2.0 FIELD PROCEDURES

Twelve (12) standard penetration test borings were advanced on July 21st and 22nd, 2021 by HGTS with a rotary drilling rig, using continuous flight augers to advance the boreholes. Representative samples were obtained from the borings, using the split-barrel sampling procedures in general accordance with ASTM Specification D-1586. In the split-barrel sampling procedure, a 2-inch O.D. split-barrel spoon is driven into the ground with a 140-pound hammer falling 30 inches. The number of blows required to drive the sampling spoon the last 12 inches of an 18-inch penetration is recorded as the standard penetration resistance value, or "N" value. The results of the standard penetration tests are indicated on the boring logs. The samples were sealed in containers and provided to HGTS for testing and soil classification.

A field log of each boring was prepared by HGTS. The logs contain visual classifications of the soil materials encountered during drilling, as well as the driller's interpretation of the subsurface conditions between samples and water observation notes. The final boring logs

included with this report represents an interpretation of the field logs and include modifications based on visual/manual method observation of the samples.

The soil boring logs, general terminology for soil description and identification, and classification of soils for engineering purposes are also included in the appendix. The soil boring log identify and describe the materials encountered, the relative density or consistency based on the Standard Penetration resistance (N-value, "blows per foot") and groundwater observations.

The strata changes were inferred from the changes in the samples and auger cuttings. The depths shown as changes between strata are only approximate. The changes are likely transitions, variations can occur beyond the location of the boring.

Three piezometers were also installed during drilling operations. One piezometer was installed in the borehole of soil boring SB-4, SB-6 and SB-10. The piezometer consists of a 10 foot long, 1 inch diameter schedule 40 slotted well screen and riser pipe set at about 20 feet below the ground surface. A sand pack was placed around the well screen and bentonite seal placed above the sand pack. A lockable steel protector pipe was then placed over the riser pipe and grouted in-place.

3.0 RESULTS

3.1 Soil Conditions

At the surface, the soil borings encountered about 1 foot of topsoil consisting of poorly graded sand with silt and silty sand that was dark brown or brown in color and contained traces of roots.

Below the topsoil, the soil borings encountered alluvial soils that extended to the termination depths of the borings. The alluvial soils predominantly consisted of poorly graded sand, poorly graded sand with silt with minor amount of silty sand encountered in soil boring SB-6. Clayey sand and silty clay were encountered below the topsoil at soil boring SB-10 and extended to depth of about 12 feet below the ground surface. Silty clay and clayey sand were also encountered in soil boring SB-12 at about 12 feet below the ground surface and extended to the termination depth of the boring.

Penetration resistance values (N-Values), shown as blows per foot (bpf) on the boring logs, within the poorly graded sand, poorly graded sand with silt and silty sand ranged from 2 to 21 with most of the values less than 10 bpf. These values indicate the soils had a very loose to medium dense relative density but were mostly very loose to loose.

N-Values within the clayey sand and silty clay ranged from 2 to 10 bpf indicating soft to rather stiff consistency.

3.2 Groundwater

Groundwater was encountered in 10 of the 12 soil borings while drilling and sampling at depths ranging from about 7 ½ to 19 ½ feet below the ground surface corresponding to elevations ranging from about 863 to 881 ½ feet above mean sea level. The observed water levels while drilling and sampling are summarized in Table 1.

Table 1. Summary of Groundwater Levels

Boring Number	Measured Surface Elevation (feet)	Approximate Depth to Groundwater (feet)*	Approximate Groundwater Elevation (feet)*
SB-1	884.3	18	866 ½
SB-2	903.2	NE	-
SB-3	889.1	9 ½	879 ½
SB-4	892.4	10	881 ½
SB-5	888.3	12 ½	876
SB-6	883.3	7 ½	876
SB-7	882.6	19 ½	863
SB-8	875.1	12	863
SB-9	888.5	7 ½	881
SB-10	890.0	12	878
SB-11	902.5	NE	-
SB-12	885.7	14 ½	871

* = Depths and elevations were rounded to the nearest ½ foot.

To further characterize groundwater conditions, piezometers were installed in borings SB-4, SB-6 and SB-10. Water levels were measured on august 4th , 2021 and are summarized in Table 2.

Table 2. Piezometer Water Level Summary

Date	Measured Ground Surface Elevation (feet)	Elevation of Top of Piezometer Casing (feet)	Approximate Depth to Groundwater (feet)	Approximate Groundwater Elevation (feet)*
Boring/Piezometer SB-4				
8/4/21	892.4	894.54	10.81	883.7
Boring/Piezometer SB-6				
8/4/21	883.3	884.88	8.26	876.6
Boring/Piezometer SB-10				
8/4/21	890.0	893.00	8.75	884.3

* = Depth to groundwater was measured from top of the piezometer casing pipe.
Groundwater levels and elevations were rounded to the nearest 0.1 foot.

Water levels were measured on the dates as noted on the boring logs and in Table 2 the period of water level observations was relatively short. Seasonal and annual fluctuations in the groundwater levels should be expected.

3.3 Laboratory Testing

Laboratory moisture content and precent passing the #200 sieve (P-200) content tests were performed on selected samples recovered from the soil borings. Table 3 below summarizes the results of the laboratory tests. Results of the laboratory tests are also shown on the boring log adjacent to the sample tested.

Table 3. Summary of Laboratory Tests

Boring Number	Sample Number	Depth (feet)	Moisture Content (%) *	P-200 Content (%) *
SB-1	SS-11	5	3 ½	3
SB-2	SS-3	5	5 ½	4 ½
SB-4	SS-27	5	5 ½	4
SB-5	SS-43	5	7	2 ½
SB-6	SS-35	5	8 ½	6 ½
SB-8	SS-59	5	7	5 ½
SB-9	SS-66	2 ½	2	5 ½
SB-9	SS-67	5	17	4
SB-10	SS-75	5	45	-
SB-10	SS-76	7 ½	48	-
SB-12	SS-91	5	4	4
SB-12	SS-94	12 ½	41	-
SB-12	SS-95	15	25 ½	-
SB-12	SS-96	20	65	-

*Moisture content values rounded to the nearest ½ percent.

3.4 OSHA Soil Classification

The soils encountered in the borings consisted of predominantly of sandy soils composed of poorly graded sand, poorly graded sand with silt and silty sand corresponding to the ASTM classifications of SP, SP-SM and SM. These soils will generally be Type C soils under Department of Labor Occupational Safety and Health Administration (OSHA) guidelines.

The borings also encountered clayey sand and silty clay that mostly had a soft consistency. For that reason, the clayey sand and silty clay will also generally be Type C soils under OASHA guidelines.

An OSHA-approved qualified person should review the soil classification in the field. Excavations must comply with the requirements of OSHA 29 CFR, Part 1926, Subpart P, "Excavations and Trenches." This document states excavation safety is the responsibility of the contractor. The project specifications should reference these OSHA requirements.

4.0 DISCUSSION AND RECOMMENDATIONS

4.1 Proposed Construction

We understand the project will consist of constructing an approximate 270 lot residential development including the associated streets underground utilities and stormwater ponds.

Specific architectural, structural or civil construction plans were not available at the time of this geotechnical evaluation. We anticipate the new homes will include one or two stories above grade with partial to full depth basements. We anticipate below grade construction consisting of cast-in-place concrete or masonry block foundation walls supported on concrete spread footings with the above grade construction likely consisting of wood framing, a pitched roof and asphalt shingles.

Based on the assumed construction we estimate wall loadings will range from about 2 to 3 kips (2,000 to 3,000 pounds) per lineal foot and column loads, if any will be less than 75 kips (75,000 pounds).

We anticipate that the proposed house pads and street will be constructed near existing site graded so that cuts and fills for permanent grade changes will typically be on the order of 5 feet but given the relatively large elevation changes across the site we anticipate there could be cuts and fills on the order of 10 feet.

We have attempted to describe our understanding of the project. If the proposed loads exceed these values, the proposed grades differ by more than 2 feet from the assumed values or if the design or location of the proposed building changes, we should be informed. Additional analyses and revised recommendations may be necessary.

4.2 Discussion

Structures existed on north central portion of the project site which we assume will be removed/demolished to make way for the proposed development. We recommend that all remnants of the structures including; foundations, foundation walls, floor slabs and any underground utilities be removed from within the proposed building, roadway, utility and oversize areas and be properly disposed of off-site.

The vegetation and topsoil are not suitable for foundation support and will need to be removed from below the building and oversize areas and replaced, as needed, with suitable compacted engineered fill.

It is our opinion that the underlying native alluvial soils are generally suitable for foundation support. However, the sand soils had a very loose to loose relative density and will need to be compacted to increase their density to provide adequate foundation support.

In addition, some soft clayey soils were encountered in soil boring SB-10 at about 4 ½ feet below the ground surface and at about 12 feet below the ground surface at soil boring SB-12. The soft clays are not suitable for foundation support and will need to be removed from below the proposed house pad and oversize areas and will either need to be replaced with suitable compacted engineered fill or excavated, dried and recompacted.

Groundwater was encountered in 10 of the 12 soil borings at depths ranging from about 7 ½ to 19 ½ feet below the ground surface, corresponding to elevations ranging from about 963 to 881 ½ feet above mean sea level. We generally do not anticipate that groundwater will be encountering during grading activities but could be encountered during utility construction and dewatering could be required.

With the building pad prepared as recommended, it is our opinion the footings can be designed for a net allowable bearing pressure up to 3,000 pounds per square foot (psf).

The following sections provide recommendations for foundation design and construction.

4.3 Site Grading Recommendations

Excavation Structures exist on the project site that will be removed/demolished to make way for the proposed development. We recommend that all building remnants including former foundations, footings, floor slabs, foundation walls and underground utilities be removed from within the building, roadway, utility and oversize area.

We recommend that all vegetation, topsoil and any soft or otherwise unsuitable soils, if encountered, be removed from below the proposed building and oversize areas. Table 4 below summarizes the anticipated excavation depths at the soil boring locations. Excavation depths may vary and could be deeper.

Table 4. Anticipated Excavation Depths

Boring Number	Measured Surface Elevation (feet)	Anticipated Excavation Depth (feet)*	Anticipated Excavation Elevation (feet)*	Approximate Groundwater Elevation (feet)*
SB-1	884.3	1 (Pond)	883 ½	866 ½
SB-2	903.2	1 (Pond)	902	NE
SB-3	889.1	1	888	879 ½
SB-4	892.4	1 (Pond)	891 ½	881 ½
SB-5	888.3	1	887 ½	876
SB-6	883.3	1 (Pond)	882 ½	876
SB-7	882.6	1	881 ½	863
SB-8	875.1	1 (Pond)	874	863
SB-9	888.5	1 (Pond)	887 ½	881
SB-10	890.0	1 – 12	889 – 878	878
SB-11	902.5	1	901 ½	NE
SB-12	885.7	1 (Pond)	884 ½	871.2

* = Excavation and groundwater elevations were rounded to nearest ½ foot. NE = Not Encountered

Oversizing In areas where the excavations for soil corrections extend below the proposed footing elevations, the excavations require oversizing. We recommend the perimeter of the excavation be extended a foot outside the proposed footprint for every foot below footing grade (1H:1V oversizing). The purpose of the oversizing is to provide lateral support of the foundation.

Fill Material Fill required to attain site grades may consist of any debris-free, non-organic mineral soil. Except, we recommend that fill or backfill placed in wet excavations or within 2 feet of the groundwater table consist of granular soil (sand) with less than 5 percent passing the number 200 sieve and at least 50 percent retained on the number 40 sieve.

The on-site soils appear to be generally suitable for reuse as structural fill or backfill. Soils that will be used or reused as fill or backfill will could require some moisture conditioning (wetting) to meet the recommend compaction levels. Clayey soils (SB-10 and SB-12) that will be reused as fill or backfill will likely require significant drying to meet the recommend compaction levels. Summer months are typically more favorable for drying wet soils.

Topsoil or soils that are black in color are not suitable for reuse as structural fill or backfill.

Backfilling We recommend any loose sands or soil disturbed during excavation activities be surface compacted to increase their density and uniformity prior to placing additional fill and/or footings. We recommend the exposed soil be surface compacted with a large self-propelled vibratory compactor operating in vibratory mode.

We recommend that backfill placed to attain site grades be compacted to a minimum of 95 percent of its standard Proctor density (ASTM D 698). Granular fill classified as SP or SP-SM should be placed within 65 percent to 105 percent of its optimum moisture content as determined by the standard Proctor. Other fill soils should be placed within 3 percentage points above and 1 percentage point below its optimum moisture content as determined by the standard Proctor. All fill should be placed in thin lifts and be compacted with a large self-propelled vibratory compactor operating in vibratory mode.

Foundations We recommend the perimeter footings bear a minimum of 42 inches below the exterior grade for frost protection. Interior footings may be placed immediately below the slab provided construction does not occur during below freezing weather conditions. Foundation elements in unheated areas should bear at least 5 feet below exterior grade for frost protection.

We anticipate the foundations and floor slabs will bear on compacted engineered fill (sand fill) or native alluvial sand soils. With the building pad prepared as recommended, it is our opinion the footings can be designed for a net allowable bearing pressure up to 2,000 pounds per square foot (psf).

We anticipate total and differential settlement of the foundations will be less than 1 inch and ½ inch, respectively, across a 30-foot span.

4.4 Dewatering

Groundwater was encountered in the soil borings at depths of about 7 ½ to 19 ½ feet below the ground surface. We generally do not anticipate that groundwater will be encountered during grading operations but could be encountered during utility installations and dewatering could be required.

Where dewatering is required, we recommend the groundwater level be temporarily lowered to a minimum of 2 feet below the lowest anticipated excavation elevation to allow for construction. In sand soils we do not recommend attempting to dewater from within the excavation. Upward seepage will loosen and disturb the excavation, resulting in a "quick condition". Rather, we recommend groundwater be drawn down below the anticipated excavation bottom.

It may be appropriate to consult a dewatering contractor to review the soil boring logs and develop a dewatering plan and evaluate the impact of dewatering on adjacent structures.

4.5 Interior Slabs

The anticipated floor subgrade will consist of compacted engineered fill (sand fill) or sandy alluvial soils. It is our opinion a modulus of subgrade reaction, k, of 150 pounds per square inch per inch (psi/inch) of deflection may be used to design the floor.

If floor coverings or coatings less permeable than the concrete slab will be used, we recommend that a vapor retarder or vapor barrier be placed immediately beneath the slab. Some contractors prefer to bury the vapor barrier or vapor retarder beneath a layer of sand to reduce curling and shrinkage, but this practice often traps water between the slab and vapor retarder or barrier. Regardless of where the vapor retarder or vapor barrier is placed, we recommend consulting the floor covering manufacturer regarding the appropriate type, use and installation of the vapor retarder or vapor barrier to preserve the warranty.

We recommend following all state and local building codes with regards to a radon mitigation plan beneath interior slabs.

4.6 Below Grade Walls

We recommend general waterproofing of the below grade walls. We recommend either placing drainage composite against the backs of the exterior walls or backfilling adjacent to the walls with sand having less than 50 percent of the particles by weight passing the #40 sieve and less than 5 percent of the particles by weight passing the #200 sieve. The sand backfill should be placed within 2 feet horizontally of the wall. We recommend the balance of the backfill for the walls consist of sand however the sand may contain up to 20 percent of the particles by weight passing the #200 sieve.

We recommend installing drain tile behind the below grade walls, adjacent to the wall footing and below the slab elevation. Preferably the drain tile should consist of perforated pipe embedded in gravel. A geotextile filter fabric should encase the pipe and gravel. The drain tile should be routed to a storm sewer, sump pump or other suitable disposal site.

Foundation walls or below grade (basement) walls will have lateral loads from the surrounding soil transmitted to them. Active earth pressures can be used to design the below grade walls if the walls are allowed to rotate slightly. If wall rotation cannot be tolerated, then below grade wall design should be based on at-rest earth pressures. It is our opinion that the estimated soil parameters presented in Table 5 can be used for below grade wall design. These estimated soil parameters are based on the assumptions that the walls are drained, there are no surcharge loads within a horizontal distance equal to the height of the wall and the backfill is level.

Table 5. Estimated Soil Parameters

Soil Type	Estimated Unit Weight (pcf)	Estimated Friction Angle (degrees)	At-Rest Pressure (pcf)	Active Soil Pressure (pcf)	Passive Soil Pressure (pcf)
Sands (SP & SP-SM)	120	32	55	35	390
Clayey and Silty Soils (CL and SM)	135	28	70	50	375

Resistance to lateral earth pressures will be provided by passive resistance against the wall footings and by sliding resistance along the bottom of the wall footings. We recommend a sliding coefficient of 0.35. This value does not include a factor of safety.

4.7 Exterior Slabs

Exterior slabs will likely be underlain by granular (sand) soils consisting of poorly grade sand with silt and poorly graded sand. These soils are generally slightly to non-frost susceptible soils. This being the case, it is our opinion that special subgrade improvements in excess of topsoil stripping in advance of slab construction will not be required.

4.8 Site Grading and Drainage

We recommend the site be graded to provide positive run-off away from the proposed buildings. We recommend landscaped areas be sloped a minimum of 6 inches within 10 feet of the building and slabs be sloped a minimum of 2 inches. In addition, we recommend downspouts with long splash blocks or extensions.

We recommend the lowest floor grades be constructed to meet City of Ramsey (City) requirements with respect to groundwater separation distances. In the absence of City requirements, we recommend maintaining at least a 4-foot separation between the lowest floor slab and the observed groundwater levels and at least a 2-foot separation between the lowest floor slab and the 100-year flood level of nearby wetlands, storm water ponds or other surface water features.

4.9 Utilities

We anticipate that new utilities will be installed as part of this project. We further anticipate that new utilities will bear at depths ranging from about 7 to 10 feet below the ground surface. At these depths, we anticipate that the pipes will bear on native alluvial soils or compacted engineered fill. We recommend removing all vegetation, topsoil and any other unsuitable soil from beneath the utilities prior to placement.

We recommend bedding material be thoroughly compacted around the pipes. We recommend trench backfill above the pipes be compacted to a minimum of 95 percent beneath slabs and pavements, the exception being within 3 feet of the proposed pavement subgrade, where 100 percent of standard Proctor density is required. In landscaped areas, we recommend a minimum compaction of 90 percent.

Groundwater was encountered in the soil borings at depths of about 7 ½ to 19 ½ feet below the ground surface. Groundwater could be encountered during utility construction and dewatering could be required. See section 4.4 for dewatering considerations.

4.10 Bituminous Pavement Recommendations

General The City may have standard plates that dictate pavement design. We recommend that the bituminous pavements be designed and constructed in accordance with the City standard plates. The following paragraphs provide general pavement recommendations in the absence of City standard plates.

We were not provided any information regarding traffic volumes, such as Average Annual Daily Traffic (AADT) or vehicle distribution. We anticipate the streets will be used predominantly by automobiles, light trucks, school busses, garbage trucks and delivery vans (FEDEX, UPS etc.). Based on the anticipated number of homes in the development and assumed traffic types we estimate the roadways will be subjected to Equivalent Single Axle Loads (ESAL's) ranging from about 50,000 to 75,000 over a 20-year design life. This does not account for any future growth.

Subgrade Preparation We recommend removing all vegetation, topsoil, and any soft or otherwise unsuitable soils from below the pavement and oversize areas. Prior to placing the aggregate base (Class 5) we recommend compacting the subgrade and/or performing compaction tests and/or Dynamic Cone Penetrometer (DCP) tests to identify soft, weak, loose, or unstable areas that may require additional subcuts. Backfill to attain pavement subgrade elevation can consist of any mineral soil provided it is free of organic material or other deleterious materials.

Granular fill classified as SP or SP-SM should be placed within 65 percent to 105 percent of its optimum moisture content as determined by the standard Proctor. Remaining fill soils should be placed within 3 percentage points above and 1 percentage point below its optimum moisture content as determined by the standard Proctor. All fill should be placed in thin lifts and be compacted to a minimum of 95 percent of its standard Proctor maximum dry density with a large self-propelled vibratory compactor operating in vibratory mode. The upper 3 feet of fill and backfill should be compacted to a minimum of 100 percent of its standard Proctor maximum dry density.

R-Value R-Value testing was beyond the scope of this project. The soil borings predominantly encountered sand soils meeting the ASTM Classification SP or SP-SM. Soils meeting the ASTM Classification CL typically have R-Values ranging from about 50 to 75. It is our opinion an R-Value of 50 can be used for pavement design.

Pavement Section - Roadways Based on an estimated R-value of 50 and a maximum of 75,000 ESAL's we recommend pavement section consisting of a minimum of 4 inches of bituminous (2 inches of wear course and 2 inches of base course) underlain by a minimum of 6 inches of aggregate base.

4.11 Pavement Materials

We recommend aggregate base meeting MN/DOT specification 3138 for Class 5 aggregate base. We recommend the aggregate base be compacted to 100 percent of its maximum standard Proctor dry density.

We recommend that the bituminous wear and base courses meet the requirement of MN/DOT specification 2360. We recommend the bituminous pavements be compacted to at least 92% of the maximum theoretical density.

We assume the streets/roadways will include concrete curb and gutter. We recommend specifying concrete that has a minimum 28-day compressive strength of 4,000 psi. We recommend specifying 5 to 8 percent entrained air for exposed concrete to provide resistance to freeze-thaw deterioration. We recommend slump, air content and compressive strength test of Portland cement concrete.

4.12 Stormwater Ponds & Infiltration Basins

We anticipate that stormwater ponds will be constructed as part of the project. We were not provided any information regarding pond bottom elevations. For the purposes of this evaluation, we've assumed the bottoms of the pond would be set about 5 feet below existing site grades. At the anticipated pond bottom elevations, the soil boring encountered sand soils generally meeting the ASTM Classification SP or SP-SM. Lesser amounts of silty clay (CL-ML) and clayey sand (SC) were also encountered in the boring and infiltration rates for these soils are also presented below. It is our opinion that the infiltration rates presented in Table 6, which were obtained from the "Minnesota Storm Water Manual", can be used for stormwater pond design.

Table 6. Infiltration Rates

In-situ soils	Soil Description	Hydrologic Soil Group	Design Infiltration Rate (in/hr)
SP & SP-SM	Poorly Graded Sand & Poorly Graded Sand with Silt	A	0.8
SC	Clayey Sand	D	0.06
CL-ML	Sandy Lean Clay and Lean Clay	D	0.06

Field tests (double ring infiltrometer) can be performed within the proposed infiltration basin area to verify infiltration rates of the in-situ soils. We would be pleased to provide these services if required or requested.

5.0 CONSTRUCTION CONSIDERATIONS

5.1 Excavation

The soils encountered in the borings consisted of predominantly of sandy soils consisting of poorly graded sand, poorly graded sand with silt and silty sand corresponding to the ASTM classifications of SP, SP-SM and SM. These soils will generally be Type C soils under Department of Labor Occupational Safety and Health Administration (OSHA) guidelines.

The borings also encountered clayey sand and silty clay that mostly had a soft consistency. For that reason, the clayey sand and silty clay will also generally be Type C soils under OASHA guidelines.

Temporary excavations in Type C soils should be constructed at a minimum of 1 ½ foot horizontal to every 1-foot vertical within excavations. Slopes constructed in this manner may still exhibit surface sloughing. If site constraints do not allow the construction of slopes with these dimensions, then temporary shoring may be required.

5.2 Observations

A geotechnical engineer or a qualified engineering technician should observe the excavation subgrade to evaluate if the subgrade soils are similar to those encountered in the borings and adequate to support the proposed construction.

5.3 Backfill and Fills

We recommend moisture conditioning all soils that will be used as fill or backfill in accordance with Section 4.3 above. We recommend that fill and backfill be placed in lifts not exceeding 4 to 12 inches, depending on the size of the compactor and materials used.

5.4 Testing

We recommend density tests of backfill and fills placed for the proposed building foundations. Samples of the proposed materials should be submitted to our laboratory prior to placement for evaluation of their suitability and to determine their optimum moisture content and maximum dry density (Standard Proctor).

5.5 Winter Construction

If site grading and construction is anticipated to proceed during cold weather, all snow and ice should be removed from cut and fill areas prior to additional grading and placement of fill. No fill should be placed on frozen soil and no frozen soil should be used as fill or backfill.

Concrete delivered to the site should meet the temperature requirements of ASTM and/or ACI. Concrete should not be placed on frozen soil. Concrete should be protected from freezing until the necessary strength is obtained. Frost should not be permitted to penetrate below the footings.

6.0 PROCEDURES

6.1 Soil Classification

The drill crew chief visually and manually classified the soils encountered in the borings in general accordance with ASTM D 2488, "Description and Identification of Soils (Visual-Manual Procedure)." Soil terminology notes are included in the Appendix. The samples were returned to our laboratory for review of the field classification by a soils engineer. Samples will be retained for a period of 30 days.

6.2 Groundwater Observations

Immediately after taking the final samples in the bottom of the boring, the hole was checked for the presence of groundwater. Immediately after removing the augers from the borehole the hole was once again checked and the depth to water and cave-in depths were noted.

7.0 GENERAL

7.1 Subsurface Variations

The analyses and recommendations presented in this report are based on data obtained from a limited number of soil borings. Variations can occur away from the boring, the nature of which may not become apparent until additional exploration work is completed, or construction is conducted. A reevaluation of the recommendations in this report should be made after performing on-site observations during construction to note the characteristics of any variations. The variations may result in additional foundation costs and it is suggested that a contingency be provided for this purpose.

It is recommended that we be retained to perform the observation and testing program during construction to evaluate whether the design is as expected, if any design changes have affected the validity of our recommendations, and if our recommendations have been correctly interpreted and implemented in the designs, specifications and construction methods. This will allow correlation of the soil conditions encountered during construction to the soil borings and will provide continuity of professional responsibility.

7.2 Review of Design

This report is based on the design of the proposed structures as related to us for preparation of this report. It is recommended that we be retained to review the geotechnical aspects of the design and specifications. With the review, we will evaluate whether any changes have affected the validity of the recommendations and whether our recommendations have been correctly interpreted and implemented in the design and specifications.

7.3 Groundwater Fluctuations

We made water level measurements in the borings at the times and under the conditions stated on the boring log. The data was interpreted in the text of this report. The period of observation was relatively short and fluctuations in the groundwater level may occur due to rainfall, flooding, irrigation, spring thaw, drainage, and other seasonal and annual factors not evident at the time the observations were made. Design drawings and specifications and construction planning should recognize the possibility of fluctuations.

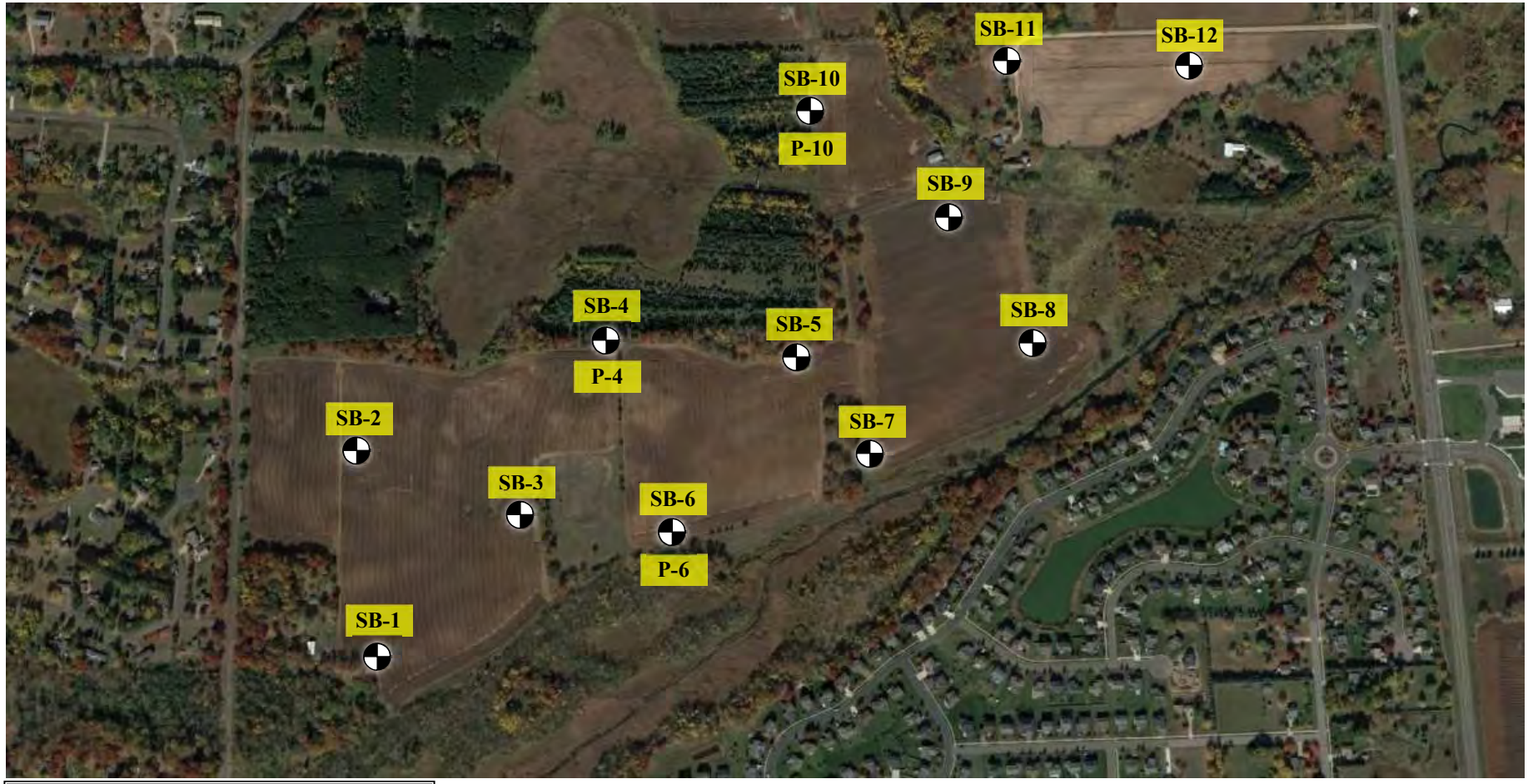
7.4 Use of Report

This report is for the exclusive use of The Excelsior Group and their design team to use to design the proposed structures and prepare construction documents. In the absence of our written approval, we make no representation and assume no responsibility to other parties regarding this report. The data, analysis and recommendations may not be appropriate for other structures or purposes. We recommend that parties contemplating other structures or purposes contact us.

7.5 Level of Care

Haugo GeoTechnical Services has used the degree of skill and care ordinarily exercised under similar circumstance by members of the profession currently practicing in this locality. No warranty expressed or implied is made.

APPENDIX



Legend

Approximate Soil Boring Location

N
W
E
S

Haugo GeoTechnical Services, LLC
2825 Cedar Avenue South
Minneapolis, MN 55407

Soil Boring Location Sketch
Trott Brook Property
Ramsey, MN

Figure #: 1
Drawn By: EC
Date: 7/30/2021
Scale: None
Project #: 21-0561

Figure 2: GPS Boring Locations

Boring Number	Elevation (US Survey Feet)	Northing Coordinate	Easting Coordinate
SB-1	884.5	188320.4	450884.2
SB-2	903.6	189197	450791.2
SB-3	889.2	188884.3	451492.5
SB-4	892.6	189631.1	451870.4
SB-5	888.7	189516.9	452698.7
SB-6	883.4	188793.8	452132.4
SB-7	882.7	189084.6	452992.4
SB-8	875.5	189548.1	453725.7
SB-9	889.3	190133	453380.7
SB-10	890.2	190614.5	452803.6
SB-11	902.9	190813.9	453670.8
SB-12	886.4	190776.2	454491.9
P-4	894.5	189631.5	451871.5
P-6	884.9	188793.3	452132.1
P-10	893	190615.4	452802.8

Referencing Minnesota County Coordinates Basis – Anoka County

Haugo GeoTechnical Services
2825 Cedar Ave South
Minneapolis, MN 55407
Telephone: 612-729-2959
Fax: 763-445-2238

BORING NUMBER SB-1

CLIENT The Excelsior Group
PROJECT NAME Trott Brook Property
PROJECT NUMBER 21-0561
PROJECT LOCATION Ramsey, MN
DATE STARTED 7/21/21 **COMPLETED** 7/21/21
GROUND ELEVATION 884.3 ft **HOLE SIZE** 3 1/4 inches
DRILLING CONTRACTOR HGTS - 750
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger/Split Spoon
AT TIME OF DRILLING 20.00 ft / Elev 864.30 ft
LOGGED BY GD **CHECKED BY** PG
AT END OF DRILLING 18.10 ft / Elev 866.20 ft
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	MOISTURE CONT. (%)	NOTES
0		Poorly Graded Sand with Silt, trace Roots, brown, moist. (Topsoil)	AU 9				
		(SP) Poorly Graded Sand, fine to medium grained, brown, moist, loose. (Alluvium)	SS 10		3-3-3 (6)		
5		P-200 = 3%	SS 11		4-2-3 (5)	3.5	
		(SP) Poorly Graded Sand, fine to medium grained, brown, moist to waterbearing, very loose to medium dense. (Alluvium)	SS 12		3-2-2 (4)		
10			SS 13		3-2-3 (5)		
			SS 14		3-3-3 (6)		
15			SS 15		6-5-6 (11)		
20			SS 16		6-6-6 (12)		

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

Bottom of borehole at 21.0 feet.

Haugo GeoTechnical Services
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Minneapolis, MN 55407
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BORING NUMBER SB-2

CLIENT The Excelsior Group
PROJECT NAME Trott Brook Property
PROJECT NUMBER 21-0561
PROJECT LOCATION Ramsey, MN
DATE STARTED 7/21/21 **COMPLETED** 7/21/21
GROUND ELEVATION 903.2 ft **HOLE SIZE** 3 1/4 inches
DRILLING CONTRACTOR HGTS - 750
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger/Split Spoon
AT TIME OF DRILLING --- Not Encountered
LOGGED BY GD **CHECKED BY** PG
AT END OF DRILLING ---
NOTES
AFTER DRILLING --- Not Encountered

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	MOISTURE CONT. (%)	NOTES
0		Poorly Graded Sand with Silt, trace Roots, brown, moist. (Topsoil)	AU 1				
		(SP) Poorly Graded Sand, fine to medium grained, brown, moist, loose (Alluvium)	SS 2		5-4-4 (8)		
5		P-200 = 4.5%	SS 3		2-3-3 (6)	5.5	
			SS 4		4-4-4 (8)		
10			SS 5		4-3-4 (7)		
			SS 6		4-4-5 (9)		
15		(SP) Poorly Graded Sand, fine to medium grained, trace Gravel, brown, moist, medium dense. (Alluvium)	SS 7		7-10-3 (13)		
20			SS 8		6-7-7 (14)		

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

Bottom of borehole at 21.0 feet.

Haugo GeoTechnical Services
2825 Cedar Ave South
Minneapolis, MN 55407
Telephone: 612-729-2959
Fax: 763-445-2238

BORING NUMBER SB-3

CLIENT The Excelsior Group
PROJECT NAME Trott Brook Property
PROJECT NUMBER 21-0561
PROJECT LOCATION Ramsey, MN
DATE STARTED 7/21/21 **COMPLETED** 7/21/21
GROUND ELEVATION 889.1 ft **HOLE SIZE** 3 1/4 inches
DRILLING CONTRACTOR HGTS - 750
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger/Split Spoon
▽ **AT TIME OF DRILLING** 9.50 ft / Elev 879.60 ft
LOGGED BY GD **CHECKED BY** PG
▼ **AT END OF DRILLING** 12.20 ft / Elev 876.90 ft
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	MOISTURE CONT. (%)	NOTES
0		Poorly Graded Sand with Silt, trace Roots, brown, moist. (Topsoil)	AU 17				
		(SP) Poorly Graded Sand, fine to medium grained, brown, moist to waterbearing, very loose to loose. (Alluvium)	SS 18		2-3-4 (7)		
5			SS 19		5-4-4 (8)		
			SS 20		3-3-3 (6)		
10		▽	SS 21		4-3-2 (5)		
		▼	SS 22		3-3-7 (10)		
15			SS 23		2-2-2 (4)		
		(SP) Poorly Graded Sand, fine to medium grained, gray, waterberaing, very loose. (Alluvium)					
20			SS 24		2-1-1 (2)		

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

Bottom of borehole at 21.0 feet.

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BORING NUMBER SB-4

CLIENT The Excelsior Group
PROJECT NAME Trott Brook Property
PROJECT NUMBER 21-0561
PROJECT LOCATION Ramsey, MN
DATE STARTED 7/21/21 **COMPLETED** 7/21/21
GROUND ELEVATION 892.4 ft **HOLE SIZE** 3 1/4 inches
DRILLING CONTRACTOR HGTS - 750
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger/Split Spoon
▽ **AT TIME OF DRILLING** 10.00 ft / Elev 882.40 ft
LOGGED BY GD **CHECKED BY** PG
▼ **AT END OF DRILLING** 11.30 ft / Elev 881.10 ft
NOTES Piezometer Installed
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	MOISTURE CONT. (%)	NOTES
0		Poorly Graded Sand with Silt, Trace Roots, brown, moist. (Topsoil)	AU 25				
		(SP) Poorly Graded Sand, fine grained, trace Gravel, brown, moist, loose. (Alluvium)	SS 26		3-2-3 (5)		
5		P-200 = 4%	SS 27		4-2-3 (5)	5.5	
			SS 28		3-3-2 (5)		
10		▽ (SP) Poorly Graded Sand, fine to medium grained, trace Gravel, brown, waterbearing, very loose. (Alluvium) ▼	SS 29		2-1-2 (3)		
			SS 30		1-2-2 (4)		
15			SS 31		2-1-1 (2)		
		(SP) Poorly Graded Sand, fine to mediumg grained, trace Gravel, gray, waterbearing, loose. (Alluvium)					
20			SS 32		1-2-3 (5)		

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

Bottom of borehole at 21.0 feet.

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BORING NUMBER SB-5

CLIENT The Excelsior Group
PROJECT NAME Trott Brook Property
PROJECT NUMBER 21-0561
PROJECT LOCATION Ramsey, MN
DATE STARTED 7/21/21 **COMPLETED** 7/21/21
GROUND ELEVATION 888.3 ft **HOLE SIZE** 3 1/4 inches
DRILLING CONTRACTOR HGTS - 750
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger/Split Spoon
AT TIME OF DRILLING 12.50 ft / Elev 875.80 ft
LOGGED BY GD **CHECKED BY** PG
AT END OF DRILLING 12.50 ft / Elev 875.80 ft
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	MOISTURE CONT. (%)	NOTES
0		Poorly Graded Sand with Silt, trace Roots, brown, moist. (Topsoil)	AU 41				
		(SP) Poorly Graded Sand, fine to medium grained, trace Gravel, brown, moist to waterbearing, loose. (Alluvium)	SS 42		3-3-3 (6)		
5		P-200 = 2.5%	SS 43		2-3-3 (6)	7	
			SS 44		3-3-3 (6)		
10			SS 45		3-5-5 (10)		
			SS 46		3-3-3 (6)		
15			SS 47		2-3-4 (7)		
20			SS 48		3-5-5 (10)		

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

Bottom of borehole at 21.0 feet.

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BORING NUMBER SB-6

CLIENT The Excelsior Group
PROJECT NAME Trott Brook Property
PROJECT NUMBER 21-0561
PROJECT LOCATION Ramsey, MN
DATE STARTED 7/21/21 **COMPLETED** 7/21/21
GROUND ELEVATION 883.3 ft **HOLE SIZE** 3 1/4 inches
DRILLING CONTRACTOR HGTS - 750
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger/Split Spoon
▽ **AT TIME OF DRILLING** 7.50 ft / Elev 875.80 ft
LOGGED BY GD **CHECKED BY** PG
▼ **AT END OF DRILLING** 11.10 ft / Elev 872.20 ft
NOTES Piezometer Installed
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	MOISTURE CONT. (%)	NOTES
0		Poorly Graded Sand with Silt, trace roots, dark brown, moist. (Topsoil)	AU 33				
		(SP-SM) Poorly Graded Sand with Silt, fine to medium grained, trace Gravel, brown, moist to waterbearing, very loose to medium dense. (Alluvium)	SS 34		2-1-2 (3)		
5		P-200 = 6.5%	SS 35		3-4-8 (12)	8.5	
		▽	SS 36		2-2-2 (4)		
10		(SP) Poorly Graded Sand, fine to medium grained, trace Gravel, gray, waterbearing, very loose. (Alluvium) ▼	SS 37		2-1-1 (2)		
		(SM) Silty Sand, fine to medium grained, gray, waterbearing, medium dense. (Alluvium)	SS 38		5-5-7 (12)		
15		(SP-SM) Poorly Graded Sand with Silt, fine to medium grained, trace Gravel, gray, waterbearing, loose. (Alluvium)	SS 39		4-4-6 (10)		
20			SS 40		3-3-3 (6)		

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

Bottom of borehole at 21.0 feet.

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BORING NUMBER SB-7

CLIENT The Excelsior Group
PROJECT NAME Trott Brook Property
PROJECT NUMBER 21-0561
PROJECT LOCATION Ramsey, MN
DATE STARTED 7/21/21 **COMPLETED** 7/21/21
GROUND ELEVATION 882.6 ft **HOLE SIZE** 3 1/4 inches
DRILLING CONTRACTOR HGTS - 750
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger/Split Spoon
▽ **AT TIME OF DRILLING** 20.00 ft / Elev 862.60 ft
LOGGED BY GD **CHECKED BY** PG
▼ **AT END OF DRILLING** 19.60 ft / Elev 863.00 ft
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	MOISTURE CONT. (%)	NOTES
0		Poorly Graded Sand with Silt, trace Roots, brown, moist. (Topsoil)	AU 49				
		(SP) Poorly Graded Sand, fine to medium grained, trace Gravel, brown, moist to waterbearing, very loose to medium dense. (Alluvium)	SS 50		3-3-3 (6)		
5			SS 51		3-2-3 (5)		
			SS 52		4-4-5 (9)		
10			SS 53		4-7-7 (14)		
			SS 54		4-5-5 (10)		
15			SS 55		4-6-5 (11)		
20		▼ ▽	SS 56		2-2-2 (4)		

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

Bottom of borehole at 21.0 feet.

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BORING NUMBER SB-8

CLIENT The Excelsior Group
PROJECT NAME Trott Brook Property
PROJECT NUMBER 21-0561
PROJECT LOCATION Ramsey, MN
DATE STARTED 7/22/21 **COMPLETED** 7/22/21
GROUND ELEVATION 875.1 ft **HOLE SIZE** 3 1/4 inches
DRILLING CONTRACTOR HGTS - 750
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger/Split Spoon
AT TIME OF DRILLING 12.50 ft / Elev 862.60 ft
LOGGED BY GD **CHECKED BY** PG
AT END OF DRILLING 12.20 ft / Elev 862.90 ft
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	MOISTURE CONT. (%)	NOTES
0		Poorly Graded Sand with Silt, trace Roots, brown, moist. (Topsoil)	AU 57				
		(SP-SM) Poorly Graded Sand with Silt, fine to medium grained, brown, moist to waterbearing, very loose to loose. (Alluvium)	SS 58		3-1-2 (3)		
5		P-200 = 5.5%	SS 59		3-2-2 (4)	7	
			SS 60		2-2-4 (6)		
10			SS 61		4-5-5 (10)		
			SS 62		1-1-1 (2)		
15		(SP) Poorly Graded Sand, fine to medium grained, trace Gravel, gray, waterbearing, very loose to loose. (Alluvium)	SS 63		1-1-1 (2)		
20			SS 64		3-3-2 (5)		

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

Bottom of borehole at 21.0 feet.

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BORING NUMBER SB-9

CLIENT The Excelsior Group
PROJECT NAME Trott Brook Property
PROJECT NUMBER 21-0561
PROJECT LOCATION Ramsey, MN
DATE STARTED 7/22/21 **COMPLETED** 7/22/21
GROUND ELEVATION 888.5 ft **HOLE SIZE** 3 1/4 inches
DRILLING CONTRACTOR HGTS - 750
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger/Split Spoon
▽ **AT TIME OF DRILLING** 7.50 ft / Elev 881.00 ft
LOGGED BY GD **CHECKED BY** PG
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	MOISTURE CONT. (%)	NOTES
0		Silty Sand, trace Roots, brown, moist. (Topsoil)	AU 65				
		(SP-SM) Poorly Graded Sand with Silt, fine grained, brown, moist, loose. (Alluvium)					
		P-200 = 5.5%	SS 66		3-3-3 (6)	2	
5		(SP) Poorly Graded Sand, fine to medium grained, brown, waterbearing, very loose to loose. (Alluvium) P-200 = 4%	SS 67		2-3-4 (7)	17	
	▽		SS 68		3-3-2 (5)		
10			SS 69		1-1-1 (2)		
			SS 70		1-1-2 (3)		
15			SS 71		1-1-1 (2)		
20			SS 72		1-2-3 (5)		

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

Bottom of borehole at 21.0 feet.

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BORING NUMBER SB-10

CLIENT The Excelsior Group
PROJECT NAME Trott Brook Property
PROJECT NUMBER 21-0561
PROJECT LOCATION Ramsey, MN
DATE STARTED 7/22/21 **COMPLETED** 7/22/21
GROUND ELEVATION 890 ft **HOLE SIZE** 3 1/4 inches
DRILLING CONTRACTOR HGTS - 750
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger/Split Spoon
▽ **AT TIME OF DRILLING** 12.50 ft / Elev 877.50 ft
LOGGED BY GD **CHECKED BY** PG
▼ **AT END OF DRILLING** 12.20 ft / Elev 877.80 ft
NOTES Piezometer Installed
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	MOISTURE CONT. (%)	NOTES
0		Silty Sand, trace Roots, light brown, moist. (Topsoil)	AU 73				
		(SC) Clayey Sand, fine to medium grained, brown, moist, loose. (Alluvium)	SS 74		3-3-4 (7)		
5		(CL-ML) Silty Clay, brown to about 9 feet then gray, wet, soft. (Alluvium)	SS 75		2-2-2 (4)	45	
			SS 76		1-2-1 (3)	48	
10			SS 77		1-1-1 (2)		
		▼ (SP) Poorly Graded Sand, fine to medium grained, trace Gravel, gray, waterbearing, very loose. (Alluvium)	SS 78		2-1-1 (2)		
15			SS 79		1-1-1 (2)		
20			SS 80		2-2-1 (3)		

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

Bottom of borehole at 21.0 feet.

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BORING NUMBER SB-11

CLIENT The Excelsior Group
PROJECT NAME Trott Brook Property
PROJECT NUMBER 21-0561
PROJECT LOCATION Ramsey, MN
DATE STARTED 7/22/21 **COMPLETED** 7/22/21
GROUND ELEVATION 902.5 ft **HOLE SIZE** 3 1/4 inches
DRILLING CONTRACTOR HGTS - 750
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger/Split Spoon
AT TIME OF DRILLING --- Not Encountered
LOGGED BY GD **CHECKED BY** PG
AT END OF DRILLING ---
NOTES
AFTER DRILLING --- Not Encountered

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	MOISTURE CONT. (%)	NOTES
0		Poorly Graded Sand with Silt, trace Roots, brown, moist. (Topsoil)	AU 81				
		(SP) Poorly Graded Sand, fine to medium grained, trace gravel, brown, moist, loose to medium dense. (Alluvium)	SS 82		2-2-3 (5)		
5			SS 83		3-3-4 (7)		
			SS 84		4-3-4 (7)		
10			SS 85		4-6-6 (12)		
		(SP) Poorly Graded Sand, fine grained, light brown, moist, loose to medium dense. (Alluvium)	SS 86		10-5-6 (11)		
15			SS 87		5-5-5 (10)		
		(SP) Poorly Graded Sand, fine to medium grained, trace Gravel, brown, moist, medium dense. (Alluvium)					
20			SS 88		7-9-12 (21)		

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

Bottom of borehole at 21.0 feet.

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BORING NUMBER SB-12

CLIENT The Excelsior Group
PROJECT NAME Trott Brook Property
PROJECT NUMBER 21-0561
PROJECT LOCATION Ramsey, MN
DATE STARTED 7/22/21 **COMPLETED** 7/22/21
GROUND ELEVATION 885.7 ft **HOLE SIZE** 3 1/4 inches
DRILLING CONTRACTOR HGTS - 750
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger/Split Spoon
▽ **AT TIME OF DRILLING** 20.00 ft / Elev 865.70 ft
LOGGED BY GD **CHECKED BY** PG
▼ **AT END OF DRILLING** 14.50 ft / Elev 871.20 ft
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	MOISTURE CONT. (%)	NOTES
0		Poorly Graded Sand with Silt, trace Roots, light brown, moist. (Topsoil)	AU 89				
		(SP) Poorly Graded Sand, fine to medium grained, trace Gravel, brown, moist, loose to medium dense. (Alluvium)	SS 90		4-3-3 (6)		
5		P-200 = 4%	SS 91		5-6-6 (12)	4	
			SS 92		5-7-9 (16)		
10			SS 93		7-4-7 (11)		
		(CL-ML) Silty Clay, gray, wet, soft. (Alluvium)	SS 94		1-1-1 (2)	41	
15		(SC) Clayey Sand, fine grained, gray, waterbearing, very loose. (Alluvium)	SS 95		1-1-1 (2)	25.5	
		(CL-ML) Silty Clay, gray, waterbearing, rather stiff. (Alluvium)					
20			SS 96		2-4-6 (10)	65	

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

Bottom of borehole at 21.0 feet.

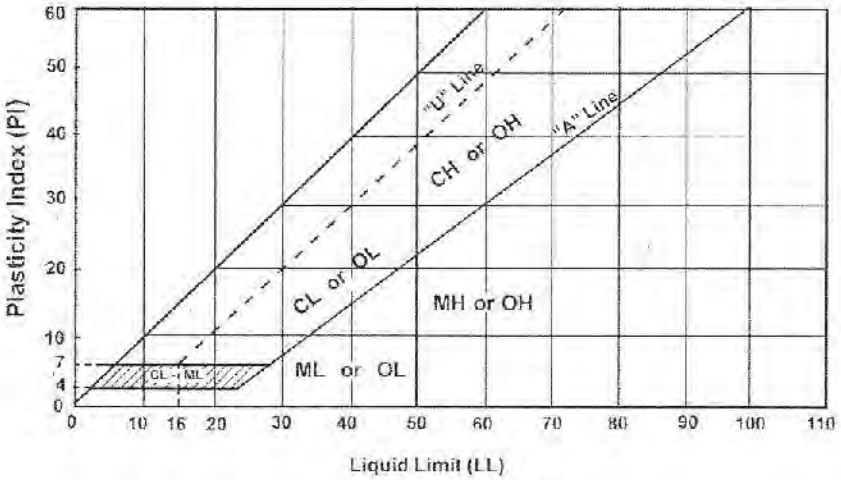
HAUGO GEOTECHNICAL SERVICES

Descriptive Terminology of Soil

Standard D 2487 - 00
Classification of Soils for Engineering Purposes
(Unified Soil Classification System)

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests [a]				Soils Classification	
				Group Symbol	Group Name [b]
Coarse-grained Soils more than 50% retained on No. 200 sieve	Gravels More than 50% of coarse fraction retained on No. 4 sieve	Clean Gravels 5% or less fines [e]	$C_u \geq 4$ and $1 \leq C_c \leq 3$ [c]	GW	Well-graded gravel [d]
			$C_u < 4$ and/or $1 > C_c > 3$ [c]	GP	Poorly graded gravel [d]
		Gravels with Fines More than 12% fines [e]	Fines classify as ML or MH	GM	Silty gravel [f,g]
			Fines classify as CL or CH	GC	Clayey gravel [f,g]
	Sands 50% or more of coarse fraction passes No. 4 sieve	Clean Sands 5% or less fines [i]	$C_u \geq 6$ and $1 \leq C_c \leq 3$ [c]	SW	Well-graded sand [h]
			$C_u < 6$ and/or $1 > C_c > 3$ [c]	SP	Poorly graded sand [h]
		Sands with Fines More than 12% [i]	Fines classify as ML or MH	SM	Silty sand [f,g,h]
			Fines classify as CL or CH	SC	Clayey sand [f,g,h]
Fine-grained Soils 50% or more passed the No. 200 sieve	Silts and Clays Liquid limit less than 50	Inorganic	PI > 7 and plots on or above "A" line [j]	CL	Lean clay [k,l,m]
			PI < 4 or plots below "A" line [j]	ML	Silt [k,l,m]
		Organic	Liquid limit - oven dried / Liquid limit - not dried < 0.75	OL	Organic clay [k,l,m,n]
				OL	Organic silt [k,l,m,o]
	Silts and clays Liquid limit 50 or more	Inorganic	PI plots on or above "A" line	CH	Fat clay [k,l,m]
			PI plots below "A" line	MH	Elastic silt [k,l,m]
		Organic	Liquid limit - oven dried / Liquid limit - not dried < 0.75	OH	Organic clay [k,l,m,p]
				OH	Organic silt [k,l,m,q]
Highly Organic Soils		Primarily organic matter, dark in color and organic odor		PT	Peat

a. Based on the material passing the 3-in (75mm) sieve
b. If field sample contained cobbles or boulders, or both, add "with cobbles or boulders or both" to group name.
c. $C_u = D_{60}/D_{10}$ $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$
d. If soil contains ≥15% sand, add "with sand" to group name.
e. Gravels with 5 to 12% fines require dual symbols:
GW-GM well-graded gravel with silt
GW-GC well-graded gravel with clay
GP-GM poorly graded gravel with silt
GP-GC poorly graded gravel with clay
f. If fines classify as CL-ML, use dual symbol GC-GM or SC-SM.
g. If fines are organic, add "with organic fines" to group name.
h. If soil contains ≥ 15% gravel, add "with gravel" to group name.
Sands with 5 to 12% fines require dual symbols:
SW-SM well-graded sand with silt
SW-SC well-graded sand with clay
SP-SM poorly graded sand with silt
SP-SC poorly graded sand with clay
i. If Atterberg limits plot in hatched area, soil is a CL-ML, silty clay.
k. If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel" whichever is predominant.
l. If soil contains ≥ 30% plus No. 200, predominantly sand, add "sandy" to group name.
m. If soil contains ≥ 30% plus No. 200 predominantly gravel, add "gravelly" to group name.
n. PI ≥ 4 and plots on or above "A" line.
o. PI < 4 or plots below "A" line.
p. PI plots on or above "A" line.
q. PI plots below "A" line.



Particle Size Identification

Boulders	over 12"
Cobbles	3" to 12"
Gravel	
Coarse	3/4" to 3"
Fine	No. 4 to 3/4"
Sand	
Coarse	No. 4 to No. 10
Medium	No. 10 to No. 40
Fine	No. 40 to No. 200
Silt	< No. 200, PI < 4 or below "A" line
Clay	< No. 200, PI ≥ 4 and on or above "A" line

Relative Density of Cohesionless Soils

Very loose	0 to 4 BPF
Loose	5 to 10 BPF
Medium dense	11 to 30 BPF
Dense	31 to 50 BPF
Very dense	over 50 BPF

Consistency of Cohesive Soils

Very soft	0 to 1 BPF
Soft	2 to 3 BPF
Rather soft	4 to 5 BPF
Medium	6 to 8 BPF
Rather stiff	9 to 12 BPF
Stiff	13 to 16 BPF
Very stiff	17 to 30 BPF
Hard	over 30 BPF

Laboratory Tests

DD	Dry density, pcf	OC	Organic content, %
WD	Wet density, pcf	S	Percent of saturation, %
MC	Natural moisture content, %	SG	Specific gravity
LL	Liquid limit, %	C	Cohesion, psf
PL	Plastic limit, %	∅	Angle of internal friction
PI	Plasticity index, %	qu	Unconfined compressive strength, psf
P200	% passing 200 sieve	qp	Pocket penetrometer strength, tsf

Drilling Notes

Standard penetration test borings were advanced by 3 1/4" or 6 1/4" ID hollow-stem augers unless noted otherwise. Jetting water was used to clean out auger prior to sampling only where indicated on logs. Standard penetration test borings are designated by the prefix "ST" (Split Tube). All samples were taken with the standard 2" OD split-tube sampler, except where noted.

Power auger borings were advanced by 4" or 6" diameter continuous flight, solid-stem augers. Soil classifications and strata depths were inferred from disturbed samples augered to the surface and are, therefore, somewhat approximate. Power auger borings are designated by the prefix "B."

Hand auger borings were advanced manually with a 1 1/2" or 3 1/4" diameter auger and were limited to the depth from which the auger could be manually withdrawn. Hand auger borings are indicated by the prefix "H."

BPF: Numbers indicate blows per foot recorded in standard penetration test, also known as "N" value. The sampler was set 6" into undisturbed soil below the hollow-stem auger. Driving resistances were then counted for second and third 6" increments and added to get BPF. Where they differed significantly, they are reported in the following form: 2/12 for the second and third 6" increments, respectively.

WH: WH indicates the sampler penetrated soil under weight of hammer and rods alone; driving not required.

WR: WR indicates the sampler penetrated soil under weight of rods alone; hammer weight and driving not required.

TW indicates thin-walled (undisturbed) tube sample.

Note: All tests were run in general accordance with applicable ASTM standards.

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Appendix D

Groundwater Well Boring Logs

Trott Brook Crossing EAW

Minnesota Unique Well Number

510517

County Anoka
Quad Nowthen
Quad ID 136C

MINNESOTA DEPARTMENT OF HEALTH
WELL AND BORING REPORT
Minnesota Statutes Chapter 1031

Entry Date 04/15/1991
Update Date 08/18/2014
Received Date 01/12/1990

Well Name	Township	Range	Dir	Section	Subsection
BECKER,	32	25	W	9	ABBBDA

Elevation 910 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

C/W 17295 VARIOLITE ST NW ANOKA MN

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
SAND	0	40	BROWN	SOFT
CLAY	40	68	BROWN	MEDIUM
ROCKS	68	71	BROWN	HARD
HARDPAN	71	98	BROWN	HARD
SANDROCK	98	119	GREEN	SOFT
SANDROCK	119	160	GREEN	HARD
SHALE	160	170	GREEN	HARD

Remarks

Well Depth 170 ft. **Depth Completed** 170 ft. **Date Well Completed** 01/04/1990

Drill Method Cable Tool **Drill Fluid**

Use domestic **Status** Active

Well Hydrofractured? Yes ☐ No ☐ **From** **To**

Casing Type Single casing **Joint** Threaded
Drive Shoe? Yes ☒ No ☐ **Above/Below** 1 ft.

Casing Diameter **Weight**
4 in. To 120 ft. 11 lbs./ft.

Open Hole From 120 ft. To 170 ft.

Screen? ☐ **Type** **Make**

Static Water Level
25 ft. land surface Measure 01/04/1990

Pumping Level (below land surface)
50 ft. 2 hrs. Pumping at 40 g.p.m.

Wellhead Completion
Pitless adapter manufacturer WHITEWATER Model
☐ Casing Protection ☒ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☐ Yes ☐ No ☒ Not Specified

Nearest Known Source of Contamination
75 feet East Direction Septic tank/drain field Type
Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 01/11/1990
Manufacturer's name FLINT AND WALLING
Model Number HP 0.5 Volt 230
Length of drop pipe 42 ft Capacity 12 g.p. Typ Submersible

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☒ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous
First Bedrock St.Lawrence-Tunnel City Aquifer Tunnel City
Last Strat Tunnel City Group Depth to Bedrock 98 ft
Located by Minnesota Geological Survey
Locate Method GPS SA Off (averaged) (15 meters)
System UTM - NAD83, Zone 15, Meters X 464005 Y 5014639
Unique Number Verification Address verification Input Date 01/04/2010

Angled Drill Hole

Well Contractor

Licensee Business	Lic. or Reg. No.	Name of Driller
Torgerson, Art & Son	02203	PITTMAN, H

Minnesota Unique Well Number

521655

County Anoka
Quad Nowthen
Quad ID 136C

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 03/04/1993
Update Date 02/14/2014
Received Date 01/23/1993

Well Name	Township	Range	Dir	Section	Subsection
	32	25	W	9	ABDBDB

Elevation 898 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

C/W 17151 VARIOLITE ST NW RAMSEY MN

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
SAND	0	35		
CLAY	35	45		
GRAVEL	45	60		
WATER SAND	60	75		

Remarks

Well Depth 75 ft. **Depth Completed** 75 ft. **Date Well Completed** 12/18/1992

Drill Method Non-specified Rotary **Drill Fluid** Bentonite

Use domestic **Status** Active

Well Hydrofractured? Yes ☐ No ☐ **From** **To**

Casing Type Single casing **Joint**

Drive Shoe? Yes ☐ No ☒ **Above/Below**

Casing Diameter	Weight	Hole Diameter
4 in. To 66 ft.	lbs./ft.	8.5 in. To 35 ft.
		6.5 in. To 75 ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** stainless **Make** JOHNSON

Diameter	Slot/Gauze	Length	Set	
2 in.	12	8 ft.	66 ft.	75 ft.

Static Water Level

15 ft. land surface Measure 12/18/1992

Pumping Level (below land surface)

ft. hrs. Pumping at 35 g.p.m.

Wellhead Completion

Pitless adapter manufacturer WHITEWATER Model

☐ Casing Protection ☐ 12 in. above grade

☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
neat cement		ft. 35	ft.

Nearest Known Source of Contamination

30 feet West Direction Septic tank/drain field Type

Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 01/04/1993

Manufacturer's name FLINT AND WALLING

Model Number HP 0.5 Volt

Length of drop pipe 40 ft Capacity g.p. Typ

Abandoned

Does property have any not in use and not sealed well(s)? ☐ Yes ☒ No

Variance

Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous

First Bedrock Aquifer Quat. buried

Last Strat sand Depth to Bedrock ft

Located by Minnesota Geological Survey

Locate Method GPS SA Off (averaged) (15 meters)

System UTM - NAD83, Zone 15, Meters X 464184 Y 5014413

Unique Number Verification Address verification Input Date 01/04/2010

Angled Drill Hole

Well Contractor

Licensee Business	Lic. or Reg. No.	Name of Driller
Torgerson Well Co.	27056	TORGERSON, S

Minnesota Unique Well Number

562382

County Anoka
Quad Anoka
Quad ID 120B

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 08/05/1997
Update Date 08/18/2014
Received Date

Well Name	Township	Range	Dir	Section	Subsection
	32	25	W	9	ABBCDD

Elevation 904 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

Well 17289 VARIOLITE ST NW RAMSEY MN

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
SAND	0	46		
SAND & CLAY	46	117		
SANDROCK	117	126		SOFT
SANDROCK	126	142		HARD

Remarks

Well Depth	Depth Completed	Date Well Completed
142 ft.	142 ft.	06/20/1995

Drill Method Non-specified Rotary **Drill Fluid** Bentonite

Use domestic **Status** Active

Well Hydrofractured? Yes ☐ No ☐ **From** **To**

Casing Type Single casing **Joint**
Drive Shoe? Yes ☐ No ☐ **Above/Below**

Casing Diameter	Weight	Hole Diameter
4 in. To 126 ft.	2 lbs./ft.	8 in. To 126 ft.
		4.7 in. To 142 ft.

Open Hole From 126 ft. To 142 ft.

Screen? ☐ **Type** **Make**

Static Water Level
25 ft. land surface Measure 06/20/1995

Pumping Level (below land surface)
50 ft. 1 hrs. Pumping at 25 g.p.m.

Wellhead Completion
Pitless adapter manufacturer MONITOR Model 8PL410
☐ Casing Protection ☒ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
bentonite	2 Sacks	6 ft.	36 ft.

Nearest Known Source of Contamination
75 feet Southeas Direction Septic tank/drain field Type
Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 07/25/1995
Manufacturer's name RED JACKET
Model Number 75UI-12BC HP 0.75 Volt 230
Length of drop pipe 60 ft Capacity g.p. Typ Submersible

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☒ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous
First Bedrock Tunnel City Group Aquifer Tunnel City
Last Strat Tunnel City Group Depth to Bedrock 117 ft
Located by Minnesota Geological Survey
Locate Method GPS SA Off (averaged) (15 meters)
System UTM - NAD83, Zone 15, Meters X 464004 Y 5014500
Unique Number Verification Address verification Input Date 01/04/2010

Angled Drill Hole

Well Contractor

Licensee Business	Lic. or Reg. No.	Name of Driller
Lauren McCullough Well	82443	OTTEN, D.

Minnesota Unique Well Number

570113

County Anoka
Quad Nowthen
Quad ID 136C

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 08/01/1997
Update Date 02/14/2014
Received Date 01/15/1996

Well Name	Township	Range	Dir	Section	Subsection
	32	25	W	9	ABDCCB

Elevation 895 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

Well 17121 VAROLITE ST NW RAMSEY MN

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
SAND	0	14	BROWN	SOFT
CLAY & GRAVEL	14	30	RED	SOFT
GRAVEL	30	35	VARIED	SOFT
CLAY & GRAVEL	35	73	BROWN	SOFT
SAND	73	85	GRAY	SOFT

Remarks

Well Depth 85 ft. **Depth Completed** 85 ft. **Date Well Completed** 10/04/1995

Drill Method Non-specified Rotary **Drill Fluid** Bentonite

Use domestic **Status** Active

Well Hydrofractured? Yes ☐ No ☐ **From** **To**

Casing Type Single casing **Joint** Glued

Drive Shoe? Yes ☐ No ☒ **Above/Below**

Casing Diameter	Weight	Hole Diameter
4 in. To 76 ft.	lbs./ft.	8.5 in. To 30 ft.
		6.5 in. To 85 ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** stainless **Make** WESCO

Diameter	Slot/Gauze	Length	Set	
4 in.	7	8 ft.	76 ft.	85 ft.

Static Water Level

22 ft. land surface Measure 10/04/1995

Pumping Level (below land surface)

ft. 1 hrs. Pumping at 20 g.p.m.

Wellhead Completion

Pitless adapter manufacturer MONITOR Model

☐ Casing Protection ☐ 12 in. above grade

☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
cuttings		30 ft.	76 ft.
bentonite		ft.	30 ft.

Nearest Known Source of Contamination

40 feet Northeas Direction Septic tank/drain field Type

Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 10/06/1995

Manufacturer's name STA-RITE

Model Number HP 0.5 Volt 230

Length of drop pipe 40 ft Capacity 10 g.p. Typ Submersible

Abandoned

Does property have any not in use and not sealed well(s)? ☐ Yes ☒ No

Variance

Was a variance granted from the MDH for this well? ☐ Yes ☒ No

Miscellaneous

First Bedrock Aquifer Quat. buried

Last Strat sand-gray Depth to Bedrock ft

Located by Minnesota Geological Survey

Locate Method GPS SA Off (averaged) (15 meters)

System UTM - NAD83, Zone 15, Meters X 464137 Y 5014311

Unique Number Verification Address verification Input Date 01/04/2010

Angled Drill Hole

Well Contractor

Mork Well Co. 02133 THOMPSON, S

Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Well Index Report **570113**

Printed on 07/13/2021

HE-01205-15

Minnesota Unique Well Number

743426

County Anoka
Quad Nowthen
Quad ID 136C

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 02/21/2007
Update Date 02/14/2014
Received Date 01/24/2007

Well Name	Township	Range	Dir	Section	Subsection
ARNT	32	25	W	10	BCDBDA

Elevation 885 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

Well 17050 NOWTHEN BL RAMSEY MN 55303

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
SAND	0	18	BROWN	SOFT
CLAY	18	32	GRAY	MEDIUM
COLORED GRAVEL	32	58		MEDIUM
SANDY CLAY	58	63	BROWN	SOFT
SAND/GRAVEL	63	104	GRAY	SOFT

Remarks

WELL IS FOR A POND.

Well Depth	Depth Completed	Date Well Completed
104 ft.	104 ft.	11/09/2006

Drill Method Non-specified Rotary **Drill Fluid** Bentonite

Use other (specify in remarks) **Status** Active

Well Hydrofractured? Yes ☐ No ☒ **From** **To**

Casing Type Single casing **Joint**
Drive Shoe? Yes ☐ No ☒ **Above/Below**

Casing Diameter	Weight	Hole Diameter
6 in. To 92 ft.	3.61 lbs./ft.	9 in. To 104 ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** stainless **Make** JOHNSON

Diameter	Slot/Gauze	Length	Set	
5 in.	10	15 ft.	92 ft.	104 ft.

Static Water Level

23 ft. land surface Measure 11/09/2006

Pumping Level (below land surface)

104 ft. 2 hrs. Pumping at 120 g.p.m.

Wellhead Completion

Pitless adapter manufacturer Model

☐ Casing Protection ☒ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
cuttings		30 ft.	92 ft.
bentonite	3 Sacks	ft.	30 ft.

Nearest Known Source of Contamination

75 feet East Direction Body of water Type

Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 11/17/2006

Manufacturer's name AERMOTOR
Model Number HP 3 Volt 230
Length of drop pipe 63 ft Capacity g.p. Typ Submersible

Abandoned

Does property have any not in use and not sealed well(s)? ☐ Yes ☒ No

Variance

Was a variance granted from the MDH for this well? ☐ Yes ☒ No

Miscellaneous

First Bedrock Aquifer Quat. buried
Last Strat sand +larger-gray Depth to Bedrock ft
Located by Minnesota Department of Health
Locate Method GPS SA Off (averaged) (15 meters)
System UTM - NAD83, Zone 15, Meters X 464989 Y 5013995
Unique Number Verification Input Date 11/09/2006

Angled Drill Hole

Well Contractor

Don Stodola Well Drilling 1691 MOORE, C.
Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well Number

408603

County Anoka
Quad Nowthen
Quad ID 136C

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 04/15/1991
Update Date 08/18/2014
Received Date

Well Name	Township	Range	Dir	Section	Subsection
	32	25	W	10	ABCCCC

Elevation 884 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

Well 17105 NOWTHEN BL NW RAMSEY MN 55303

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
SAND	0	17	BROWN	SOFT
CLAY	17	60	BLUE	SOFT
SAND	60	65	BROWN	SOFT
CLAY & ROCK	65	80	RED	HARD
CLAY	80	105	ORANGE	HARD
SHALE & SANDROCK	105	140	YELLOW	HARD
SHALE	140	175	GREEN	HARD
SANDROCK	175	196	WHITE	HARD

Remarks

Well Depth 196 ft. **Depth Completed** 196 ft. **Date Well Completed** 11/20/1984

Drill Method Non-specified Rotary **Drill Fluid**

Use domestic **Status** Active

Well Hydrofractured? Yes ☐ No ☐ **From** **To**

Casing Type Single casing **Joint** Threaded
Drive Shoe? Yes ☒ No ☐ **Above/Below** 1 ft.

Casing Diameter	Weight	Hole Diameter
4 in. To 156 ft.	12 lbs./ft.	4 in. To 196 ft.

Open Hole From 156 ft. To 196 ft.

Screen? ☐ **Type** **Make**

Static Water Level
15 ft. land surface Measure 11/20/1984

Pumping Level (below land surface)
15 ft. 2 hrs. Pumping at 50 g.p.m.

Wellhead Completion
Pitless adapter manufacturer WHITEWATER Model SU6.5
☐ Casing Protection ☒ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
bentonite		0 ft.	156 ft.

Nearest Known Source of Contamination
50 feet Northeas Direction Septic tank/drain field Type
Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 11/21/1984
Manufacturer's name AERMOTOR
Model Number SD 1275 HP 0.75 Volt 230
Length of drop pipe 40 ft Capacity 15 g.p. Typ Submersible

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous
First Bedrock Tunnel City Group Aquifer Tunnel City-
Last Strat Wonewoc Sandstone Depth to Bedrock 105 ft
Located by Minnesota Geological Survey
Locate Method Digitized - scale 1:24,000 or larger (Digitizing Table)
System UTM - NAD83, Zone 15, Meters X 465537 Y 5014267
Unique Number Verification Address verification Input Date 01/01/1990

Angled Drill Hole

Well Contractor
Mc Alpine's Well Co. 27186 MCALPINE, G.
Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well Number

434642

County Anoka
Quad Nowthen
Quad ID 136C

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 04/15/1991
Update Date 03/10/2014
Received Date

Well Name	Township	Range	Dir	Section	Subsection
MCCLERN,	32	25	W	10	BACAAA

Elevation 883 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

C/W 17220 NOWTHEN BL NW RAMSEY MN 55303

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
SAND	0	12	BROWN	SOFT
SAND & GRAVEL	12	19	BROWN	SOFT
CLAY & GRAVEL	19	76	BROWN	SOFT
SAND	76	97	BROWN	SOFT

Remarks

Well Depth	Depth Completed	Date Well Completed
97 ft.	97 ft.	07/24/1987

Drill Method Non-specified Rotary **Drill Fluid** Bentonite

Use domestic **Status** Active

Well Hydrofractured? Yes ☐ No ☐ **From** **To**

Casing Type Single casing **Joint**
Drive Shoe? Yes ☐ No ☒ **Above/Below** 1 ft.

Casing Diameter	Weight	Hole Diameter
4 in. To 84 ft.	lbs./ft.	6.2 in. To 97 ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** stainless **Make** JOHNSON

Diameter	Slot/Gauze	Length	Set
2 in.	12	13 ft.	84 ft. 97 ft.

Static Water Level
18 ft. land surface Measure 07/24/1987

Pumping Level (below land surface)
81 ft. 1 hrs. Pumping at 50 g.p.m.

Wellhead Completion
Pitless adapter manufacturer MONITOR Model SNAPPY
☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
neat cement	3 Sacks	0 ft.	30 ft.
bentonite		30 ft.	84 ft.

Nearest Known Source of Contamination
69 feet Southeas Direction Septic tank/drain field Type
Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 07/30/1987
Manufacturer's name RED JACKET
Model Number HP 0.5 Volt 230
Length of drop pipe 40 ft Capacity 10 g.p. Typ Submersible

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous
First Bedrock Aquifer Quat. buried
Last Strat sand-brown Depth to Bedrock ft
Located by Minnesota Geological Survey
Locate Method Digitized - scale 1:24,000 or larger (Digitizing Table)
System UTM - NAD83, Zone 15, Meters X 465281 Y 5014431
Unique Number Verification Address verification Input Date 01/01/1990

Angled Drill Hole

Well Contractor

Licensee Business	Lic. or Reg. No.	Name of Driller
Mork Well Co.	02133	LAWRENCE, R.

Minnesota Unique Well Number

450174

County Anoka
Quad Nowthen
Quad ID 136C

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 04/15/1991
Update Date 02/14/2014
Received Date

Well Name	Township	Range	Dir	Section	Subsection
KOEPP, GLENN	32	25	W	3	CDDDDB

Elevation 885 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

Well 6841 173RD AV NW RAMSEY MN 55303

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
SAND GRAVEL	0	11	BROWN	HARD
CLAY & GRAVEL	11	28	BROWN	MEDIUM
SAND & GRAVEL	28	58	BROWN	SOFT

Remarks

Well Depth 58 ft. **Depth Completed** 58 ft. **Date Well Completed** 09/10/1988

Drill Method **Drill Fluid**

Use domestic **Status** Active

Well Hydrofractured? Yes ☐ No ☐ **From** **To**

Casing Type Single casing **Joint**
Drive Shoe? Yes ☐ No ☐ **Above/Below** 1 ft.

Casing Diameter	Weight	Hole Diameter
4 in. To 50 ft.	lbs./ft.	6.2 in. To 58 ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** stainless **Make** JOHNSON

Diameter	Slot/Gauze	Length	Set
2 in.	12	12.4 ft.	50 ft. 58 ft.

Static Water Level
15 ft. land surface Measure 09/10/1988

Pumping Level (below land surface)
45 ft. 1 hrs. Pumping at 30 g.p.m.

Wellhead Completion
Pitless adapter manufacturer MONITOR Model 8PL41UC1
☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
neat cement	3 Sacks	ft.	30 ft.

Nearest Known Source of Contamination
feet Direction Type
Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 09/26/1988
Manufacturer's name MYERS
Model Number SJ72-J511P HP 0.75 Volt 230
Length of drop pipe 33 ft Capacity 15 g.p. Typ Submersible

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous
First Bedrock Aquifer Quat. buried
Last Strat sand +larger-brown Depth to Bedrock ft
Located by Minnesota Geological Survey
Locate Method Digitized - scale 1:24,000 or larger (Digitizing Table)
System UTM - NAD83, Zone 15, Meters X 465461 Y 5014680
Unique Number Verification Address verification Input Date 01/01/1990

Angled Drill Hole

Well Contractor

Licensee Business	Lic. or Reg. No.	Name of Driller
Mork Well Co.	02133	LAWRENCE, R.

Minnesota Unique Well Number

460099

County Anoka
Quad Nowthen
Quad ID 136C

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 04/15/1991
Update Date 08/18/2014
Received Date

Well Name	Township	Range	Dir	Section	Subsection
LACHNER, PAUL	32	25	W	10	CABAAA

Elevation 885 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

Well 16850 GARNET ST NW RAMSEY MN

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
SANDY CLAY	0	10	RED	SOFT
SAND MED	10	17	RED	SOFT
CLAY	17	26	GRAY	SOFT
SAND	26	41	BROWN	SOFT
GRAVEL	41	47	BROWN	MEDIUM
CLAY	47	55	RED	MEDIUM
ROCKY CLAY	55	123	RED	HARD
SAND CLAY MIXED	123	128	RED	MEDIUM
SAND FINE	128	139	RED	SOFT
SHALE	139	141	GREEN	MEDIUM
SHALE	141	165	BRN/GRN	M.HARD

Remarks

Well Depth 165 ft. **Depth Completed** 165 ft. **Date Well Completed** 11/06/1990

Drill Method Non-specified Rotary **Drill Fluid** Bentonite

Use domestic **Status** Active

Well Hydrofractured? Yes ☐ No ☐ **From** **To**

Casing Type Single casing **Joint**
Drive Shoe? Yes ☐ No ☐ **Above/Below** 1 ft.

Casing Diameter	Weight	Hole Diameter
4 in. To 141 ft.	lbs./ft.	6.5 in. To 139 ft.
		4.7 in. To 141 ft.
		3.1 in. To 165 ft.

Open Hole From 141 ft. To 165 ft.

Screen? ☐ **Type** **Make**

Static Water Level
16 ft. land surface Measure 11/06/1990

Pumping Level (below land surface)
30 ft. 3 hrs. Pumping at 20 g.p.m.

Wellhead Completion
Pitless adapter manufacturer Model
☐ Casing Protection ☒ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
bentonite		30 ft.	139 ft.
neat cement		ft.	30 ft.

Nearest Known Source of Contamination
feet Direction Type
Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 11/14/1990
Manufacturer's name MYERS
Model Number HP 0.5 Volt 230
Length of drop pipe 60 ft Capacity g.p. Typ Submersible

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☒ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous
First Bedrock Tunnel City Group Aquifer Tunnel City
Last Strat Tunnel City Group Depth to Bedrock 139 ft
Located by Minnesota Geological Survey
Locate Method GPS SA Off (averaged) (15 meters)
System UTM - NAD83, Zone 15, Meters X 465304 Y 5013840
Unique Number Verification Address verification Input Date 01/20/2010

Angled Drill Hole

Well Contractor
Ingleside Engr. 27355 DEHN, D
Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well Number

471736

County Anoka
Quad Nowthen
Quad ID 136C

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 10/25/1992
Update Date 03/03/2017
Received Date 12/20/1990

Well Name	Township	Range	Dir	Section	Subsection
	32	25	W	10	CAABBD

Elevation 884 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

Well 16851 GARNET ST NW RAMSEY MN

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
SAND	0	10		
CLAY	10	30		
GRAVEL	30	50		
CLAY AND GRAVEL	50	110		
CLAY	110	120		
SHALE AND	120	170		

Remarks

SEALED 11-09-2006 BY 1431.

Well Depth 170 ft. **Depth Completed** 170 ft. **Date Well Completed** 11/08/1990

Drill Method Non-specified Rotary **Drill Fluid**

Use domestic **Status** Sealed

Well Hydrofractured? Yes ☐ No ☐ **From** **To**

Casing Type Single casing **Joint**

Drive Shoe? Yes ☐ No ☐ **Above/Below**

Casing Diameter **Weight**

4 in. To 135 ft. lbs./ft.

Open Hole From 135 ft. To 170 ft.

Screen? ☐ **Type** **Make**

Static Water Level

15 ft. land surface Measure 11/08/1990

Pumping Level (below land surface)

ft. hrs. Pumping at 40 g.p.m.

Wellhead Completion

Pitless adapter manufacturer Model

☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
well grouted, type unknown		ft.	ft.

Nearest Known Source of Contamination

feet Direction Type

Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 11/19/1990

Manufacturer's name AERMOTOR

Model Number HP 0.5 Volt

Length of drop pipe 63 ft Capacity g.p. Typ Submersible

Abandoned

Does property have any not in use and not sealed well(s)? ☐ Yes ☒ No

Variance

Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous

First Bedrock Tunnel City Group Aquifer Tunnel City

Last Strat Tunnel City Group Depth to Bedrock 120 ft

Located by Minnesota Geological Survey

Locate Method GPS SA Off (averaged) (15 meters)

System UTM - NAD83, Zone 15, Meters X 465348 Y 5013816

Unique Number Verification Address verification Input Date 01/20/2010

Angled Drill Hole

Well Contractor

Licensee Business	Lic. or Reg. No.	Name of Driller
Torgerson Well Co.	27056	TORGERSON, S

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Appendix E

Rare Plant Survey

Trott Brook Crossing EAW

Trott Brook - Rare Plant Sur...

Prepared for:
Ms. Tracey Rust
The Excelsior Group
1660 Highway 100 South, Suite 400
St. Louis Park, MN 55416

August 17, 2021

Prepared by:
Midwest Natural Resources, Inc.
1032 West 7th Street, Suite 150
St. Paul, Minnesota 55102
www.mnrinc.us

1032 Seventh Street West, Suite 150 | Saint Paul, MN 55102 | mnrinc.us | 612.418.6260

MIDWEST NATURAL RESOURCES

Ms. Tracey Rust
The Excelsior Group
1660 Highway 100 South, Suite 400
St. Louis Park, MN 55416

August 17, 2021

Ms. Rust,

Midwest Natural Resources, Inc. (MNR) is pleased to provide the following botanical survey report for the Trott Brook project site in Ramsey, Minnesota. (**Figure 1**).

Project Limits and Existing Background Data

The project area, which is approximately 196.1 acres, is located in Township 32 North, Range 25 West in the SWNE, SENE, NENE, and NWSE quarter-quarter sections of Section 9 and the NWNW, SWNW, and NENW quarter-quarter sections of Section 10 (**Figure 2**). Background data evaluated includes digital soil data, the Minnesota Biological Survey sites of biodiversity significance data layer, the Minnesota Department of Natural Resources (DNR) Native Plant Community (NPC) data layer, and surficial geology. According to the Anoka County Soil Survey (**Table 1** and **Figure 3**), the site includes 15 different soil map units ranging from very poorly drained to excessively drained. Of these soil types, Rifle mucky peat (Rf) is often associated with rare plant species occurrences, but there are no sites of biodiversity significance nor NPC polygons mapped within the project limits. However, the sites of biodiversity significance data layer does identify a site, Trott Brook Wetlands, just outside of the survey area on the west side of Variolite Street. This site is classified as one below the minimum biodiversity threshold for statewide significance. Although sites with this designation lack occurrences of rare species or natural features, they may include areas of conservation value.

Table 1. Soils mapped within the project area

Map Unit Symbol	Map Unit Name	Drainage Class	Hydric Rating
AnA	Anoka loamy fine sand, 0 to 2 percent slopes	Well drained	Non-Hydric
AnB	Anoka loamy fine sand, 2 to 6 percent slopes	Well drained	Non-Hydric
Bm	Blomford loamy fine sand	Poorly drained	Hydric
Bx	Brickton silt loam	Poorly drained	Hydric
D20A	Isan-Isan, frequently ponded, complex, 0 to 2 percent slopes	Very poorly drained	Hydric
D67C	Hubbard loamy sand, 2 to 12 percent slopes	Excessively drained	Non-Hydric
D90B	Nymore loamy sand, 1 to 6 percent slopes	Excessively drained	Non-Hydric
Mc	Marsh	Very poorly drained	Hydric
NrD	Nymore loamy coarse sand, 12 to 25 percent slopes	Excessively drained	Non-Hydric
NyA	Nymore loamy sand, 0 to 2 percent slopes	Excessively drained	Non-Hydric
NyC	Nymore loamy sand, 6 to 12 percent slopes	Excessively drained	Non-Hydric
Rf	Rifle mucky peat	Very poorly drained	Hydric

Map Unit Symbol	Map Unit Name	Drainage Class	Hydric Rating
ZmB	Zimmerman fine sand, 1 to 6 percent slopes	Somewhat excessively drained	Non-Hydric
ZmC	Zimmerman fine sand, 6 to 12 percent slopes	Somewhat excessively drained	Non-Hydric
ZmD	Zimmerman fine sand, 12 to 24 percent slopes	Excessively drained	Non-Hydric

According to the 2012 Surficial Geology map of Anoka County, the site includes two map units, Richfield terrace (Qwr) and Peat and muck (Qp). The majority of the site is mapped as the Richfield terrace with Peat and muck associated directly with Trott Brook. The Peat and muck map unit is mapped for those areas with peat greater than four feet in depth and can include marl, a calcareous clay (**Table 2** and **Figure 4**).

Table 2. Surficial Geology map of Anoka County – Key Map Units

Map Unit Symbol	Map Unit	Map Unit Description
Qp	Peat and muck	Partially decomposed plant matter deposited in swamps, commonly formed in ice-block melt-out depressions and in former meltwater channels. Generally mapped only where greater than 4 feet (1.2 meters) thick. Includes fine-grained organic matter laid down in ponded water, marl at depth in places, and small bodies of open water. In developed areas, many of these deposits have been drained and buried under artificial fill; the organic sediment is commonly removed prior to filling in areas where structures are built (such as in Blaine). Small ridges of sand (units Qwr, Qbs) surrounded by unit Qp in places could be eolian sand overlying organic material.
Qwr	Richfield terrace	Sand and gravelly sand about 50 to 70 feet (15 to 21 meters) above the modern floodplain, ranging in elevation from about 870 feet (265 meters) in southern Fridley to about 915 feet (279 meters) in western Ramsey.

Methods

Prior to conducting field surveys, MNR submitted a rare plant survey protocol to the DNR Endangered Species Coordinator (**Appendix A**). This survey protocol did not list any target species, but indicated that surveys would entail a general rare plant survey.

Initial field efforts, which involved meander surveys, were conducted on July 21-22, 2021 by Jake Walden, a DNR approved rare plant surveyor. Field efforts included collecting a general plant species list (**Appendix B**) along with representative site photos and general site notes. A second visit of the site was conducted on August 13 by Otto Gockman and the undersigned to further investigate one particular area of interest with strong discharge and a number of calciphiles.

Observed rare plant locations were documented spatially using points to mark single, isolated individuals or clusters of plants. Voucher specimens were collected and pressed with the intent to verify their identification and this is also required by the DNR for certain species. The number of individuals present was either counted or estimated, and that information is included in the associated attribute table included in our submittal to the DNR's Natural Heritage Information System (NHIS) program. All collected spatial data during this effort was captured using a sub-meter GPS unit (Trimble® GeoXT 6000). Data was collected in WGS84 and post-processed in ArcMap using Trimble Positions Desktop.

Results

Overall site photos are provided in **Appendix D**. A large portion of the survey area is under agricultural production (corn and conifer plantation) or fallow land. Wooded areas bordering the cultivated lands include both pin oak (*Quercus ellipsoidalis*) and bur oak (*Quercus macrocarpa*) in the canopy with Pennsylvania sedge (*Carex pensylvanica*), smooth brome (*Bromus inermis*), and rosy sedge (*Carex rosea*) dominating the ground layer.

Wetlands are present in both the northern and southern portions of the site. The northern wetland area is a mosaic of intact native plant community and invasive cattail (*Typha* sp.). Intact portions of this complex are dominated by wiregrass sedge (*Carex lasiocarpa*), Canada rush (*Juncus canadensis*), and broad-leaved arrowhead (*Sagittaria latifolia*).

The southern wetland complex adjacent to Trott Brook is strongly influenced by groundwater discharge. This specific area corresponds to the Peat and muck map unit depicted in the Surficial Geology map. The wetland itself is intact and floristically diverse with both wet forest and wet meadow communities. This complex includes an open graminoid-dominated community with obvious groundwater discharge and dome-like topography. This area is bordered to the north by wet forest containing black ash (*Fraxinus nigra*), tamarack (*Larix laricina*), and a wall of non-native cattail. Species of note include bog birch (*Betula pumila*), fringed brome (*Bromus ciliatus*), spring cress (*Cardamine bulbosa*), water sedge (*Carex aquatilis*), porcupine sedge (*Carex hystericina*), interior sedge (*Carex interior*), prairie sedge (*Carex prairea*), sage-leaved willow (*Salix candida*) and bog aster (*Symphyotrichum boreale*). The species list for this collective community is presented in **Appendix C**. Other noteworthy species include marsh stitchwort (*Stellaria palustris*) and the native broad-leaved cattail (*Typha latifolia*). The marsh stitchwort is identified as an introduced species from northern Europe. However, the this is the second known occurrence of this species in the state that we are aware of. Both populations are present in discharge systems including a rich fen community in northern Minnesota and now this population. The broad-leaved cattail is sporadically distributed within the feature in contrast to the aforementioned wall of non-native cattail. It is either an issue of time or a combination of factors (soils, hydrology, and chemistry) that is currently inhibiting the non-native cattails from taking over this system.

Photo of open graminoid-dominated discharge feature with tamarack in the background.

Although it would be unusual and unexpected for this area, the mentioned assemblage of plants is suggestive of possible calcareous fen conditions. If using the calciphile species occurrence method in Leete and Smith (2005), this location (Minnesota River Valley Region) would have a point total of 65. The critical Vegetation Criterion threshold for calcareous fens is 50 points. However, key calciphile species, other than the prairie sedge, appear to be absent. Soils were evaluated on the second site visit in an attempt to collect

more information. The observation of deep peat soils (histosols) is consistent with the digital soil layer. The soils were further evaluated by applying a solution of 10% HCl on various soil samples within the area of interest and within the community transition beyond. No visual evidence of effervescence was detected in any of the examined soils with the exception of one sample examined within a band of black ash directly north of the graminoid-dominated community. Although this finding indicates the presence of calcium carbonate, the influence is not great enough to classify this particular area as a calcareous fen. Other criteria including detailed water chemistry and bryophyte composition were not evaluated.

Regarding rare plants, approximately 308 species were observed during survey efforts. This includes the detection of one rare plant species, the St. Lawrence grapefern (*Sceptridium rugulosum*). This fern has a state status of Special Concern, which is not protected under state law. Further information about this observation is presented in **Table 3**. The population location is illustrated in **Figure 5**, and a representative photo of this grapefern is provided in **Appendix E**. A collection of this species was vouchered and will be provided to the DNR State Botanist (Welby Smith) for verification purposes.

Table 3. Documented rare species

Scientific Name	Status[1]	Habitat and Associate Species	Number of Individuals
Sceptridium rugulosum	SC	Located near a wetland/upland transition with sandy loam soil. Associate species include *Salix petiolaris*, *Solidago gigantea*, *Fragaria virginiana*, *Phalaris arundinacea*, *Zanthoxylum americanum*, *Muhlenbergia racemosa*, and *Parthenocissus vitacea*.	4

[1]SC = MN Special Concern, THR = MN Threatened, END = MN Endangered

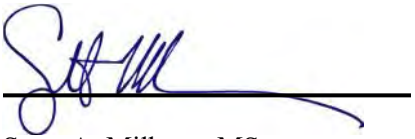
Conclusion

The primary focus of our field efforts was surveys related to state-listed plant species. As noted, we additionally conducted a brief evaluation of a wetland area associated with Trott Brook that appears to meet the vegetation criterion for calcareous fens, and having deep peat soils with discharge hydrology. However, a rapid field evaluation of the soil chemistry did not conclude strongly calcareous conditions nor were there any other high point calciphiles present other than reported. With that, we cannot conclude that this area is a calcareous fen.

The late-season rare plant survey resulted in the detection of the St. Lawrence grapefern, a rare species with no legal status. No other state-listed plant species were documented during the late-season efforts. However, based on the observed habitat and strong hydrologic influence of the wetland complex associated with Trott Brook, there is potential for other state-listed species that would be observable in the spring. This includes two spring ephemeral species, bog bluegrass (*Poa paludigena*) and false mermaid (*Floerkea proserpinacoides*). Both species have a state protected status of Threatened. We recommend additional surveys next spring, specifically in May as that is the optimal survey period for these two species. No other portions of the project site warrant further rare plant survey efforts.

We welcome any questions you may have upon reading this report.

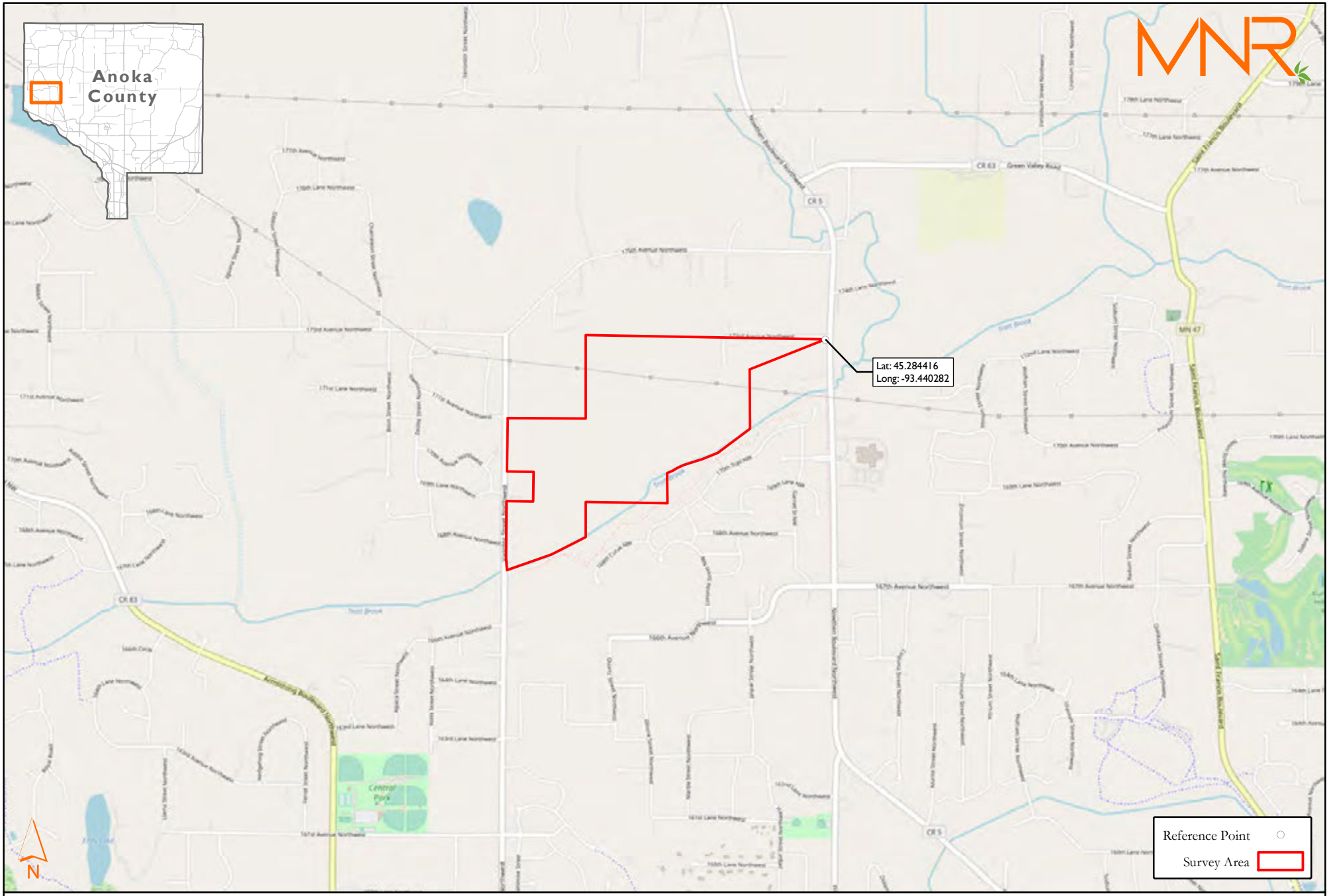
Respectfully submitted,



Scott A. Milburn, MS
Principal Botanist/President
Midwest Natural Resources, Inc.

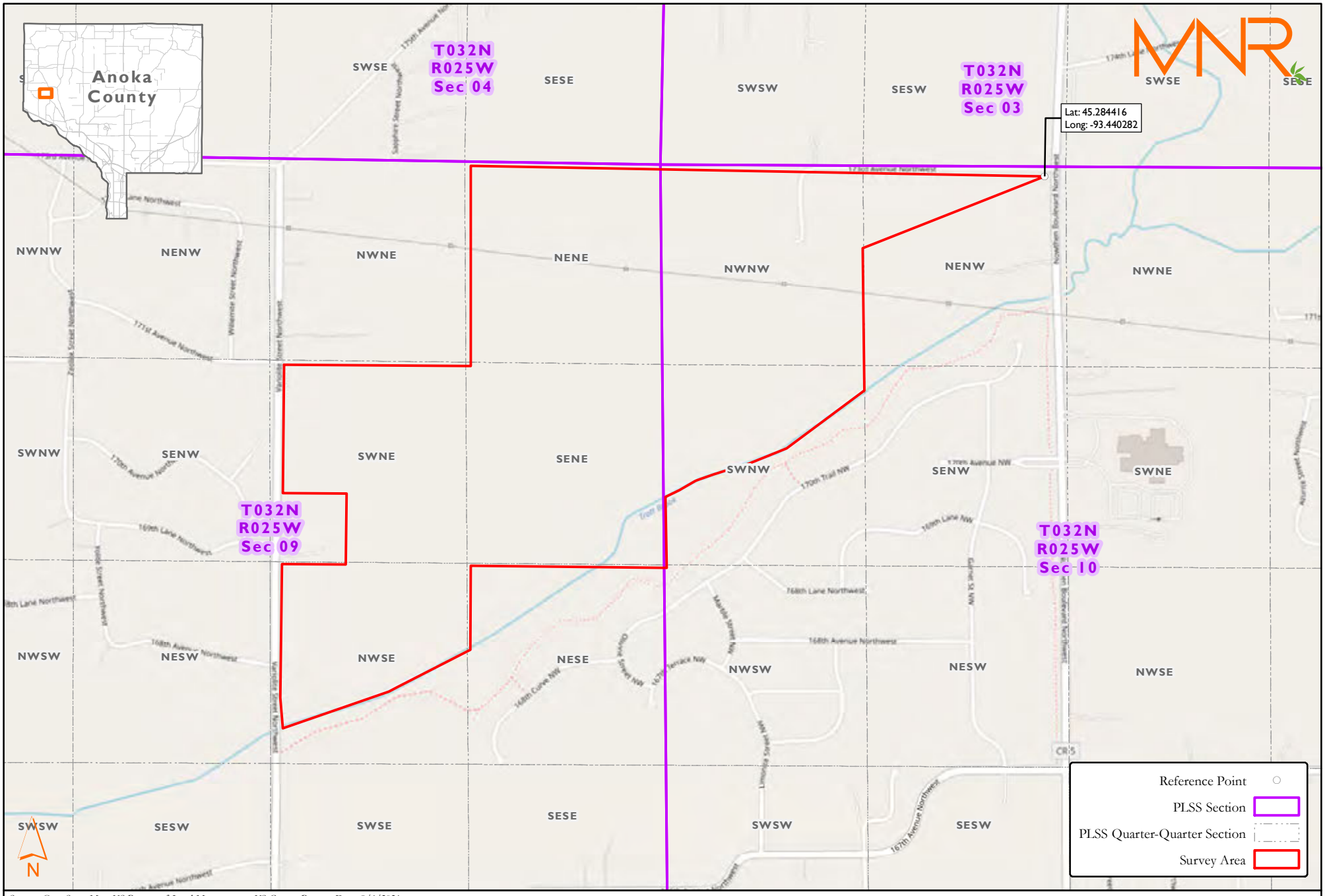
References

Leete, J.H. and W.R. Smith. 2005. Final Report to the US EPA: Test of the Technical Criteria for identifying and Delineating Calcareous Fens in Minnesota and Draft Revised Technical Criteria for Identifying Calcareous Fens in Minnesota. Clean Water Act Section 104 (b)(3) Grant Number CD-97504601-3, Minnesota Department of Natural Resources, Minneapolis, Minnesota.



Survey Location
Rare Plant Survey
Trott Brook Project - The Excelsior Group
Ramsey, Anoka County, Minnesota

Figure 1

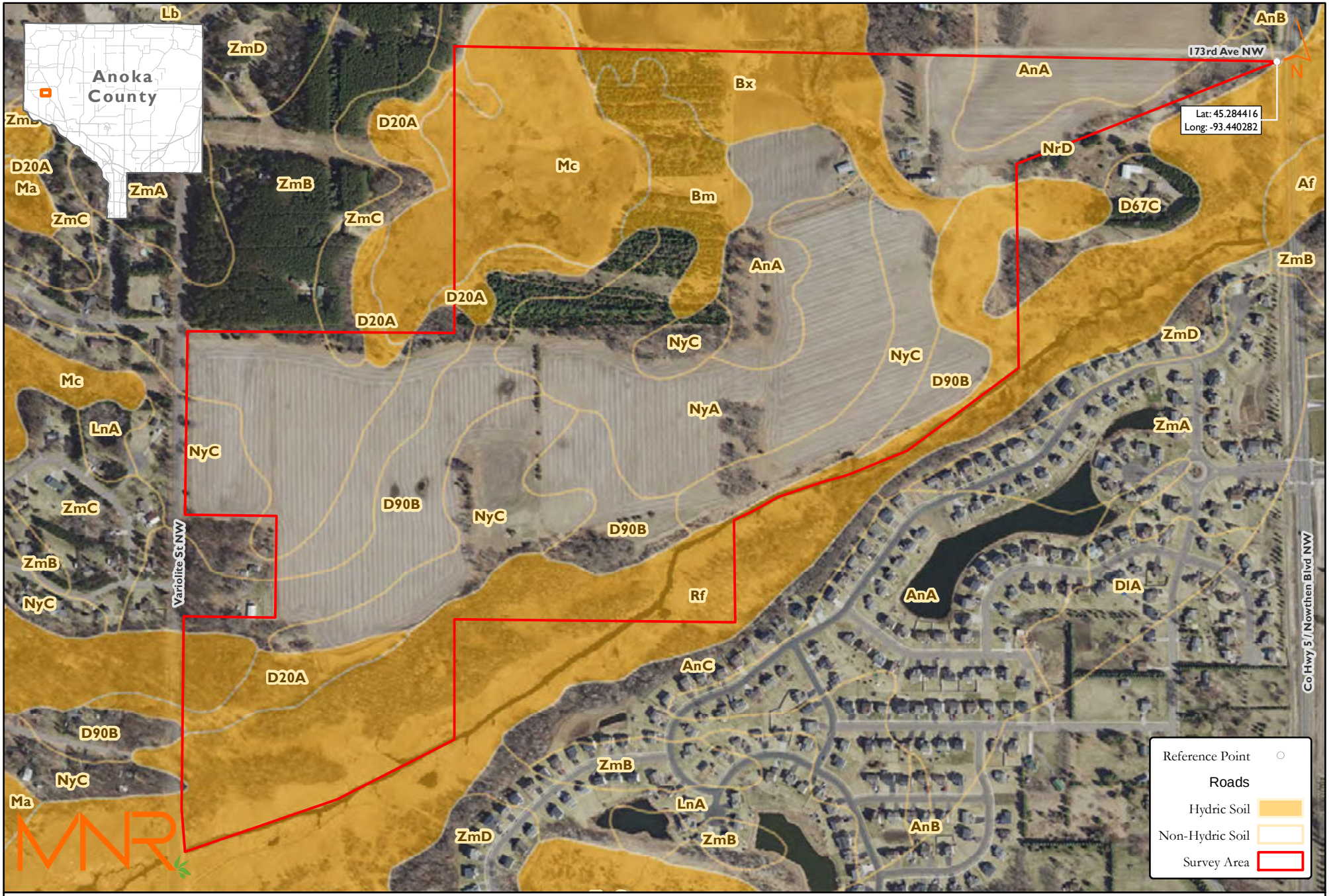


Source: OpenStreetMap, US Bureau of Land Management, US Census Bureau, Date: 8/6/2021

0 500 1,000 Feet

PLSS Survey Divisions
Rare Plant Survey
Trott Brook Project - The Excelsior Group
Ramsey, Anoka County, Minnesota

Figure 2

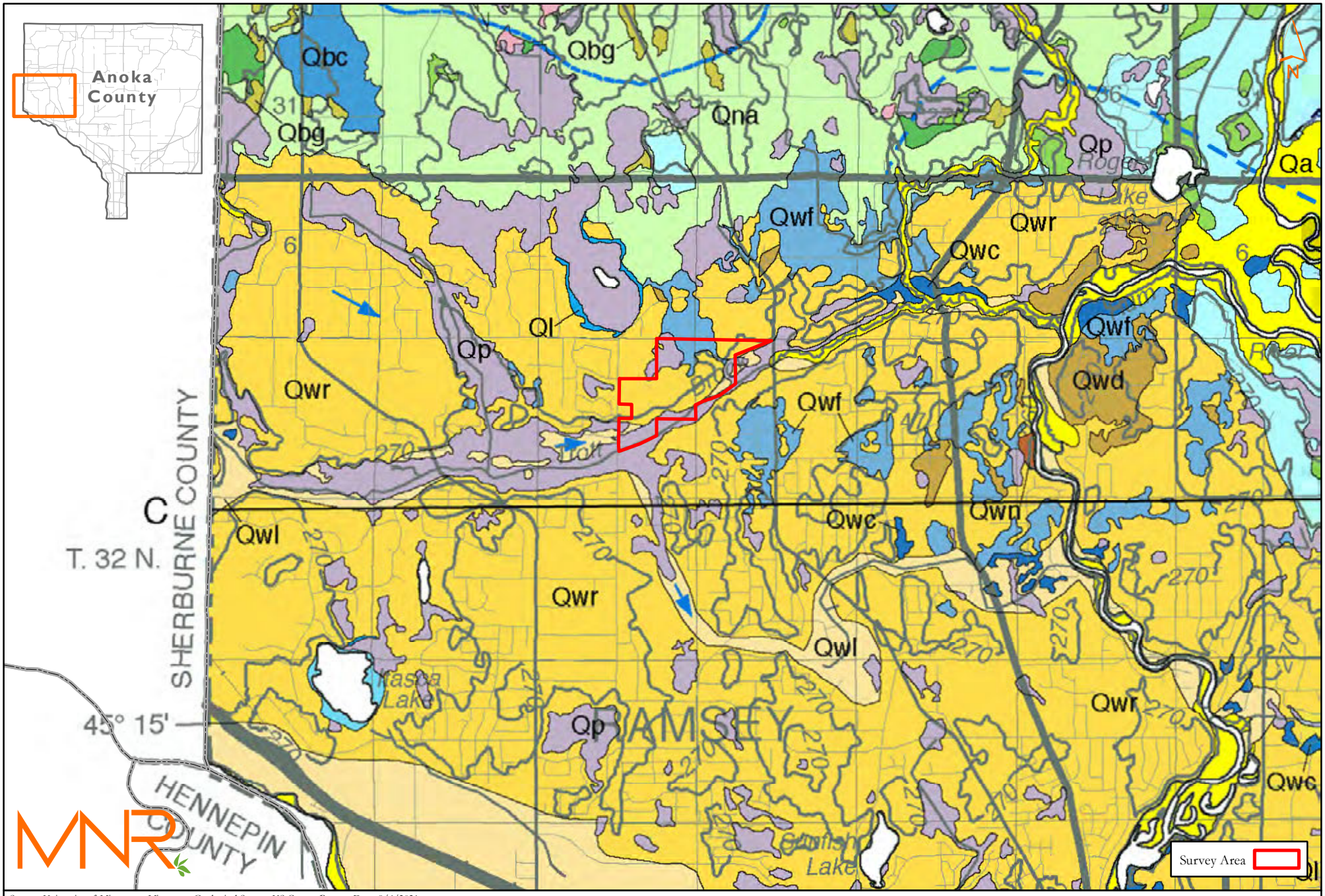


Source: Metropolitan Council, MnGeo, MN Department of Natural Resources, USDA Natural Resources Conservation Service, US Census Bureau, Date: 8/6/2021

0 400 800 Feet

Anoka County Soil Survey Units
Rare Plant Survey
Trott Brook Project - The Excelsior Group
Ramsey, Anoka County, Minnesota

Figure 3

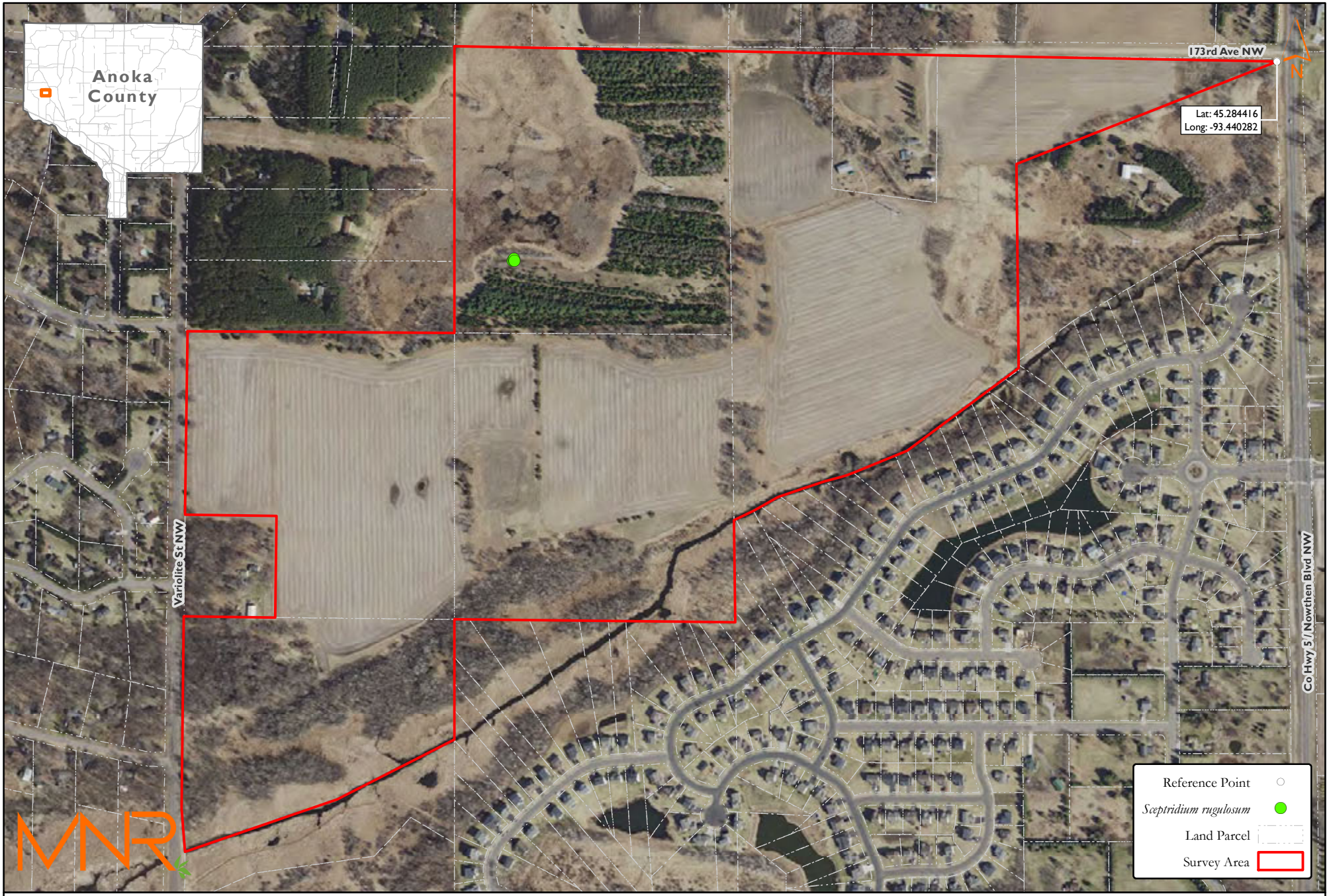


Source: University of Minnesota, Minnesota Geological Survey, US Census Bureau, Date: 8/6/2021

0 0.5 1 Miles

Surficial Geology of Anoka County
Rare Plant Survey
Trott Brook Project - The Excelsior Group
Ramsey, Anoka County, Minnesota

Figure 4



Source: Metropolitan Council, MnGeo, MN Department of Natural Resources, US Census Bureau, Date: 8/14/2021

0 400 800 Feet

Survey Results
Rare Plant Survey
Trott Brook Project - The Excelsior Group
Ramsey, Anoka County, Minnesota

Figure 5

Appendix A – Survey Protocol

MIDWEST NATURAL RESOURCES

Ms. Lisa Joyal
Endangered Species Review Coordinator
Minnesota Department of Natural Resources
Ecological & Water Resources
500 Lafayette Road
St. Paul, MN 55155

July 19, 2021

Ms. Joyal,

Midwest Natural Resources, Inc. (MNR) is proposing to conduct a rare plant survey within the proposed Trott Brook project site located west of Nowthen Blvd NW and 173rd Ave NW in Ramsey, Minnesota (**Figure 1**). Additionally, this project is found in the SWNE, NWSE, SENE, and NENE quarter-quarter sections of Section 9 in Township 32 North and Range 25 West and NWNW, SWNW, and NENW quarter-quarter sections of Section 10 in Township 32 North and Range 25 West.

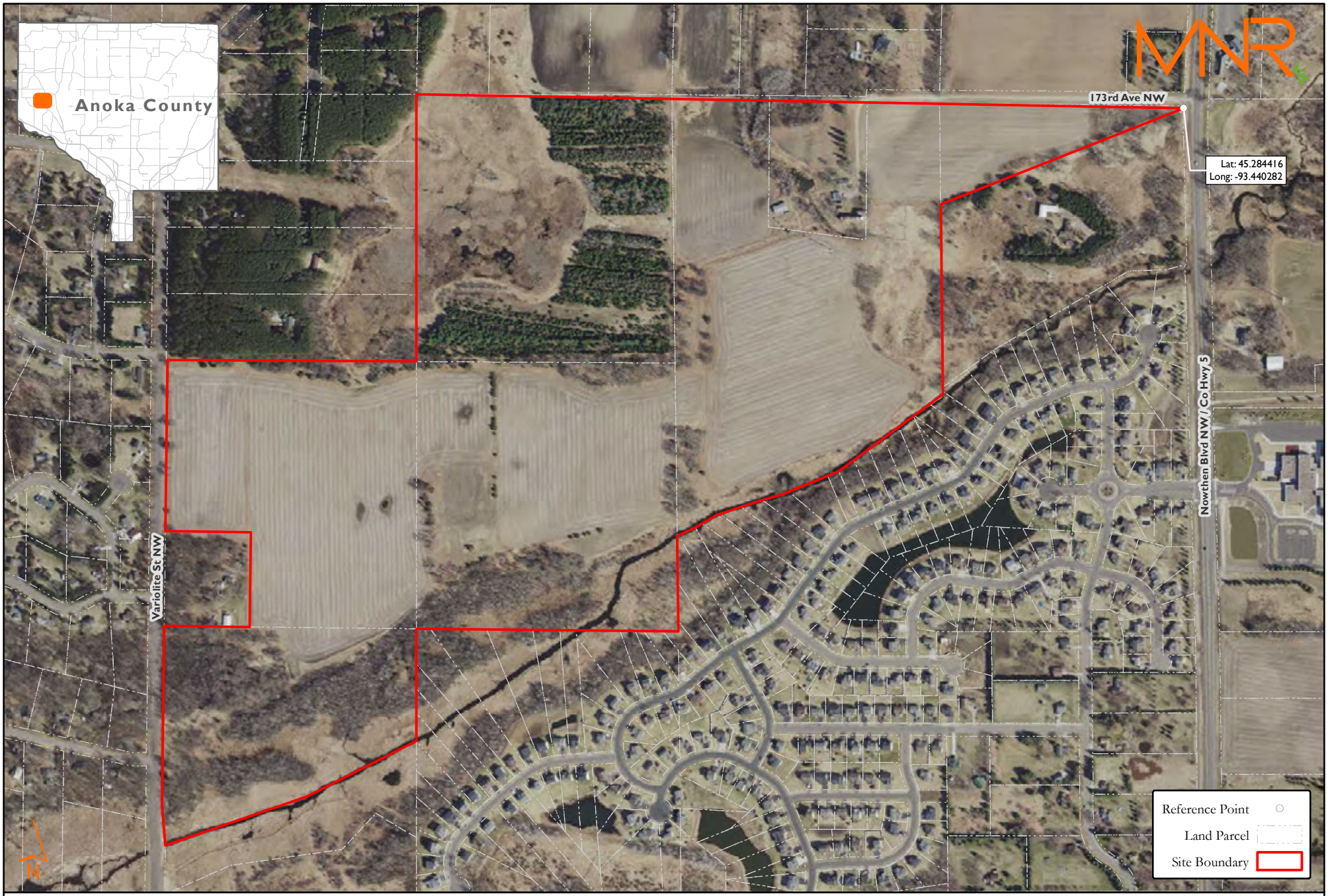
A Natural Heritage Information System (NHIS) data request has not been submitted at this time and therefore, we are unaware if there are any rare plant element occurrences in the general vicinity of the project area. However, we are intending to conduct field surveys regardless and without undue bias. The majority of the property is either actively farmed or hayed with limited acreage undeveloped or actively managed. Survey of the site is anticipated for late July and surveys will be conducted by one of our staff members on the DNR's list of approved rare plant surveyors. During field efforts, *Rare Species Survey Process* and the *Rare Plant Guidance* will be followed as required by the DNR.

Survey efforts will involve documenting all vascular plant species observed during this visit. Rare plant species, if encountered, will be documented spatially using sub-meter GPS units (Trimble GeoXT 6000). Rare plant species documentation will include notes on habitat, associate species, number of individuals observed within each population documented, and representative photos. Voucher collections will be made following the DNR's collection guidance procedure should the population allow for collecting, and this will be done under my collection permit.

A summary report will be produced at the conclusion of field efforts. This document will include information pertaining to survey methods, survey results, report figures/graphics, and appendices (species lists and representative photos). The report along with the GIS shapefile, associated spreadsheet, and notification that the voucher specimens have been verified by State Botanist Welby Smith.

Please let us know if you have any questions.

Scott A. Milburn, MS
Principal Botanist/President
Midwest Natural Resources, Inc.



Source: Metropolitan Council, MnGeo, MN Department of Natural Resources, US Census Bureau, Date: 7/6/2021

0 430 860 Feet

Project Site Boundary
Rare Plant Survey
Trott Brook - The Excelsior Group
Anoka County, Minnesota

Figure 1

Appendix B – Species List

Species List		
Abies balsamea	*Campanula aparinoides*	*Cryptotaenia canadensis*
Acer ginnala	*Cannabis sativa*	*Cyperus lupulinus*
Acer negundo	*Cardamine bulbosa*	*Cyperus schweinitzii*
Achillea millefolium	*Carex aquatilis*	*Cyperus strigosus*
Acorus americanus	*Carex aurea*	*Cypripedium parviflorum*
Actaea rubra	*Carex blanda*	*Cystopteris tenuis*
Agastache foeniculum	*Carex brevior*	*Dactylis glomerata*
Ageratina altissima var. altissima	*Carex comosa*	*Dichanthelium acuminatum*
Agrimonia pubescens	*Carex conoidea*	*Dichanthelium oligosanthes*
Agrostis gigantea	*Carex debilis var. rudgei*	*Digitaria cognata*
Agrostis perennans	*Carex disperma*	*Digitaria sanguinalis*
Agrostis scabra	*Carex echinata subsp. echinata*	*Drosera rotundifolia*
Alliaria petiolata	*Carex gracillima*	*Dryopteris carthusiana*
Alnus incana subsp. rugosa	*Carex granularis*	*Dryopteris cristata*
Ambrosia artemisiifolia	*Carex hystericina*	*Dulichium arundinaceum var. arundinaceum*
Amelanchier sp.	*Carex interior*	*Echinocystis lobata*
Amorpha canescens	*Carex intumescens*	*Eleocharis erythropoda*
Amphicarpaea bracteata	*Carex lacustris*	*Eleocharis ovata*
Anaphalis margaritacea	*Carex lasiocarpa subsp. americana*	*Eleocharis palustris*
Andropogon gerardii	*Carex lupulina*	*Elymus cf. villosus*
Anemone canadensis	*Carex pensylvanica*	*Elymus curvatus*
Antennaria neglecta	*Carex prairea*	*Elymus hystrix*
Apocynum androsaemifolium	*Carex projecta*	*Elymus repens*
Aquilegia canadensis	*Carex retrorsa*	*Epilobium coloratum*
Aralia nudicaulis	*Carex rosea*	*Epilobium leptophyllum*
Aralia racemosa	*Carex scoparia var. scoparia*	*Epilobium strictum*
Arctium minus	*Carex siccata*	*Equisetum arvense*
Arisaema triphyllum	*Carex stipata var. stipata*	*Equisetum fluviatile*
Aristida basiramea	*Carex stricta*	*Erechtites hieraciifolius var. hieraciifolius*
Artemisia ludoviciana subsp. ludoviciana	*Carex tetanica*	*Erigeron annuus*
Asclepias syriaca	*Carex utriculata*	*Erigeron philadelphicus var. philadelphicus*
Athyrium filix-femina var. angustum	*Celastrus scandens*	*Erigeron strigosus*
Berteroa incana	*Celtis occidentalis*	*Eriophorum gracile*
Betula alleghaniensis	*Centaurea stoebe subsp. micranthos*	*Euonymus alatus*
Betula papyrifera	*Chelone glabra*	*Eupatorium perfoliatum*
Betula pumila	*Cicuta bulbifera*	*Euphorbia esula*
Bidens connata	*Cicuta maculata var. maculata*	*Eurybia macrophylla*
Bidens frondosa	*Circaea lutetiana var. canadensis*	*Euthamia graminifolia*
Boehmeria cylindrica	*Cirsium arvense*	*Eutrochium maculatum*
Botrychium dissectum	*Cirsium muticum*	*Fallopia sp.*
Botrychium rugulosum	*Conyza canadensis*	*Festuca subverticillata*
Bromus ciliatus	*Cornus amomum var. schuetzeana*	*Fragaria vesca var. americana*
Bromus inermis	*Cornus racemosa*	*Fragaria virginiana*
Calamagrostis canadensis	*Cornus sericea*	*Frangula alnus*
Caltha palustris	*Corylus americana*	*Fraxinus nigra*
Calystegia sepium	*Crepis tectorum*	*Fraxinus pennsylvanica*

Species List		
Galium boreale	*Mirabilis nyctaginea*	*Rhamnus cathartica*
Galium labradoricum	*Mitella nuda*	*Rhus glabra*
Galium tinctorium var. tinctorium	*Moehringia lateriflora*	*Ribes hirtellum*
Galium trifidum var. trifidum	*Mollugo verticillata*	*Ribes missouriense*
Galium triflorum var. triflorum	*Monarda fistulosa*	*Rubus cf. satis*
Geum canadense	*Nepeta cataria*	*Rubus cf. superioris*
Glechoma hederacea	*Onoclea sensibilis*	*Rubus idaeus var. strigosus*
Glyceria grandis var. grandis	*Osmorhiza claytonii*	*Rubus occidentalis*
Glyceria striata	*Osmorhiza longistylis*	*Rubus plicatifolius*
Hackelia virginiana	*Osmunda cinnamomea*	*Rubus pubescens*
Hedeoma hispida	*Packera aurea*	*Rudbeckia hirta var. pulcherrima*
Helianthus sp.	*Parthenocissus vitacea*	*Rumex acetosella*
Hibiscus trionum	*Pedicularis lanceolata*	*Rumex britannica*
Hieracium caespitosum	*Penthorum sedoides*	*Rumex crispus*
Humulus lupulus	*Persicaria amphibia*	*Rumex triangulivalvis*
Hypericum majus	*Persicaria sagittata*	*Sagittaria latifolia*
Hypericum perforatum	*Phalaris arundinacea*	*Salix bebbiana*
Ilex verticillata var. verticillata	*Phleum pratense subsp. pratense*	*Salix candida*
Iris sp.	*Phryma leptostachya*	*Salix discolor*
Juglans nigra	*Physalis heterophylla var. heterophylla*	*Salix petiolaris*
Juncus brevicaudatus	*Picea glauca*	*Sambucus racemosa var. pubens*
Juncus canadensis	*Pilea pumila*	*Sanicula gregaria*
Juncus tenuis	*Pinus resinosa*	*Schizachyrium scoparium var. scoparium*
Juniperus virginiana var. virginiana	*Pinus strobus*	*Schoenoplectus tabernaemontani*
Lactuca sp.	*Plantago major*	*Scirpus atrovirens*
Laportea canadensis	*Plantago patagonica*	*Scirpus cyperinus*
Larix laricina	*Platanthera aquilonis*	*Scirpus pedicellatus*
Lathyrus ochroleucus	*Poa palustris*	*Scrophularia lanceolata*
Lathyrus palustris	*Poa pratensis subsp. pratensis*	*Scutellaria galericulata*
Lechea cf. stricta	*Populus tremuloides*	*Scutellaria lateriflora*
Linaria vulgaris	*Potamogeton sp.*	*Setaria pumila subsp. pumila*
Liparis loeselii	*Potentilla argentea*	*Silene latifolia*
Lonicera cf. x bella	*Potentilla norvegica*	*Smilax sp.*
Lonicera dioica	*Potentilla palustris*	*Solanum dulcamara*
Lotus corniculatus	*Potentilla simplex*	*Solidago canadensis*
Lycopus americanus	*Prenanthes alba*	*Solidago gigantea*
Lycopus uniflorus	*Prunella vulgaris*	*Sorbus decora*
Lysimachia terrestris	*Prunus serotina*	*Sorghastrum nutans*
Lysimachia thyrsiflora	*Prunus virginiana*	*Sparganium eurycarpum*
Maianthemum canadense	*Pseudognaphalium obtusifolium*	*Spartina pectinata*
Maianthemum racemosum subsp. racemosum	*Pyrola elliptica*	*Spiraea alba*
Maianthemum trifolium	*Quercus ellipsoidalis*	*Sporobolus cryptandrus*
Malus sp.	*Quercus macrocarpa*	*Stachys palustris*
Medicago lupulina	*Ranunculus abortivus*	*Stellaria cf. palustris*
Medicago sativa	*Ranunculus recurvatus var. recurvatus*	*Stellaria longifolia*
Micranthes pensylvanica	*Rhamnus alnifolia*	*Symphyotrichum boreale*

Species List		
Symphyotrichum lanceolatum		
Symphyotrichum lateriflorum		
Symphyotrichum oolentangiense		
Symphyotrichum puniceum var. puniceum		
Taraxacum officinale		
Thelypteris palustris var. pubescens		
Tilia americana		
Toxicodendron rydbergii		
Toxicodendron vernix		
Triadenum fraseri		
Trientalis borealis		
Trifolium arvense		
Trifolium repens		
Typha spp.		
Ulmus americana		
Ulmus pumila		
Urtica dioica subsp. gracilis		
Utricularia intermedia		
Utricularia minor		
Utricularia vulgaris		
Uvularia sessilifolia		
Verbascum thapsus		
Verbena hastata		
Verbena stricta		
Viburnum lentago		
Vicia americana		
Viola sagittata		
Viola sp.		
Vitis riparia		
Zanthoxylum americanum		
Zea mays		
Zizia aurea		

Appendix C – Species List (Discharge feature)

Discharge Species List		
Betula pumila		
Bromus ciliatus		
Calamagrostis canadensis		
Caltha palustris		
Campanula aparinoides		
Cardamine bulbosa		
Carex aquatilis		
Carex hystericina		
Carex interior		
Carex lacustris		
Carex prairea		
Cicuta bulbifera		
Eleocharis erythropoda		
Epilobium leptophyllum		
Equisetum fluviatile		
Eutrochium maculatum		
Galium labradoricum		
Galium trifidum var. trifidum		
Impatiens capensis		
Lysimachia thyrsiflora		
Packera aurea		
Pilea pumila		
Rumex britannica		
Sagittaria latifolia		
Salix candida		
Schoenoplectus tabernaemontani		
Scutellaria galericulata		
Sparganium eurycarpum		
Stellaria palustris		
Symphyotrichum boreale		
Symphyotrichum puniceum var. puniceum		
Typha latifolia		

Appendix D – Representative Photos

Photo pt 9742

Photo pt 9743

Photo pt 9763

Photo pt 9764

Photo pt 9769

Photo pt 9770

Photo pt 9771

Photo pt 9772

Photo pt 9774

Photo pt 9796

Photo pt 9802

Photo pt 9804

Photo pt 9807

Photo pt 9808

Photo pt 9810

Photo pt 9818

Photo pt 9819

Photo pt 9822

Appendix E – Rare Species Photos

Photo of *Sceptridium rugulosum* (St. Lawrence grapefern) – MN Special Concern

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Appendix F

Phase I Archaeological Survey

Trott Brook Crossing EAW

Phase I Archaeological Survey of Trott Brook Property in Ramsey, Anoka County, Minnesota

Principal Investigator:
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Nienow Cultural Consultants LLC
Registered Professional Archaeologist #12071

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Final Report
July 8, 2021

Phase I Archaeological Survey of Trott Brook Property in Ramsey, Anoka County, Minnesota

Submitted To:

Excelsior Group
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Submitted By:

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Final Report
July 8, 2021

Management Summary

Excelsior Group is proposing construction of a residential development at "Trott Brook Property" in the City of Ramsey, Anoka County Minnesota. The project area, approximately 200 acres in size, is located in the NE ¼ of Section 9 and NW ¼ of Section 10 of Township 32N, Range 25W in Archaeological Region 4e: Central Lakes Deciduous East. The majority of the project area is cultivated with corn surrounded by patches of woods and wetlands. The project area extends from Nowthen Blvd at the eastern end to Variolite St NW at the west, and is generally bounded by 173rd Ave NW along the northern edge, and Trott Brook along the southern edge. Planned development includes approximately 270 residential lots, associated roads and ponds, approximately 13.4 acres of dedicated park land, and several ponds.

Nienow Cultural Consultants LLC (NCC) was contracted to complete a Phase I Archaeological Survey in June of 2021. NCC's Principal Investigator for this project was Jeremy Nienow, PhD., RPA. Work began with a literature review June 10 followed by fieldwork completed June 14-16, 2021. Fieldwork consisted of surface survey of all agricultural fields. Surface visibility in the agricultural fields ranged between 70 and 90%. Surface survey transects were spaced on a maximum of a seven-meter interval. After the identification of six artifacts during the surface survey, eight shovel tests were completed along a low ridge overlooking Trott Brook with a follow-up ninth test located at Find Spot 1 at the southern base of the ridge. Shovel tests were typically 35-40 centimeters (cm) wide and at least 80cm deep. All soils were screened through ¼" mesh screen, detailed profile notes completed, photographs taken, and GPS points collected for each shovel test. Architectural review was not included as part of this project.

Six prehistoric artifacts were identified during the surface survey. These included five tertiary quartz flakes, and one piece of quartz shatter. No additional cultural materials were identified during shovel testing. The flakes have been reported to the Office of the State Archaeologist as three separate sites based on their locations. These have received site numbers 21AN0197 (single quartz shatter), 21AN0198 (single tertiary quartz flake), and 21AN0199 (four tertiary quartz flakes). Based on these results, Nienow Cultural Consultants does not recommend these sites eligible for the National Register of Historic Places, and recommends no further archaeological work at this time.

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1.0 INTRODUCTION

Excelsior Group is proposing construction of a residential development at "Trott Brook Property" in the City of Ramsey, Anoka County Minnesota. The project area, approximately 200 acres in size, is located in the NE ¼ of Section 9 and NW ¼ of Section 10 of Township 32N, Range 25W in Archaeological Region 4e: Central Lakes Deciduous East. The majority of the project area is cultivated with corn surrounded by patches of woods and wetlands. The project area extends from Nowthen Blvd at the eastern end to Variolite St NW at the west, and is generally bounded by 173rd Ave NW along the northern edge, and Trott Brook along the southern edge. Planned development includes approximately 270 residential lots, associated roads and ponds, approximately 13.4 acres of dedicated park land, and several ponds.

Nienow Cultural Consultants LLC (NCC) was contracted to complete a Phase I Archaeological Survey in June of 2021. NCC's Principal Investigator for this project was Jeremy Nienow, PhD., RPA. NCC subcontracted six individuals to assist in completing research, fieldwork, and lab processing for the project: Alexandra Hedquist (Hedquist Archaeological Consulting, LLC), Andrew Vang-Roberts (Vang-Roberts Consulting), Chris Rico (Rico Cultural Resource Management Services, LLC), John Strot (John's Archaeological Consulting), and Laura Koski (Zooarchaeo Consulting). The investigation was guided by the Secretary of Interior's Standards and Guidelines for Archaeology and Historic Preservation (48FR44716), the State Historic Preservation Office's (SHPO) Manual for Archaeological Projects in Minnesota (Anfinson 2005), and the State Archaeologist's Manual for Archaeological Projects in Minnesota (Minnesota Office of the State Archaeologist 2011). Research and report preparation were accomplished by professional archaeologists meeting the standards set forth in 35CFR61.

Work began with a literature review June 10 followed by fieldwork completed June 14-16, 2021. Fieldwork consisted of surface survey of all agricultural fields. Surface visibility in the agricultural fields ranged between 70 and 90%. Surface survey transects were spaced on a maximum of a seven-meter interval. After the identification of six artifacts during the surface survey, eight shovel tests were completed along a low ridge overlooking Trott Brook with a follow-up ninth test located at Find Spot 1 at the southern base of the ridge. Shovel tests were typically 35-40 centimeters (cm) wide and at least 80cm deep. All soils were screened through ¼" mesh screen, detailed profile notes completed, photographs taken, and GPS points collected for each shovel test. Architectural review was not included as part of this project.

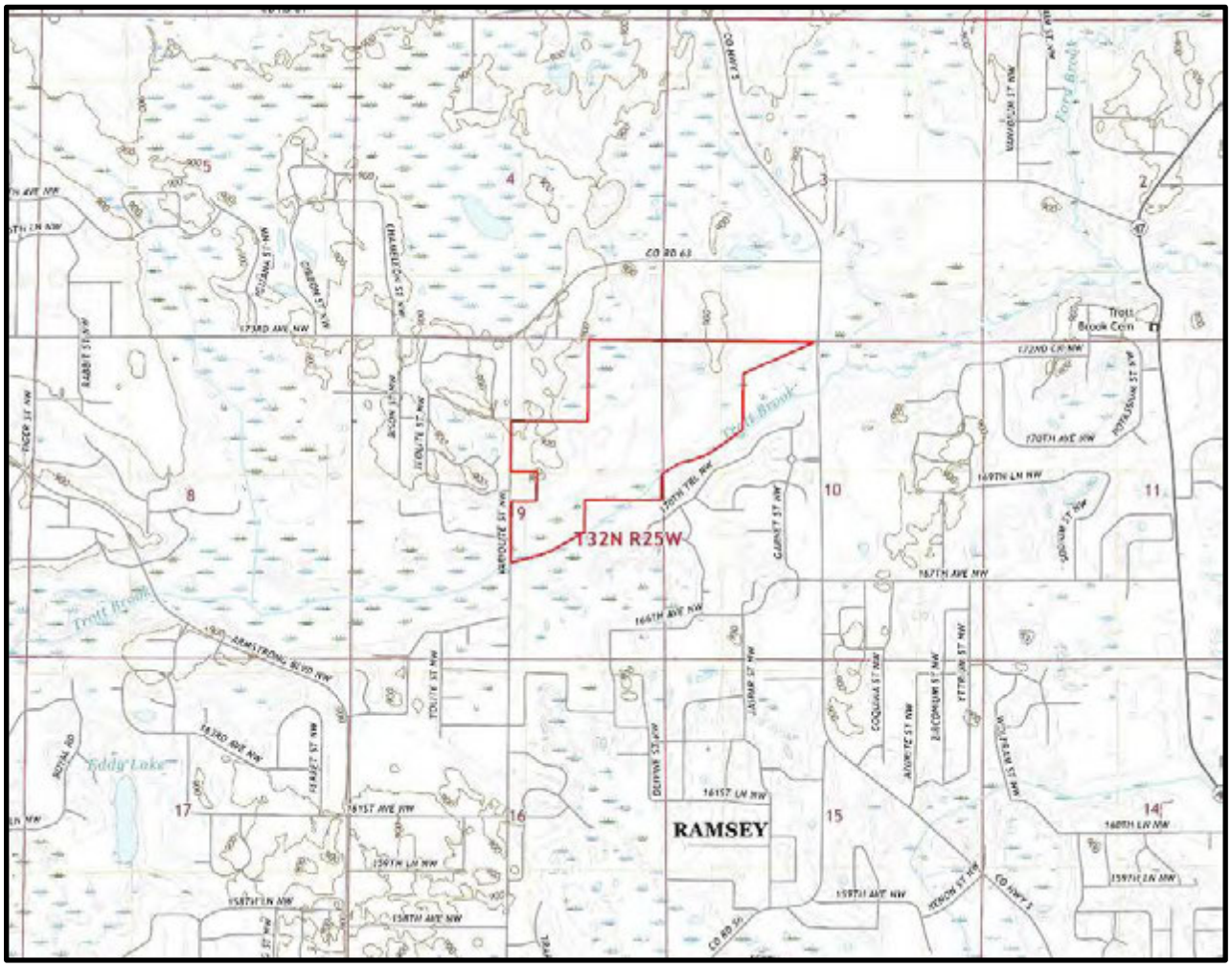

Figure 1: USGS Topographic Map Illustrating Project Area (outlined in red).
(USGS 7.5' Topographic Map, Anoka Quadrangle, 2019, 1:24,000)

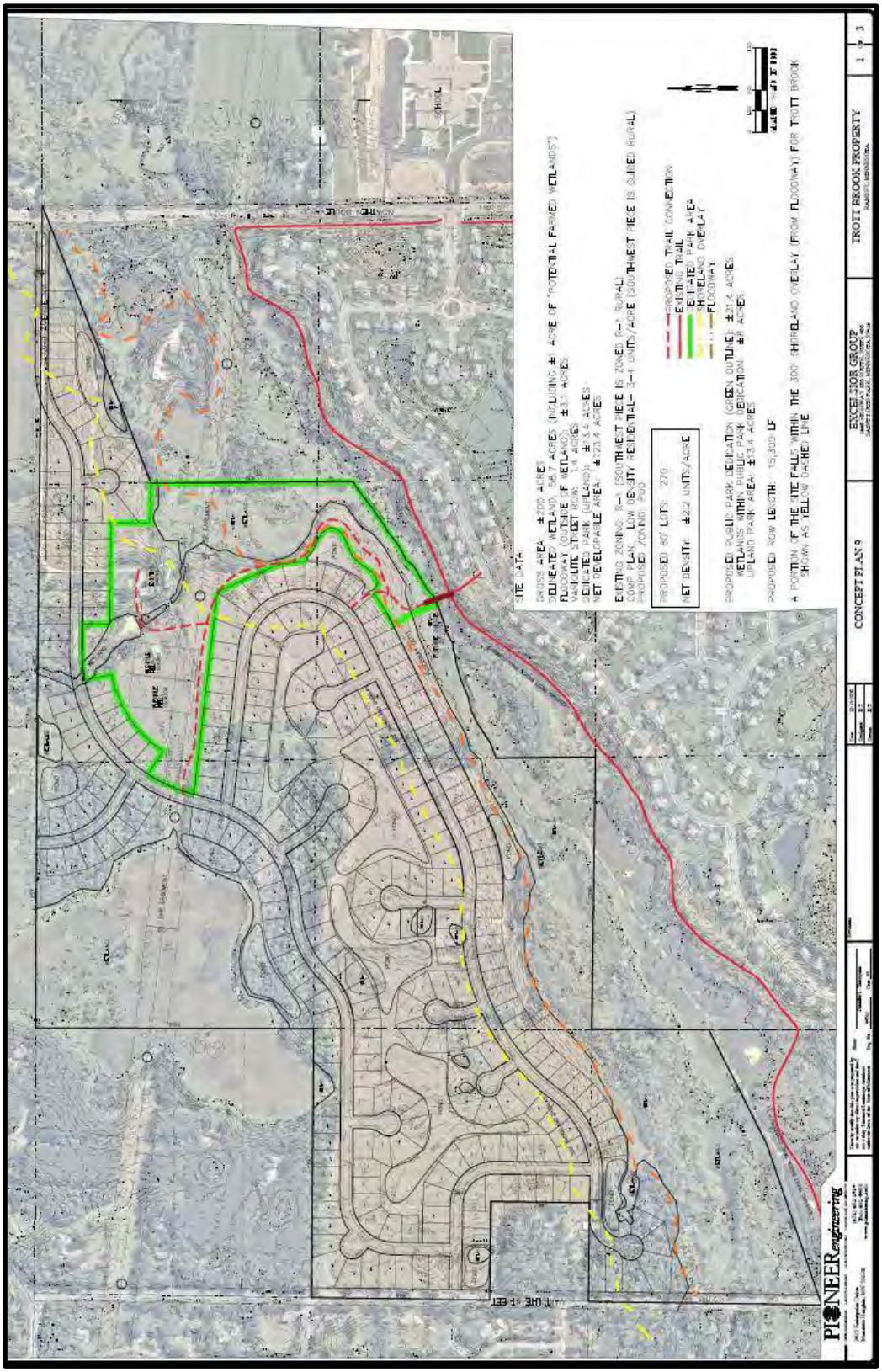

Figure 2: Engineering Sketch Plan of Project Area.
(Provided by Kjolhaug Environmental Services.)

2.0 RESEARCH DESIGN AND METHODOLOGY

2.1 Literature Review

A literature review was completed on June 10, 2021. Typically, the literature review would be completed by visiting the Office of the State Archaeologist and the State Historic Preservation Office. Unfortunately, both of these offices were closed due to safety precautions surrounding SARS-CoV-2 spread prevention. Instead, previously identified archaeological sites were noted for a two-mile radius surrounding the project area using the online Minnesota Office of the State Archaeologist archaeological sites portal (OSA Portal). In addition, the Township/Range/Sections within the two-mile radius were sent to the State Historic Preservation Office to generate an internal database search. The Township/Range/Section search did not yield any additional sites not included on the OSA Portal. Archaeological survey reports from nearby sites were also reviewed to determine whether survey had already been completed within the project area. All resulting previously identified sites and adjacent archaeological surveys were reviewed as a part of this project.

2.2 Fieldwork

Fieldwork was completed on June 14-16, 2021. Fieldwork included surface survey and shovel testing within the project area. Surface surveyed areas consisted of all agricultural fields on a seven-meter interval. Ground visibility in all surface-surveyed areas ranged between 70 and 90% (see Appendix A for example surface visibility photographs). Six prehistoric artifacts were identified during the surface survey. To test the depth of these cultural deposits, nine follow-up shovel tests were completed. Eight of these were excavated on a low ridge overlooking Trott Brook, and an additional shovel test was excavated at the location of Find Spot 1 just south of the ridge and north of Trott Brook. Shovel tests were typically 35-40 centimeters (cm) wide and at least 100cm deep. All soils were screened through ¼" mesh screen, detailed profile notes completed, photographs taken, and GPS points collected for each shovel test.

2.3 Artifact Processing

When encountered in the field, all artifacts were bagged by provenience and a GPS point recorded for its location. Artifacts were then transported to the NCC lab space and cleaned, lotted, and photographed. At the time of this report, the landowner has been contacted regarding whether they would like to keep the artifacts, but has not responded with their decision. If the landowner would like to keep the artifacts, all cultural material will be returned to them. If they would not like to keep the artifacts, all artifacts will be curated with the Minnesota Historical Society under Repository Agreement Number 953.

3.0 ENVIRONMENTAL SETTING

3.1 Geological Background and Soils

In his 1990 publication *Archaeological Regions in Minnesota and the Woodland Period*, former State Archaeologist Scott Anfinson divides the state of Minnesota into nine environmental-archaeological regions based on natural resources available within each region. This classification allows archaeologists to research and analyze prehistoric environments in the state, as well as predict where archaeological sites may be located.

The Trott Brook Property falls within the southeastern portion of Anfinson's region 4e: Central Lakes Deciduous East Sub-Region. The region sits within east-central to central Minnesota, spanning Dakota to Becker Counties. Topographically, the region consists of a mixture of moraines, till plains, and outwash plains, and is heavily spotted with lakes, some over 30 meters (m) deep. Major rivers include the Mississippi and Minnesota Rivers flowing along the western boundary of the region, and the St. Croix River along the region's eastern boundary. Streams draining the western part of the region flow in a western direction to the Red River (Anfinson 1990). River formation was the result of a complex glacial history including several episodes of advancing and retreating glacial lobes.

The Central Lakes Deciduous East Sub-Region is located directly west of the Mississippi River, but could arguably incorporate portions of western Wisconsin. The regional topography consists of moraines, glacial till, and outwash plains, as well as a large variety of lakes, streams, and wetlands (Gibbon et al. 2002). Average precipitation ranges from 21 to 32 inches (Grimes 1968). Average high winter temperatures range from 12 to 24 degrees Fahrenheit (F) while average high summer temperatures range from 78 to 82 degrees F. The frost-free season ranges from 140 to 160 days (Gibbon et al. 2002).

Soils in the region reflect a diverse history of glacial and vegetation activity. Soil texture ranges from medium to course, with prairie soils more commonly found in the southern and western portions of the region and forest soils found mostly in the north and east portions (Anfinson 1990). Bedrock outcrops are mainly located along the region's central and eastern edge, and are comprised of mainly granite outcroppings along river banks (Gibbon et al. 2002).

All soil source material was deposited during the Wisconsin stage of the Pleistocene epoch. Two main types of glacial drift were deposited over the county when the Superior Lobe retreated from the area around 13,500 years ago. The Superior Lobe, which flowed into the area from the north, deposited coarse textured material, reddish brown in color, with pebbles of basalt, gabbro, and red sandstone. At a later date, the Grantsburg Sub-lobe, an extension of the Des Moines Lobe, advanced into Sherburne County. This lobe brought in what is commonly called "gray till" or "buff till." During the retreat of the Grantsburg Lobe around 12,500 years ago, the ice stagnated in the northern and eastern parts of the county and melt water left intermixed outwash gravel and sand from both of the previous lobes. Additionally, when the Grantsburg Lobe retreated westward, it uncovered the Mississippi Valley, and melt water from the wasting Des Moines Lobe filled the valley throughout the county with coarse alluvium, which underlies two broad terraces parallel to

the Mississippi River. The sands in these areas are course in texture near the river and become increasingly finer in texture the further the distance from the river. In various places, it is underlain by strata of calcareous gravel, which was representative of what was found during the current archaeological survey (Grimes 1968).

The project area is comprised of Anoka loamy fine sand, Nymore loamy sand, Nymore loamy sand, and Nymore loamy coarse sand. The Anoka loamy fine sand series consists of well drained soils on 0 to 2 percent slopes found on outwash plains. The typical soil profile consists of loamy fine sand from 0 to 20 inches, followed by fine sand from 20 to 152 inches. The Nymore loamy sand series consists of excessively drained soils found on 0 to 12 percent slopes on stream terraces. The typical soil profile consists of loamy sand from 0 to 66 inches, followed by sand from 66 to 152 inches. The Nymore loamy coarse sand series consists of excessively drained soils found on 12 to 25 percent slopes on stream terraces. The typical soil profile for the series reflects that of the Nymore loamy sand series (NRCS 2021).

3.2 Regional Flora and Fauna

Vegetation in the area at the time of Euro-American settlement consisted of Big Wood species in both the south and west portions of the region. Most specifically, the trees were deciduous hardwood species, primarily oak, mixed with deciduous-coniferous forest in the northern part of the region (Anfinson 1990) which also contained maple, basswood, and hickory. As Euro-American settlers moved through the area and cleared portions of forest, prairie land became more abundant. White-tailed deer, bison, elk, beaver, bear, prairie chickens, and a variety of fish and waterfowl would have been commonly available resources (Anfinson 1990). Specific to the site area, the majority of the trees on the sand plain consisted of bur oak and northern pin oak, as well as mixed hardwoods which grow in areas of glacial till, specifically in the areas where the Hayden soil series is prominent (Grimes 1968). Large areas of hardwoods invaded areas of native grasses in the outwash plains along the Mississippi River. The Hubbard series discussed above developed in these areas.

4.0 CULTURAL HISTORY

The Minnesota State Historic Preservation Office (SHPO) has developed statewide contexts examining Minnesota's Prehistoric through recent past. These contexts are laid out on the Minnesota Archaeological Site Form (Minnesota Office of the State Archaeologist 2016). Generally, they describe the history of the state and assist in predicting where specific types of sites may occur.

Native American contexts are commonly divided into three major traditions: Paleoindian, Archaic, and Woodland. Late Woodland is further subdivided into Plains Village, Mississippian, and Oneota Traditions. These divisions are based on significant changes in how these communities lived, with a special focus on subsistence strategies. Historic contexts are generally divided into Contact and Post-Contact periods. The Contact period begins with early European exploration and

continues through the Post-Contact period including Euro-American settlement and Minnesota statehood. The following is a general summary of these traditions using the Author's general knowledge and various disseminated sources for information including the OSA's website, Elden Johnson's 1988 *The Prehistoric Peoples of Minnesota*, Gibbon and Anfinson's 2008 *Minnesota Archaeology: The First 13,000 Years*, and Gibbon's 2012 *Archaeology of Minnesota: The Prehistory of the Upper Mississippi River Region*.

4.1 Pre-Contact Period

4.1.1 Paleoindian Tradition (11,500 to 7,500 B.C.)

The Paleoindian Tradition in Minnesota is divided into two periods: Early Paleoindian and Late Paleoindian/Early Archaic (Gibbon and Anfinson 2008). Throughout the Paleoindian, Native American communities were small, mobile, and focused on hunting. However, between the early and late periods, the environment and available food resources changed dramatically. The beginning of the Early Paleoindian Tradition is characterized by retreat of glacial ice and the growth of spruce forests. During this time, now extinct megafauna like mastodon, mammoth, and large bison were available for hunting. The Early Paleoindian period is poorly understood in Minnesota because most evidence for Paleoindian lifeways comes from isolated finds of large fluted projectile points (Gibbon and Anfinson 2008). Based on more plentiful sites in the southeastern and southwestern portions of the United States, it is generally assumed Native American populations were small, consisting of highly-mobile hunters and foragers who followed large game throughout the landscape (Gibbon and Anfinson 2008).

By the Late Paleoindian period, modern vegetation zones had established themselves in Minnesota. Modern animal species like white tail deer, grouse, and fish were available for Native American communities to hunt and fish. Lithic tool evidence from Late Paleoindian sites in Minnesota take the form of stemmed rather than fluted points and a wider range of tool types including groundstone tools (Gibbon and Anfinson 2008). Again, lifeways during this time are poorly understood, but based on three well-documented sites found in Minnesota (Cedar Creek-21AK58, Bradbury Brook-21ML42, and Browns Valley-21TR5), communities are still small, highly-mobile and focused on hunting larger animals and foraging for wild plants. However, stone toolkits did diversify and communities began exploiting smaller territories. It is also likely populations started to increase (Gibbon and Anfinson 2008).

4.1.2 Archaic Tradition (7,500 to 800 B.C.)

The Archaic Tradition continues the trend of resource diversification started in the Late Paleoindian period. Native American communities developed broader toolkits, used a wider array of foods, and became less mobile over the course of the Archaic. Additionally, by the end of the Archaic, communities were using communal burial sites. Stemmed and notched points, groundstone tools, particularly those for woodworking, and cold-hammered copper tools are hallmarks of the Archaic Tradition in the archaeological record (Anfinson 1997; Gibbon and

Anfinson 2008). By the end of this period the climate shifted to a cooler, wetter pattern up until the strong, human-driven, warmer climates of the modern era. Resource gathering technologies during the Archaic included the aforementioned hunting, as well as trapping, fishing, foraging, woodworking and plant processing. Many of the larger, documented sites in the central portion of the state likely began during the end of this period.

4.1.3 Woodland Tradition (800 B.C. to European Contact)

In the Midwest region, archaeologists tend to divide the Woodland Tradition into three periods: Early, Middle, and Late. However, Anfinson (1987) and Gibbon (2012) suggest in Minnesota it is more appropriate to divide the era into Initial and Terminal Woodland periods. This view is not as widespread as research would at first suggest, with work including Arzigian's *Statewide Multiple Property Documentation Form for the Woodland Tradition* (2008), and Buhta et. al. *On the Periphery?: Archaeological Investigations of the Woodland Tradition in West- Central Minnesota* (2014), retaining the more traditional use of Early, Middle, and Late designations. Beginning approximately 2,800 years ago, peoples in the region experienced increases in population with the advent of first horticultural and then agricultural subsistence strategies to augment already extant systems of hunting, gathering, etc. As populations increased, settlements near favorable transportation and resource corridors shifted from seasonal to year-round occupations as they made forays to collect necessary resources (Johnson 1988; Anfinson 1987:222).

The period also witnessed the technical transition from spear/atlatl to bow and arrow weaponry useful for both hunting and warfare. This change in technology lead to the use of smaller projectile points or arrow heads. Similarly, the period also saw the invention of ceramic vessels and it is these vessels and their change over time, from thick walled, grit tempered, conoidal vessels, to thinner walled, shell tempered, globular vessels, which has greatly assisted the archaeological community in further refining their understanding of group identity, cohesion, and integration throughout the region. Indeed, there are more than ten major recognized ceramic complexes for the state with many temporal overlaps, often based more on location than visual representation. A final example representing not only identity and permanence on the landscape, but also religious practices, was the use of earthen burial mounds. Although community size was likely similar between the Early Woodland and Late Archaic periods, by the Late Woodland period, populations were certainly on the rise.

4.2 Contact/Post-Contact Period (1630 A.D. to Present)

This period generally refers to the span of time extending from the first European explorations until intensive Euro-American settlement of the region. Minnesota's historic period began in 1673 when French explorers Marquette and Joliet discovered the upper portion of the Mississippi River. Ten years later, Catholic Missionary Father Louis Hennepin told his story of exploring Minnesota and being held captive by Dakota Indians in the first book written about Minnesota, *Description de la Louisiane* (Hennepin 1683).

The territory containing modern-day Minnesota was claimed at various periods of time by Spain, France, Great Britain, and the United States. Lieutenant Zebulon Montgomery Pike led the first United States expedition through the area in 1805, which would ultimately become Minnesota in 1858. Fort St. Anthony (later Ft. Snelling) was completed between 1819 and 1824, and in 1836 the Wisconsin Territory, including a portion of Minnesota, was formed. Just one year later, on September 29th, 1837, during treaty negotiations in Washington, D.C., Dakota leaders ceded their lands between the Mississippi and St. Croix Rivers.

The fur trade drove much of European exploration and settlement into Minnesota prior to territorial frontier settlement in the mid-1800s. While the fur trade impacted Native American communities throughout all of Minnesota, the heaviest impacts came with later Euro-American settlement. Intensive settlement and agriculture dramatically transformed the landscape, displacing large numbers of Native Americans and their communities. In 1862 tensions between white settlers and Native Americans resulted in the Dakota War. Ultimately, this war left 462 whites and "an unknown but substantial number" of Native Americans dead (Anderson and Woolworth 1988). The conflict concluded with the largest mass execution in United States history with the hanging of 38 Dakota on December 26, 1862 at Mankato and the deportation of remaining tribal members to Santee, Nebraska.

Native American archaeological site types associated with this period are generally consistent with those of earlier periods, but European and Euro-American traders, missionaries, settlers, and industries affected the locations of these sites. This period also includes Euro-American immigrant settlement patterns, subsistence activities, and economic strategies. Sites associated with Euro-American immigrants appear in the mid-nineteenth century. Associated archaeological and historic site types categorized in the Contact/Post-Contact period include standing structures as well as archaeological sites.

5.0 LITERATURE REVIEW

Four previously identified archaeological sites and one alpha site are located within two miles of the project area (Table 1). Alpha sites are versions of archaeological sites which have been reported as *potential* sites based on mentions in literature, historic mapping (i.e. the 1874 Andreas Atlas), or by individuals reporting casually finding cultural materials; these sites have yet to be field verified through systematic archaeological research and survey. SHPO has no recorded historical structures within the project area.

Table 1. Previously Identified Archaeological Sites Within Two Miles

Site Number	Site Name	Site Description	Cultural Affiliation	Miles from Project Area	TRS
21AN0156	Trott Brook 1	Artifact Scatter	Pre-Contact: Woodland	0.04	T32N, R25W, SW ¼ of SE ¼ of NE ¼ of NW ¼ of S10
21AN0158	Trott Brook III	Habitation	Pre-Contact	0.08	T32N, R25W, SE ¼ of NW ¼ of NE ¼ of SE ¼ and NE ¼ of SW ¼ of NE ¼ of SE ¼ of S9
21AN0157	Trott Brook II	Single Artifact	Pre-Contact	0.1	T32N, R25W, SE ¼ o NE ¼ of NE ¼ of SE ¼ of S9
21AN0149	Demerest Brook Knoll	Single Artifact	Pre-Contact	0.27	T32N, R25W, NE ¼ of SE ¼ of SW ¼ of SE ¼ of S3
21ANy	-	Human Burial	Pre-Contact	1.58	T32N, R25W, NW ¼ of SW ¼ of NW ¼ of S12

The three nearest sites, 21AN0156, 21AN1057, and 21AN0158 were all identified during the same archaeological survey completed by Archaeological Research Services in 2003. NCC acquired and reviewed the report for the survey, titled "Report on Cultural Resource Reconnaissance Survey Conducted for Proposed Trott Brook Estates Development, City of Ramsey, Anoka County, Minnesota" (Harrison 2003). This survey was completed immediately south of the current project area for the housing development standing there today. The above-mentioned sites were identified through a combination of surface survey and shovel testing.

Site 21AN0156 (Trott Brook 1) consists of three grit-tempered cord-marked ceramic body sherds and a secondary flake of Prairie du Chien (PDC) chert located 20-30 centimeters below surface (cmbs) (Figures 3 and 4). While the presence of the grit-tempered and cord-marked ceramics indicates this was a Woodland Period habitation site, the low frequency of artifacts indicates the period of occupation was likely slight. Site 21AN0157 (Trott Brook II) was identified through surface survey and consists of an isolated broken tip of a PDC projectile point located on a cultivated crest overlooking Trott Brook (Figure 5). Site 21AN0158 (Trott Brook III) was also identified in a cultivated field during surface survey and consists of a grindstone fragment and secondary quartz flake (Figure 6). Shovel testing was completed at nine-meter intervals at and around all surface finds for 21AN0157 and 21AN0158, and all shovel tests were sterile for cultural materials.

Figure 3: 21AN0156 Artifacts found in Shovel Tests 2 and 2A.

Figure 4: 21AN0156 Artifacts found in Shovel Test 4.

Figure 5: 21AN0157 Artifact, Found on Surface.

Figure 6: 21AN0158 Artifacts, Found on Surface.

6.0 RESULTS

Fieldwork was completed June 14-16, 2021. This began with surface survey of all agricultural areas on a tight seven-meter interval. Surface visibility within all surface-surveyed areas varied between 70 and 90% (see Appendix A for example surface visibility photographs). Surface survey resulted in the identification of six surface find spots (labeled FS1 through FS6 on Figure 3). Five of the six artifacts were tertiary quartz flakes, with one quartz shatter. The locations of the find spots divided them into three archaeological sites: FS2 (single find spot of quartz shatter, Figure 4); FS6 (single find spot of a quartz tertiary flake, Figure 5); and FS1, 3, 4, and 5 (lithic scatter of quartz tertiary flakes, Figure 6).

A series of eight shovel tests were completed on a low ridgeline overlooking Trott Brook to the south (just north of FS 1, 3, and 4 and in line with FS5), with a ninth shovel test completed at the southwestern base of the ridgeline at FS1. The typical soil profile along the ridgeline consists of 10YR3/3 Silty Sand with slight gravel from 0 to an average of 30cmbs (plow zone), followed by 10YR4/3 Silty Sand with slight gravel from 30cmbs to an average of 55cmbs, and finally 10YR4/4 Coarse Sand with gravel from 55cmbs through to shovel test termination at 100cmbs. No additional artifacts were recovered during shovel testing.

The find spots have been recorded with the Office of the State Archaeologist as three separate sites and have been assigned the following site numbers: 21AN0197 for FS2, 21AN0198 for FS6, and 21AN0199 for FS1, 3, 4, and 5. These site forms can be found in Appendix C.

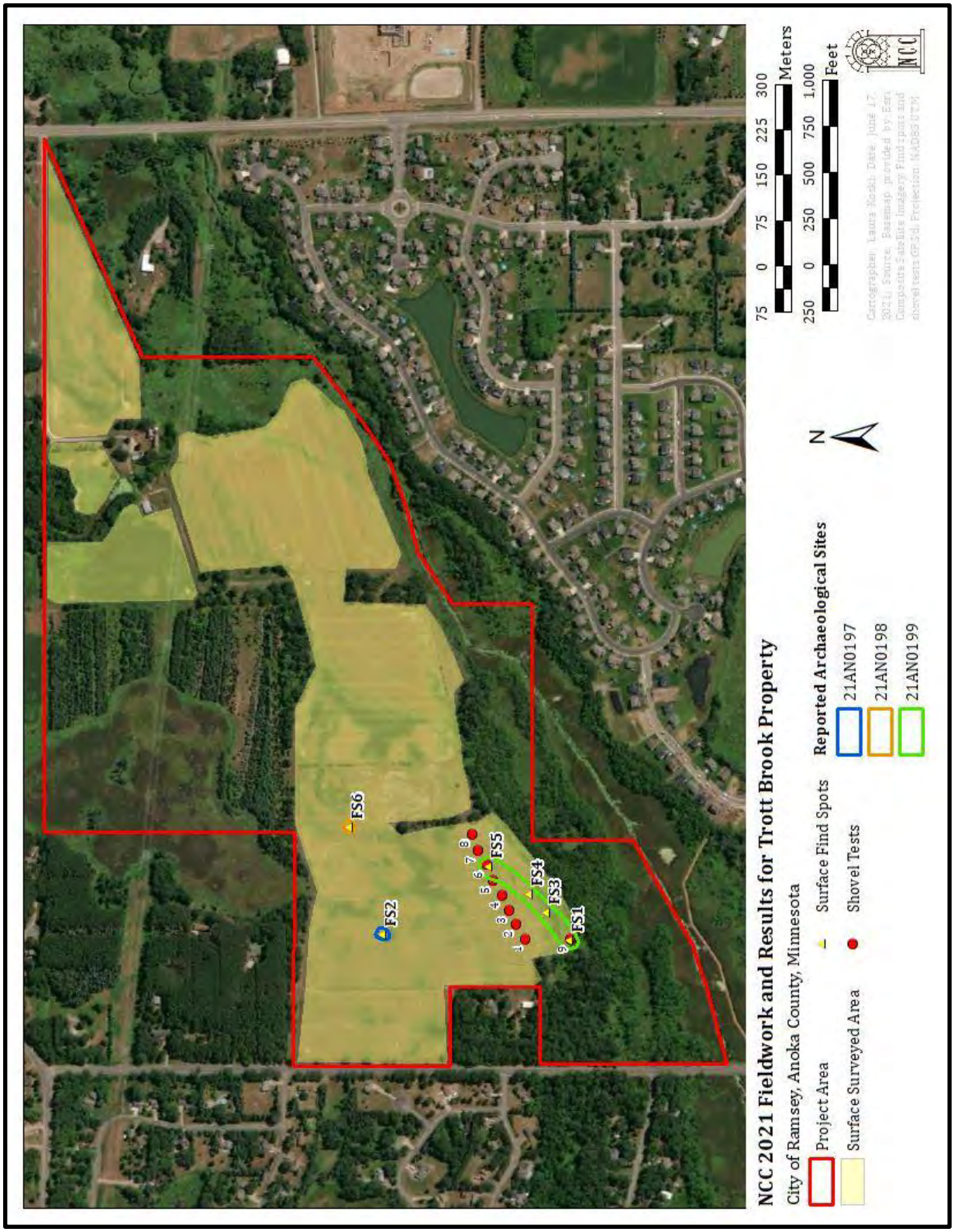

Figure 7: Map of NCC fieldwork and results.

Figure 8: Quartz Shatter at FS2 (21AN0197).

Figure 9: Tertiary Quartz Flake at FS6 (21AN0198).

Figure 10: Tertiary Quartz Flakes at FS1, 3, 4 and 5 (21AN0199).

7.0 CONCLUSION AND RECOMMENDATIONS

Excelsior Group is proposing construction of a residential development at "Trott Brook Property" in the City of Ramsey, Anoka County Minnesota. The project area, approximately 200 acres in size, is located in the NE ¼ of Section 9 and NW ¼ of Section 10 of Township 32N, Range 25W in Archaeological Region 4e: Central Lakes Deciduous East. The majority of the project area is cultivated with corn surrounded by patches of woods and wetlands. The project area extends from Nowthen Blvd at the eastern end to Variolite St NW at the west, and is generally bounded by 173rd Ave NW along the northern edge, and Trott Brook along the southern edge. Planned development includes approximately 270 residential lots, associated roads and ponds, approximately 13.4 acres of dedicated park land, and several ponds.

Work began with a literature review June 10 followed by fieldwork completed June 14-16, 2021. Fieldwork consisted of surface survey of all agricultural fields. Surface visibility in the agricultural fields ranged between 70 and 90%. Surface survey transects were spaced on a maximum of a seven-meter interval. After the identification of six artifacts during the surface survey, eight shovel tests were completed along a low ridge overlooking Trott Brook with a follow-up ninth test located at Find Spot 1 at the southern base of the ridge. Shovel tests were typically 35-40 centimeters (cm) wide and at least 80cm deep. All soils were screened through ¼" mesh screen, detailed profile notes completed, photographs taken, and GPS points collected for each shovel test. Architectural review was not included as part of this project.

Six prehistoric artifacts were identified during the surface survey. These included five tertiary quartz flakes, and one piece of quartz shatter. No additional cultural materials were identified during shovel testing. The flakes have been reported to the Office of the State Archaeologist as three separate sites based on their locations. These have received site numbers 21AN0197 (single quartz shatter), 21AN0198 (single tertiary quartz flake), and 21AN0199 (four tertiary quartz flakes). Based on these results, Nienow Cultural Consultants does not recommend these sites eligible for the National Register of Historic Places, and recommends no further archaeological work at this time.

With any project there is the chance of unanticipated discovery. Should archaeological materials surface during any future construction, it is advised a professional archaeologist be consulted. Minnesota Statute 307.08 protects unplatted cemeteries (including burial mounds) and issues guidelines for dealing with unexpected finds. Should human remains be encountered during earth moving activity, all work must stop and local law enforcement must be called.

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APPENDIX A:

FIELDWORK PHOTOGRAPHS

Image 1: Of Typical Surface Visibility within Corn Fields.

Image 2: Of Field Crew Surface Surveying.

APPENDIX B:

SHOVEL TEST FORMS

NCC Shovel Test Form
– Generic 2020

Date: 6-16-2021 Personal Initials: SFS, CER

Additional Notes: Trott Brook Phase I

GIS Information: NAD 83

Acc. 6M N. 45.27732 W. 093.45705 STP 1

Shovel Test Location: N 45.27751 W. 093.45672 Acc. 5m STP 2

STP 1	STP 2
0cm-- STP 1	0cm-- > very dry silty sand 10yr 5/3 to 10cm
10cm-- Silty sand course gravel	10cm-- 10yr 3/3 ↓
20cm-- 10yr 3/3	20cm-- 25 ~ plow horizon
30cm-- ~ plow horizon	30cm-- 10yr 4/4
40cm--	40cm-- silty sand slight gravel
50cm-- course silty sand w/ Pea gravel	50cm--
60cm--	60cm--
70cm-- 10yr 4/3	70cm--
80cm--	80cm--
90cm--	90cm--
100cm-- ~	100cm-- ~
Max Depth: 100	Max Depth: 100

☒ No Artifacts Found in STP (Check Box)

Sampled Items: / Weight (lbs):

☐ Coal _____ ☐ Clinker _____

☐ Brick _____ ☐ Concrete _____

☐ Limestone _____ ☐ Asphalt _____

☐

Prehistoric _____

Photographed: Yes Photo #s:

☒ No Artifacts Found in STP (Check Box)

Sampled Items: / Weight (lbs):

☐ Coal _____ ☐ Clinker _____

☐ Brick _____ ☐ Concrete _____

☐ Limestone _____ ☐ Asphalt _____

☐

Prehistoric _____

Photographed: Yes Photo #s:

* genral notes: Shovel tests 1 thru 8 @ 30 meters apart
test # 9 @ Find spot 1

NCC Shovel Test Form
– Generic 2020

Date: 6-16-2021 Personal Initials: JFS-CER

Additional Notes: Trott Brook Phase I

GIS Information: NAD 83

Shovel Test Location: W093.45639 N.45.27761 Acc. 4m STP3

0cm-- 10yr 5/3 to 16cm silty sand coarse slight grave	
10cm--	
20cm-- 10yr 3/3 to 35cm	
30cm-- 35 plow horizon	
40cm-- 10yr 4/4 silty sand coarse slight gravel	
50cm--	
60cm--	
70cm--	
80cm--	
90cm--	
100cm--	
Max Depth: 100	

☒ No Artifacts Found in STP (Check Box)

Sampled Items: / Weight (lbs):

☐ Coal _____ ☐ Clinker _____

☐ Brick _____ ☐ Concrete _____

☐ Limestone _____ ☐ Asphalt _____

☐ Prehistoric _____

Photographed: Yes Photo #s:

Shovel Test Location: W093.45603 N.45.27769 Acc 5m STP4

0cm-- 10yr 5/3 to 10cm fine silty sand, slight gravel	
10cm--	
20cm-- 10yr 3/3 mottled 4/3 to 30cm silty sand	
30cm-- plow	
40cm-- 10yr 4/3 to 50cm coarse sand slight gravel	
50cm--	
60cm-- 10yr 6/4 fine sand slight gravel	
70cm--	
80cm--	
90cm--	
100cm--	
Max Depth: 100	

☒ No Artifacts Found in STP (Check Box)

Sampled Items: / Weight (lbs):

☐ Coal _____ ☐ Clinker _____

☐ Brick _____ ☐ Concrete _____

☐ Limestone _____ ☐ Asphalt _____

☐ Prehistoric _____

Photographed: Yes Photo #s:

NCC Shovel Test Form
– Generic 2020

Date: 6-16-2021 Personal Initials: J.F§. CER

Additional Notes: Trott Brook Phase I

GIS Information: NAD 83

Shovel Test Location: Acc 4m N45.27780 W.093.45567 STP5

0cm--
10yr 3/3 . to 30
10cm-- Silty sand slight gravel
20cm--
30cm-- ~~ Plow-line
10yr 4/3 to 55cm
40cm-- Silty sand slight gravel
50cm--
55 ~~
60cm--
10yr 5/4 to 100
70cm-- Corse sand with gravel
80cm--
90cm--
100cm-- ~~

Max Depth: 100 cmss

☒ No Artifacts Found in STP (Check Box)

Sampled Items: / Weight (lbs):

☐ Coal _____ ☐ Clinker _____
☐ Brick _____ ☐ Concrete _____
☐ Limestone _____ ☐ Asphalt _____
☐

Prehistoric _____

Photographed: Yes Photo #s:

Shovel Test Location: Acc. 7m N45.27797. W.093.45538 STP6

0cm-- 10yr 3/3
10cm-- Silty sand w/ gravel
20cm--
30cm-- ~~ Plow line
mottled → 10yr 4/4 - 2/1 to 50
40cm-- *this soil appears burnt
Silty sand w/ gravel
50cm-- ~~
60cm-- 10yr 4/4 to 100 cm
70cm-- Damp silty sand w/gravel. w/ slight clay nodules
80cm--
90cm--
100cm-- ~~

Max Depth: 100 cmss

☒ No Artifacts Found in STP (Check Box)

Sampled Items: / Weight (lbs):

☐ Coal _____ ☐ Clinker _____
☐ Brick _____ ☐ Concrete _____
☐ Limestone _____ ☐ Asphalt _____
☐

Prehistoric _____

Photographed: Yes Photo #s:

NCC Shovel Test Form
– Generic 2020

Date: 6-16-2021 Personal Initials: SFS - CER

Additional Notes: Trott brook Phase I

GIS Information: NAD 83

Acc. 4m N, 45.27813

Shovel Test Location: W, 093.45512 STP7

N 45.27825 Gm Acc

Shovel Test Location: W 093.45476 STP8

0cm--	0cm-- 10yr 5/3 to 10 coarse silty sand slight gravel
10cm-- 10yr 3/3 to 30 silty sand slight gravel	10cm--
20cm--	20cm-- 10yr 3/3 coarse silty sand to 30cm slight gravel
30cm-- Plow line	30cm-- Plow line
40cm-- 10yr 4/3 to 65 silty sand slight gravel	40cm-- 10yr 4/4 to 100cm. Damp silty sand slight gravel
50cm--	50cm--
60cm-- 65	60cm--
70cm-- 10yr 4/4 to 100	70cm--
80cm-- silty sand slight gravel	80cm--
90cm--	90cm--
100cm--	100cm--
Max Depth: 100 cmbs	Max Depth: 100 cmbs

☒ No Artifacts Found in STP (Check Box)

Sampled Items: / Weight (lbs):

☐ Coal _____ ☐ Clinker _____

☐ Brick _____ ☐ Concrete _____

☐ Limestone _____ ☐ Asphalt _____

☐

Prehistoric _____

Photographed: Yes Photo #s:

☒ No Artifacts Found in STP (Check Box)

Sampled Items: / Weight (lbs):

☐ Coal _____ ☐ Clinker _____

☐ Brick _____ ☐ Concrete _____

☐ Limestone _____ ☐ Asphalt _____

☐

Prehistoric _____

Photographed: Yes Photo #s:

shovel test

NCC 2021

~~Soil Monitoring Form~~

Date: 6-16-2021 Personnel Initials: JFS-CER

Project Name: TROTT Brook Phase 1

Locational Information: NAD 83 N 45.27682 W 093.45722 6m Acc

Soil Core/Pit Location: STP 9 Placed @ F.S. 1 Flag loc

~~280~~cm-- 10yr 3/2	300cm--
~~290~~cm-- silty sandy loam slight gravel	310cm--
~~300~~cm--	320cm--
25 ~ plow line	
~~310~~cm-- 10yr 5/3	330cm--
wet coarse sand	
~~320~~cm-- slight gravel	340cm--
45 ~~	
~~330~~cm--	350cm--
10yr 6/2	
~~340~~cm-- Wet coarse sand	360cm-- N/A
~~350~~cm-- slight gravel	370cm--
wetness increase	
~~360~~cm-- w/ depth	380cm--
~~370~~cm--	390cm--
~~380~~cm--	400cm--
Max Depth: 100 cmbs	Max Depth:
0-100	

☒ No Artifacts Found ~~200-300~~ (Check Box)

Sampled Items: / Depth & Weight (lbs):

☐ Coal _____ ☐ Clinker _____

☐ Brick _____ ☐ Concrete _____

☐ Limestone _____ ☐ Asphalt _____

☐

Prehistoric Materials: _____

Photographed?: (Yes)

☐ No Artifacts Found 300-400

Sampled Items: / Depth & Weight (lbs):

☐ Coal _____ ☐ Clinker _____

☐ Brick _____ ☐ Concrete _____

☐ Limestone _____ ☐ Asphalt _____

☐

Prehistoric Materials: _____

Photographed?: Yes

APPENDIX C:

ARCHAEOLOGICAL SITE FORMS

Rev.: 7/1/09

MINNESOTA ARCHAEOLOGICAL SITE FORM

OFFICE OF THE STATE ARCHAEOLOGIST
Fort Snelling History Center, St. Paul, MN 55111 (612) 725-2729

SITE #: 21AN0197 *(OSA assigns if New Site)* Site Name: Agency/Field #: **TBFS2**

X New Site __ Site Update OSA License #: **N/A, Private Land** SHPO RC #:

Type of Fieldwork: _X Reconnaissance/Phase I Date(s) of This Fieldwork:**June 14-16, 2021**
___ Evaluation/Phase II
___ Excavation/Phase III

NRHP Status: __ Listed __ Determined Eligible __ CEF(106) X CNEF(106) __ Undetermined

LOCATIONAL INFORMATION

County: **Anoka** City/Twp. Name: **Ramsey** SHPO Sub-Region: **4e** *(see map in instructions)*

USGS 7.5' Quadrangle Map *(name and year):* **Nowthen Quadrangle, 2019**

Township: **32N**	Range: **25W**	Section: **9**	¼ Sections (at least 2): **NE ¼ of SW ¼ of NE 1/4**
Township:	Range:	Section:	¼ Sections (at least 2):
Township:	Range:	Section:	¼ Sections (at least 2):

UTM Coordinates: (*less than 10 acres use center; over 10 acres define polygon around site; draw points on USGS*)
Zone: **15N** Datum: ___ 1927 _X 1983 Method: ___ USGS Map X_ GPS ___ Other

Point 1: Easting	**464152.77**	Northing **5014119.13**
Point 2: Easting		Northing
Point 3: Easting		Northing
Point 4: Easting		Northing
Point 5: Easting		Northing

SITE CHARACTERISTICS

Acreage: **0.01** Site Dimensions: N-S __**1m**___ E-W __**1m**___ Maximum Cultural Depth (if known) ____

Site Description *(√all that apply, but only one check per line):*
X single artifact __ lithic scatter __ artifact scatter
__ burial mound (number of mounds _____) __ non-mound lone grave __ non-mound cemetery
__ petroglyph __ pictograph __ petroform
__ surface features (list below)
__ other: _____

Surface Features (√*all that apply*): __ earthwork __ pit/depression __ foundation/ruin __ other: _____

Inferred Site Function (√*all that apply*): __ habitation __ mortuary __ farm __ industrial __ transportation
X Other (*list*): **Lithic Reduction** __ unknown

Current Land Use (*list approximate % for all that apply):*
100% cultivated ___ fallow ___ commercial ___ recreational ___ industrial ___ residential
___ woodland ___ grassland ___ water-covered ___ other: _____

Surface Visibility (*list approximate % for all that apply):*
__X__ excellent ___ good ___ fair ___ poor/none

Degree of Disturbance (*list approximate % for all that apply or √ unassessed):*
___ minimal **100%** moderate ___ heavy ___ completely destroyed ___ unassessed

Current Threats to Site: (√*all that apply or √ none known)*
__ erosion X development __ agricultural __ other: _____ __ none known

SITE #: 21AN0197 Site Name: Agency/Field #: **TBFS2**

CULTURAL/TEMPORAL AFFILIATION
(list all that apply by level of certainty: 1 = confirmed; 2 = probable or √ "not determined");

Period:
__ not determined
X Precontact (9500 BC - 1650 AD)
__ Contact (1650-1837)
__ Post-Contact (1837-1945)

Precontact Context: *(list all that apply by level of certainty; if unable to discern specific context, √here X)*

Paleoindian Tradition __ not determined __ Folsom __ Lanceolate Point/Plano
__ Clovis __ Eastern Fluted __ other: _____

Archaic Tradition __ not determined __ Prairie __ Riverine
__ Shield __ Lake-Forest __ other: _____

Woodland Tradition __ not determined __ Fox Lake __ Laurel
__ SE Mn Early __ C Mn Transitional __ Lake Benton
__ Brainerd __ Blackduck-Kathio __ Psinomani/Sandy Lake
__ Havana-Related __ SE Mn Late __ Rainy River Late
__ other: _____

Plains Village Tradition __ not determined __ Cambria __ Great Oasis __ Big Stone
__ other: _____

Mississippian Tradition __ not determined __ Silvernale __ other: _____

Oneota Tradition __ not determined __ Blue Earth __ Orr __ other: _____

Contact Context: *(list all that apply by level of certainty; if unable to discern specific context, √here __)*

American Indian __ not determined __ Dakota __ Ojibwe __ other: _____

Euro-American __ not determined __ British __ other: _____
__ French __ Initial US

Post-Contact Context: *(list all that apply by level of certainty; if unable to discern specific context, √here __)*

__ Indian Communities & Reservations (1837-1934)
__ Early Agriculture & River Settlement (1840-1870)
__ Northern MN Lumbering (1870-1930s)
__ Tourism & Recreation (1870-1945)
__ St. Croix Triangle Lumbering (1830s-1900s)
__ Railroads & Agricultural Development (1870-1940)
__ Iron Ore Industry (1880s-1945)
__ Urban Centers (1870-1940)

Approximate Post-Contact Occupation/Site Formation Date(s): _____

Context Assignment/Dating Methods *(√all that apply):*

X artifact type/style __ feature type __ radiometric __ relative stratigraphy __ geomorphology
__ historic accounts (list) _____
__ historic maps (list) _____
__ other(s) (*specify*): _____

(For radiometric dates, attach photocopies of laboratory sheets if available.)

MATERIALS PRESENT *(√all that apply):*

Basic Artifact Categories

Ceramics	*Lithics*	*Biological Remains*	*Historic Materials*
__ Aboriginal	__ projectile points	__ animal	__ glass
__ Euro-American	__ other chipped stone tools	__ human	__ metal
	X debitage	__ unidentified bone	__ brick
	__ ground/pecked stone	__ seeds/nuts	__ other: _____
	__ FCR	__ charcoal	
	__ aboriginal copper	__ wood	

SITE #: 21AN0197 Site Name: Agency/Field #: **TBFS2**

Major Exotic Materials *(√all that apply):*
__ catlinite __ native copper __ Hixton orthoquartzite
__ Knife River Flint __ obsidian __ other: _____

Diagnostic Artifacts:
Ceramics: Prehistoric Types/Wares/Temper _____
Historic _____
Prehistoric Lithics: _____
Glass: _____
Metal: _____
Other: _____

ENVIRONMENTAL DATA **Current Topographic Setting** *(√all that apply):*

Away from Water	*Riverine*	*Lacustrine*
X general upland	__ fan	__ inlet/outlet
__ terrace edge	__ terrace/bluff top	__ peninsula
__ hilltop	__ stream-stream junction	__ island
__ glacial beach ridge	__ bluff-base	__ isthmus
__ rock outcrop	__ cave/rockshelter	__ general shoreline
__ other: _____	__ floodplain	__ bog/slough/lake bottom
	__ other: _____	__ other: _____

Topographic Feature Name from USGS Map: **Nearest feature is Trott Brook, approx. 430m SE of Site**

OWNERSHIP INFORMATION
Source and Date of Ownership Information *(e.g., plat map, county recorder's office, personal communication, etc.):*
Anoka County GIS Parcel Viewer
Ownership Type *(list approximate % for all that apply; if unknown √here __):*
___ Federal ___ State ___ Local (public) __ Tribal X Private

Land Owner *(name and address if known):*
Makowsky Family Farm, LLC at 1040 173rd Ave NW, Ramsey, MN 55303

CURRENT INVESTIGATION INFORMATION
Methods/Techniques Employed *(√all that apply):*
__ informant report __ small diameter soil coring (≈ 1" diameter) X surface survey
X shovel testing __ formal test units __ mechanical testing max. test depth _____
__ geomorphological survey *(specify)*: _____
__ geophysical survey *(specify)*: _____
__ other: _____

Informant Name and Address (if known): **None known.**

Known Collectors/Collections: **None known.**

Artifact Repository *(name and accession numbers or repository agreement number):* **[Waiting to hear from landowner]**

Most Recent Survey Report – Title, Author, Date: **Nienow, JL 2021 Phase I Archaeological Survey, Trott Brook Property, Anoka County, MN.**

Major Previous Bibliographic Reference(s) to Site: None.

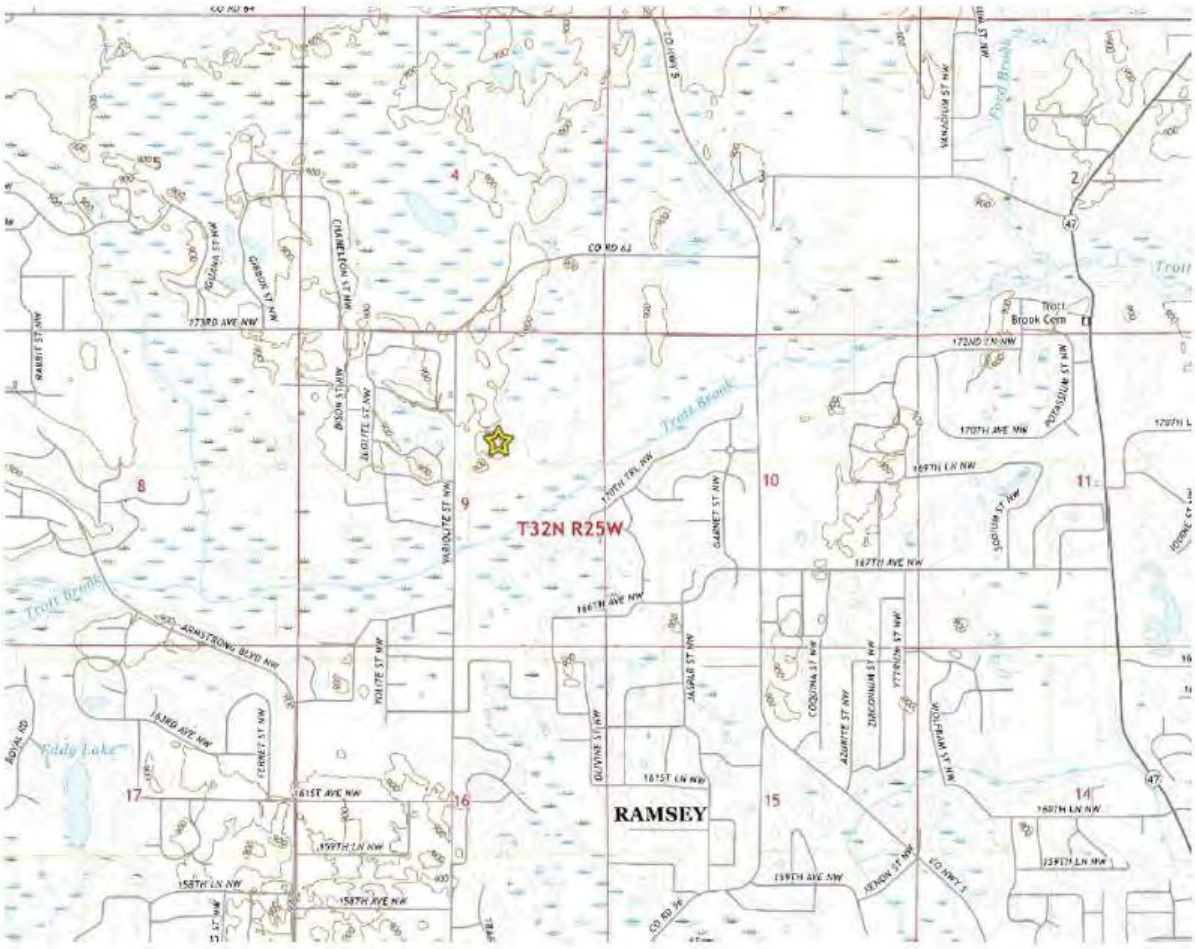
Principal Investigator *(name and affiliation):* **Dr. Jeremy Nienow, RPA of Nienow Cultural Consultants, LLC**

Form Completed By *(name and date):* **Dr. Jeremy Nienow, RPA and Laura Koski, MSc, RPA, June of 2021**

Rev.: 7/1/09 **MINNESOTA ARCHAEOLOGICAL SITE FORM - CONTINUATION SHEET** page 4

SITE #: 21AN0197 Site Name: Agency/Field #: **TBFS2**

MAPS: *Attach/include original scale copy of 7.5' USGS map with site location clearly outlined or designated. Attach a sketch map if surface features present, if sub-surface testing done, or if complicated boundaries/setting. Sketch map must have re-locatable datum, scale, north arrow, and legend if symbols are used.*



Map 1: USGS Topographic Map of Site Location
Nowthen Quadrangle, 2019, 1:24,000

Map 2: Field map illustrating associated project area, fieldwork, and site location (at FS2).

SITE #: 21AN0197 Site Name: Agency/Field #: **TBFS2**

ADDITIONAL INFORMATION *(Reason for Update or Survey, Location, Site Characteristics, Materials Present, Setting, Archaeological Methods, etc.; attach extra sheets as needed.)*

At the time of this site form, Excelsior Group is proposing the construction of a residential development at "Trott Brook Property" in the City of Ramsey, Anoka County Minnesota. The proposed development would include the construction of housing on 270 lots with associated roads and drives, ponds, and a dedicated park area. Nienow Cultural Consultants LLC (NCC) was contracted to complete the Phase I Archaeological Survey for this project.

NCC completed the fieldwork on June 14, 15, and 16, 2021. Fieldwork consisted of surface survey of all agricultural areas on a seven- meter interval. Visibility across the project area ranged between 70 and 90%. Surface survey resulted in the identification of six surface find spots (labeled FS1 through FS6 on Map 2). Five of the six artifacts were tertiary quartz flakes, with one quartz shatter. The locations of the find spots divide them into three archaeological sites: FS2 (single find spot – quartz shatter); FS6 (single fine spot – quartz tertiary flake); and FS1, 3, 4, and 5 (lithic scatter – quartz tertiary flakes). The find spot associated with this site form is FS2 (highlighted in blue on Map 2). A series of eight shovel tests were completed on a low ridgeline overlooking Trott Brook to the south (just north of FS1, 3, 4, and 5), with a ninth shovel test at the southern base of the ridgeline at FS1. The typical soil profile along the ridgeline consists of 10YR3/3 Silty Sand with slight gravel from 0 to an average of 30cmbs (plow zone), followed by 10YR4/3 Silty Sand with slight gravel from 30cmbs to an average of 55cmbs, and finally 10YR4/4 Coarse Sand with gravel from 55cmbs through to shovel test termination at 100cmbs. No additional artifacts were recovered during shovel testing.

Figure 1: Quartz Shatter.

Rev.: 7/1/09

MINNESOTA ARCHAEOLOGICAL SITE FORM

OFFICE OF THE STATE ARCHAEOLOGIST
Fort Snelling History Center, St. Paul, MN 55111 (612) 725-2729

SITE #: 21AN0198 *(OSA assigns if New Site)* Site Name: Agency/Field #: **TBFS6**

_X_ New Site __ Site Update OSA License #: **N/A, Private Land** SHPO RC #:

Type of Fieldwork: _X_ Reconnaissance/Phase I ___ Evaluation/Phase II ___ Excavation/Phase III Date(s) of This Fieldwork: **June 14-16, 2021**

NRHP Status: __ Listed __ Determined Eligible __ CEF(106) _X_ CNEF(106) __ Undetermined

LOCATIONAL INFORMATION

County: **Anoka** City/Twp. Name: **Ramsey** SHPO Sub-Region: **4e** *(see map in instructions)*

USGS 7.5' Quadrangle Map *(name and year)*: **Nowthen Quadrangle, 2019**

Township: **32N**	Range: **25W**	Section: **9**	¼ Sections (at least 2): **NW ¼ of SE ¼ of NE ¼**
Township:	Range:	Section:	¼ Sections (at least 2):
Township:	Range:	Section:	¼ Sections (at least 2):

UTM Coordinates: (*less than 10 acres use center; over 10 acres define polygon around site; draw points on USGS*)
Zone: **15N**_ Datum: ___ 1927 _X 1983 Method: ___ USGS Map X_ GPS ___ Other

Point 1: Easting	**464326.55**	Northing **5014168.14**
Point 2: Easting		Northing
Point 3: Easting		Northing
Point 4: Easting		Northing
Point 5: Easting		Northing

SITE CHARACTERISTICS

Acreage: **0.01** Site Dimensions: N-S __**1m**___ E-W __**1m**___ Maximum Cultural Depth (if known) ____

Site Description (*√all that apply, but only one check per line*):
_X_ single artifact __ lithic scatter __ artifact scatter
__ burial mound (number of mounds _____) __ non-mound lone grave __ non-mound cemetery
__ petroglyph __ pictograph __ petroform
__ surface features (list below)
__ other: _____

Surface Features (*√all that apply*): __ earthwork __ pit/depression __ foundation/ruin __ other: _____

Inferred Site Function (*√all that apply*): __ habitation __ mortuary __ farm __ industrial __ transportation
_X_ Other (*list*): **Lithic Reduction** __ unknown

Current Land Use (*list approximate % for all that apply*):
100% cultivated ___ fallow ___ commercial ___ recreational ___ industrial ___ residential
___ woodland ___ grassland ___ water-covered ___ other: _____

Surface Visibility (*list approximate % for all that apply*):
_X_ excellent ___ good ___ fair ___ poor/none

Degree of Disturbance (*list approximate % for all that apply or √ unassessed*):
___ minimal **100%** moderate ___ heavy ___ completely destroyed ___ unassessed

Current Threats to Site: (*√all that apply or √ none known*)
__ erosion _X_ development __ agricultural __ other: _____ __ none known

SITE #: 21AN0198 Site Name: Agency/Field #: **TBFS6**

CULTURAL/TEMPORAL AFFILIATION
(list all that apply by level of certainty: 1 = confirmed; 2 = probable or √ "not determined"):

Period:
__ not determined
X Precontact (9500 BC - 1650 AD)
__ Contact (1650-1837)
__ Post-Contact (1837-1945)

Precontact Context: *(list all that apply by level of certainty; if unable to discern specific context, √here X)*

Paleoindian Tradition __ not determined __ Folsom __ Lanceolate Point/Plano
__ Clovis __ Eastern Fluted __ other: _____

Archaic Tradition __ not determined __ Prairie __ Riverine
__ Shield __ Lake-Forest __ other: _____

Woodland Tradition __ not determined __ Fox Lake __ Laurel
__ SE Mn Early __ C Mn Transitional __ Lake Benton
__ Brainerd __ Blackduck-Kathio __ Psinomani/Sandy Lake
__ Havana-Related __ SE Mn Late __ Rainy River Late
__ other: _____

Plains Village Tradition __ not determined __ Cambria __ Great Oasis __ Big Stone
__ other: _____

Mississippian Tradition __ not determined __ Silvernale __ other: _____

Oneota Tradition __ not determined __ Blue Earth __ Orr __ other: _____

Contact Context: *(list all that apply by level of certainty; if unable to discern specific context, √here __)*

American Indian __ not determined __ Dakota __ Ojibwe __ other: _____

Euro-American __ not determined __ British __ other: _____
__ French __ Initial US

Post-Contact Context: *(list all that apply by level of certainty; if unable to discern specific context, √here __)*

__ Indian Communities & Reservations (1837-1934)
__ Early Agriculture & River Settlement (1840-1870)
__ Northern MN Lumbering (1870-1930s)
__ Tourism & Recreation (1870-1945)
__ St. Croix Triangle Lumbering (1830s-1900s)
__ Railroads & Agricultural Development (1870-1940)
__ Iron Ore Industry (1880s-1945)
__ Urban Centers (1870-1940)

Approximate Post-Contact Occupation/Site Formation Date(s): _____

Context Assignment/Dating Methods *(√all that apply):*

X artifact type/style __ feature type __ radiometric __ relative stratigraphy __ geomorphology
__ historic accounts (list) _____
__ historic maps (list) _____
__ other(s) (*specify*): _____

(For radiometric dates, attach photocopies of laboratory sheets if available.)

MATERIALS PRESENT *(√all that apply):*

Basic Artifact Categories

Ceramics	*Lithics*	*Biological Remains*	*Historic Materials*
__ Aboriginal	__ projectile points	__ animal	__ glass
__ Euro-American	__ other chipped stone tools	__ human	__ metal
	X debitage	__ unidentified bone	__ brick
	__ ground/pecked stone	__ seeds/nuts	__ other: _____
	__ FCR	__ charcoal	
	__ aboriginal copper	__ wood	

SITE #: 21AN0198 Site Name: Agency/Field #: **TBFS6**

Major Exotic Materials *(√all that apply):*
__ catlinite __ native copper __ Hixton orthoquartzite
__ Knife River Flint __ obsidian __ other: _____

Diagnostic Artifacts:
Ceramics: Prehistoric Types/Wares/Temper _____
Historic _____
Prehistoric Lithics: _____
Glass: _____
Metal: _____
Other: _____

ENVIRONMENTAL DATA **Current Topographic Setting** *(√all that apply):*

Away from Water	*Riverine*	*Lacustrine*
X general upland	__ fan	__ inlet/outlet
__ terrace edge	__ terrace/bluff top	__ peninsula
__ hilltop	__ stream-stream junction	__ island
__ glacial beach ridge	__ bluff-base	__ isthmus
__ rock outcrop	__ cave/rockshelter	__ general shoreline
__ other: _____	__ floodplain	__ bog/slough/lake bottom
	__ other: _____	__ other: _____

Topographic Feature Name from USGS Map: **Nearest feature is Trott Brook, approx. 370m SE of Site**

OWNERSHIP INFORMATION
Source and Date of Ownership Information *(e.g., plat map, county recorder's office, personal communication, etc.):*
Anoka County GIS Parcel Viewer
Ownership Type *(list approximate % for all that apply; if unknown √here __):*
___ Federal ___ State ___ Local (public) ___ Tribal X Private

Land Owner *(name and address if known):*
Makowsky Family Farm, LLC at 1040 173rd Ave NW, Ramsey, MN 55303

CURRENT INVESTIGATION INFORMATION
Methods/Techniques Employed *(√all that apply):*
__ informant report __ small diameter soil coring (≈ 1" diameter) X surface survey
X shovel testing __ formal test units __ mechanical testing max. test depth _____
__ geomorphological survey *(specify)*: _____
__ geophysical survey *(specify)*: _____
__ other: _____

Informant Name and Address (if known): **None known.**

Known Collectors/Collections: **None known.**

Artifact Repository *(name and accession numbers or repository agreement number):* **[Waiting to hear from landowner]**

Most Recent Survey Report – Title, Author, Date: **Nienow, JL 2021 Phase I Archaeological Survey, Trott Brook Property, Anoka County, MN.**

Major Previous Bibliographic Reference(s) to Site: None.

Principal Investigator *(name and affiliation):* **Dr. Jeremy Nienow, RPA of Nienow Cultural Consultants, LLC**

Form Completed By *(name and date):* **Dr. Jeremy Nienow, RPA and Laura Koski, MSc, RPA, June of 2021**

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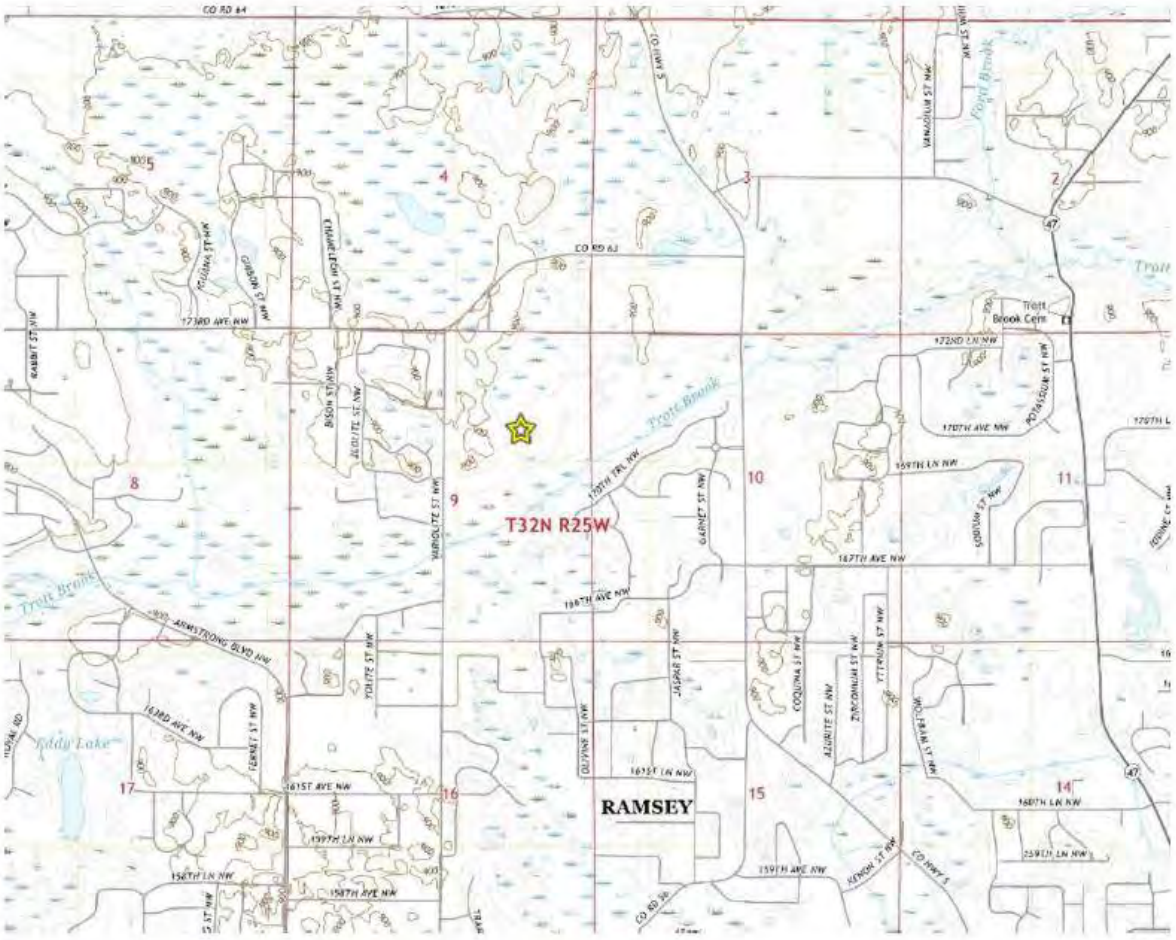
SITE #: 21AN0198 Site Name: Agency/Field #: **TBFS6**

MAPS: *Attach/include original scale copy of 7.5' USGS map with site location clearly outlined or designated. Attach a sketch map if surface features present, if sub-surface testing done, or if complicated boundaries/setting. Sketch map must have re-locatable datum, scale, north arrow, and legend if symbols are used.*



Map 1: USGS Topographic Map of Site Location
Nowthen Quadrangle, 2019, 1:24,000

Map 2: Field map illustrating associated project area, fieldwork, and site location (at FS6).

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SITE #: 21AN0198 **Site Name:** **Agency/Field #:** TBFS6

ADDITIONAL INFORMATION *(Reason for Update or Survey, Location, Site Characteristics, Materials Present, Setting, Archaeological Methods, etc.; attach extra sheets as needed.)*

At the time of this site form, Excelsior Group is proposing the construction of a residential development at "Trott Brook Property" in the City of Ramsey, Anoka County Minnesota. The proposed development would include the construction of housing on 270 lots with associated roads and drives, ponds, and a dedicated park area. Nienow Cultural Consultants LLC (NCC) was contracted to complete the Phase I Archaeological Survey for this project.

NCC completed the fieldwork on June 14, 15, and 16, 2021. Fieldwork consisted of surface survey of all agricultural areas on a seven-meter interval. Visibility across the project area ranged between 70 and 90%. Surface survey resulted in the identification of six surface find spots (labeled FS1 through FS6 on Map 2). Five artifacts were tertiary quartz flakes and one is quartz shatter. The locations of the find spots divide them into three archaeological sites: FS2 (single find spot – quartz shatter); FS6 (single fine spot – quartz tertiary flake); and FS1, 3, 4, and 5 (lithic scatter – quartz tertiary flakes). The find spot associated with this site form is FS6 (highlighted in blue on Map 2). A series of eight shovel tests were completed on a 30m interval on a low ridgeline overlooking Trott Brook to the south (just north of FS1, 3, 4, and 5), with a ninth shovel test at the southern base of the ridgeline at FS1. The typical soil profile along the ridgeline consists of 10YR3/3 Silty Sand with slight gravel from 0 to an average of 30cmbs (plow zone), followed by 10YR4/3 Silty Sand with slight gravel from 30cmbs to an average of 55cmbs, and finally 10YR4/4 Coarse Sand with gravel from 55cmbs through to shovel test termination at 100cmbs. No additional artifacts were recovered during shovel testing.

Figure 1: Quartz Tertiary Flake.

Rev.: 7/1/09

MINNESOTA ARCHAEOLOGICAL SITE FORM

OFFICE OF THE STATE ARCHAEOLOGIST
Fort Snelling History Center, St. Paul, MN 55111 (612) 725-2729

SITE #: 21AN0199 *(OSA assigns if New Site)* Site Name: Agency/Field #: **TBFS1345**

X New Site __ Site Update OSA License #: **N/A, Private Land** SHPO RC #:

Type of Fieldwork: _X Reconnaissance/Phase I Date(s) of This Fieldwork:**June 14-16, 2021**
___ Evaluation/Phase II
___ Excavation/Phase III

NRHP Status: __ Listed __ Determined Eligible __ CEF(106) X CNEF(106) __ Undetermined

LOCATIONAL INFORMATION

County: **Anoka** City/Twp. Name: **Ramsey** SHPO Sub-Region: **4e** *(see map in instructions)*

USGS 7.5' Quadrangle Map *(name and year)*: **Nowthen Quadrangle, 2019**

Township: **32N**	Range: **25W**	Section: **9**	¼ Sections (at least 2): **SE ¼ of SW ¼ of NE ¼**
Township: **32N**	Range: **25W**	Section: **9**	¼ Sections (at least 2): **NE ¼ of NW ¼ of SE ¼**
Township:	Range:	Section:	¼ Sections (at least 2):

UTM Coordinates: (*less than 10 acres use center; over 10 acres define polygon around site; draw points on USGS*)
Zone: **15N** Datum: ___ 1927 _X 1983 Method: ___ USGS Map X_ GPS ___ Other

Point 1: Easting	**464215.78**	Northing **5013873.94**
Point 2: Easting		Northing
Point 3: Easting		Northing
Point 4: Easting		Northing
Point 5: Easting		Northing

SITE CHARACTERISTICS

Acreage: **1.45** Site Dimensions: N-S __**195m**___ E-W __**30m**___ Maximum Cultural Depth (if known) ____

Site Description (*√all that apply, but only one check per line*):
__ single artifact X lithic scatter __ artifact scatter
__ burial mound (number of mounds _____) __ non-mound lone grave __ non-mound cemetery
__ petroglyph __ pictograph __ petroform
__ surface features (list below)
__ other: _____

Surface Features (*√all that apply*): __ earthwork __ pit/depression __ foundation/ruin __ other: _____

Inferred Site Function (*√all that apply*): __ habitation __ mortuary __ farm __ industrial __ transportation
X Other (*list*): **Lithic Reduction** __ unknown

Current Land Use (*list approximate % for all that apply*):
100% cultivated ___ fallow ___ commercial ___ recreational ___ industrial ___ residential
___ woodland ___ grassland ___ water-covered ___ other: _____

Surface Visibility (*list approximate % for all that apply*):
X excellent ___ good ___ fair ___ poor/none

Degree of Disturbance (*list approximate % for all that apply or √ unassessed*):
___ minimal **100%** moderate ___ heavy ___ completely destroyed ___ unassessed

Current Threats to Site: (*√all that apply or √ none known*)
__ erosion X development __ agricultural __ other: _____ __ none known

SITE #: 21AN0199 Site Name: Agency/Field #: **TBFS1345**

CULTURAL/TEMPORAL AFFILIATION
(list all that apply by level of certainty: 1 = confirmed; 2 = probable or √ "not determined"):

Period:
__ not determined
X Precontact (9500 BC - 1650 AD)
__ Contact (1650-1837)
__ Post-Contact (1837-1945)

Precontact Context: *(list all that apply by level of certainty; if unable to discern specific context, √here X)*

Paleoindian Tradition __ not determined __ Folsom __ Lanceolate Point/Plano
__ Clovis __ Eastern Fluted __ other: _____

Archaic Tradition __ not determined __ Prairie __ Riverine
__ Shield __ Lake-Forest __ other: _____

Woodland Tradition __ not determined __ Fox Lake __ Laurel
__ SE Mn Early __ C Mn Transitional __ Lake Benton
__ Brainerd __ Blackduck-Kathio __ Psinomani/Sandy Lake
__ Havana-Related __ SE Mn Late __ Rainy River Late
__ other: _____

Plains Village Tradition __ not determined __ Cambria __ Great Oasis __ Big Stone
__ other: _____

Mississippian Tradition __ not determined __ Silvernale __ other: _____

Oneota Tradition __ not determined __ Blue Earth __ Orr __ other: _____

Contact Context: *(list all that apply by level of certainty; if unable to discern specific context, √here __)*

American Indian __ not determined __ Dakota __ Ojibwe __ other: _____

Euro-American __ not determined __ British __ other: _____
__ French __ Initial US

Post-Contact Context: *(list all that apply by level of certainty; if unable to discern specific context, √here __)*

__ Indian Communities & Reservations (1837-1934)
__ Early Agriculture & River Settlement (1840-1870)
__ Northern MN Lumbering (1870-1930s)
__ Tourism & Recreation (1870-1945)
__ St. Croix Triangle Lumbering (1830s-1900s)
__ Railroads & Agricultural Development (1870-1940)
__ Iron Ore Industry (1880s-1945)
__ Urban Centers (1870-1940)

Approximate Post-Contact Occupation/Site Formation Date(s): _____

Context Assignment/Dating Methods *(√all that apply):*

X artifact type/style __ feature type __ radiometric __ relative stratigraphy __ geomorphology
__ historic accounts (list) _____
__ historic maps (list) _____
__ other(s) (*specify*): _____

(For radiometric dates, attach photocopies of laboratory sheets if available.)

MATERIALS PRESENT *(√all that apply):*

Basic Artifact Categories

Ceramics	*Lithics*	*Biological Remains*	*Historic Materials*
__ Aboriginal	__ projectile points	__ animal	__ glass
__ Euro-American	__ other chipped stone tools	__ human	__ metal
	X debitage	__ unidentified bone	__ brick
	__ ground/pecked stone	__ seeds/nuts	__ other: _____
	__ FCR	__ charcoal	
	__ aboriginal copper	__ wood	

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MINNESOTA ARCHAEOLOGICAL SITE FORM

page 3

SITE #: 21AN0199 Site Name: Agency/Field #: **TBFS1345**

Major Exotic Materials *(√all that apply):*

__ catlinite __ native copper __ Hixton orthoquartzite
__ Knife River Flint __ obsidian __ other: _____

Diagnostic Artifacts:

Ceramics: Prehistoric Types/Wares/Temper _____
Historic _____
Prehistoric Lithics: _____
Glass: _____
Metal: _____
Other: _____

ENVIRONMENTAL DATA **Current Topographic Setting** *(√all that apply):*

Away from Water	*Riverine*	*Lacustrine*
X general upland	__ fan	__ inlet/outlet
__ terrace edge	__ terrace/bluff top	__ peninsula
__ hilltop	__ stream-stream junction	__ island
__ glacial beach ridge	__ bluff-base	__ isthmus
__ rock outcrop	__ cave/rockshelter	__ general shoreline
__ other: _____	__ floodplain	__ bog/slough/lake bottom
	__ other: _____	__ other: _____

Topographic Feature Name from USGS Map: **_Nearest feature is Trott Brook, approx. 160m SE of Site**

OWNERSHIP INFORMATION

Source and Date of Ownership Information *(e.g., plat map, county recorder's office, personal communication, etc.):*
Anoka County GIS Parcel Viewer
Ownership Type *(list approximate % for all that apply; if unknown √here __):*
___ Federal ___ State ___ Local (public) ___ Tribal X Private

Land Owner *(name and address if known):*
Makowsky Family Farm, LLC at 1040 173rd Ave NW, Ramsey, MN 55303

CURRENT INVESTIGATION INFORMATION

Methods/Techniques Employed *(√all that apply):*

__ informant report __ small diameter soil coring (≈ 1" diameter) X surface survey
X shovel testing __ formal test units __ mechanical testing max. test depth _____
__ geomorphological survey *(specify)*: _____
__ geophysical survey *(specify)*: _____
__ other: _____

Informant Name and Address (if known): **None known.**

Known Collectors/Collections: **None known.**

Artifact Repository *(name and accession numbers or repository agreement number):* **[Waiting to hear from landowner]**

Most Recent Survey Report – Title, Author, Date: **Nienow, JL 2021 Phase I Archaeological Survey, Trott Brook Property, Anoka County, MN.**

Major Previous Bibliographic Reference(s) to Site: **None.**

Principal Investigator *(name and affiliation):* **Dr. Jeremy Nienow, RPA of Nienow Cultural Consultants, LLC**

Form Completed By *(name and date):* **Dr. Jeremy Nienow, RPA and Laura Koski, MSc, RPA, June of 2021**

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SITE #: 21AN0199 **Site Name:** **Agency/Field #:** TBFS1345

MAPS: *Attach/include original scale copy of 7.5' USGS map with site location clearly outlined or designated. Attach a sketch map if surface features present, if sub-surface testing done, or if complicated boundaries/setting. Sketch map must have re-locatable datum, scale, north arrow, and legend if symbols are used.*

Map 1: USGS Topographic Map of Site Location
Nowthen Quadrangle, 2019, 1:24,000

Map 2: Field map illustrating associated project area, fieldwork, and site location (at FS6).

Rev.: 7/1/09 **MINNESOTA ARCHAEOLOGICAL SITE FORM - CONTINUATION SHEET** page 6

SITE #: 21AN0199 Site Name: Agency/Field #: **TBFS1345**

ADDITIONAL INFORMATION *(Reason for Update or Survey, Location, Site Characteristics, Materials Present, Setting, Archaeological Methods, etc.; attach extra sheets as needed.)*

At the time of this site form, Excelsior Group is proposing the construction of a residential development at "Trott Brook Property" in the City of Ramsey, Anoka County Minnesota. The proposed development would include the construction of housing on 270 lots with associated roads and drives, ponds, and a dedicated park area. Nienow Cultural Consultants LLC (NCC) was contracted to complete the Phase I Archaeological Survey for this project.

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Figure 1: Four Quartz Tertiary Flakes from site location.

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Appendix G

Traffic Study

Trott Brook Crossing EAW

TROTT BROOK

RESIDENTIAL DEVELOPMENT

STS

Swing Traffic Solutions

TRAFFIC IMPACT STUDY

in

Ramsey, MN

September 3, 2021

TROTT BROOK

Ramsey, MN

TRAFFIC IMPACT STUDY

PROJECT NO. 2021045

September 3, 2021

I hereby certify that this plan, specification, or report was prepared by me, or under my direct supervision, and that I am a duly Registered Professional Engineer under the laws of the State of Minnesota:

Vernon E. Swing, P.E.

Date: 9-3-2021 Lic. No.: 41417

TRAFFIC IMPACT STUDY

TROTT BROOK

RAMSEY, MINNESOTA

September 3, 2021

Prepared For:

Sotarra
1660 Highway 100 S., Suite 400
St. Louis Park, MN 55416

Prepared By:

Swing Traffic Solutions, LLC
4290 Norwood Lane North
Plymouth, MN 55442
612-968-4142

Project No. 2021045

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TECHNICAL APPENDICES

(Available upon Request)

A. TRAFFIC COUNTS

B. TRIP GENERATION CALCULATIONS

C. RESULTS OF OPERATIONAL ANALYSES

I. INTRODUCTION

Sotarra proposes to develop an approximately 200-acres site referred to as Sotarra - Trott Brook as single family detached residential homes. The project will consist of 270 single-family homes. For the purposes of this study, it is anticipated that construction will be complete, and the facilities fully occupied by 2026.

The proposed site is located between Nowthen Boulevard to the east and Variolite Street to the west and is bordered on the south by Trott Brook, and on the north by an extension of 173rd Avenue NW. The site location is illustrated on Figure 1, "Vicinity Map". Direct access to the site is proposed via two locations, a new public roadway originating at a new intersection along Variolite Street at approximately 170th Avenue NW and progressing eastward into the site, and from 173rd Avenue NW at the intersection with Nowthen Boulevard moving westward into the site. Indirect access is available from 175th Avenue NW, 167th Avenue NW, Alpine Avenue NW and Ramsey Boulevard via the intersections with Variolite Street and Nowthen Boulevard. The location of these accesses is illustrated on the Concept Site Plan, Figure 2.

The purpose of this study is to support the EAW completed for the Sotarra Trott Brook development, particularly to evaluate the impact of traffic generated by the proposed development on the operations and safety of the adjacent roadway network. The study focuses on the roads and intersections that provide direct and indirect access into the site. This study details the existing and future roadway conditions at studied intersections and includes traffic volumes, lane geometrics and traffic operational analysis results. Recommendations regarding roadway improvements to accommodate site generated traffic, as well as the anticipated growth in background traffic are included as necessary.

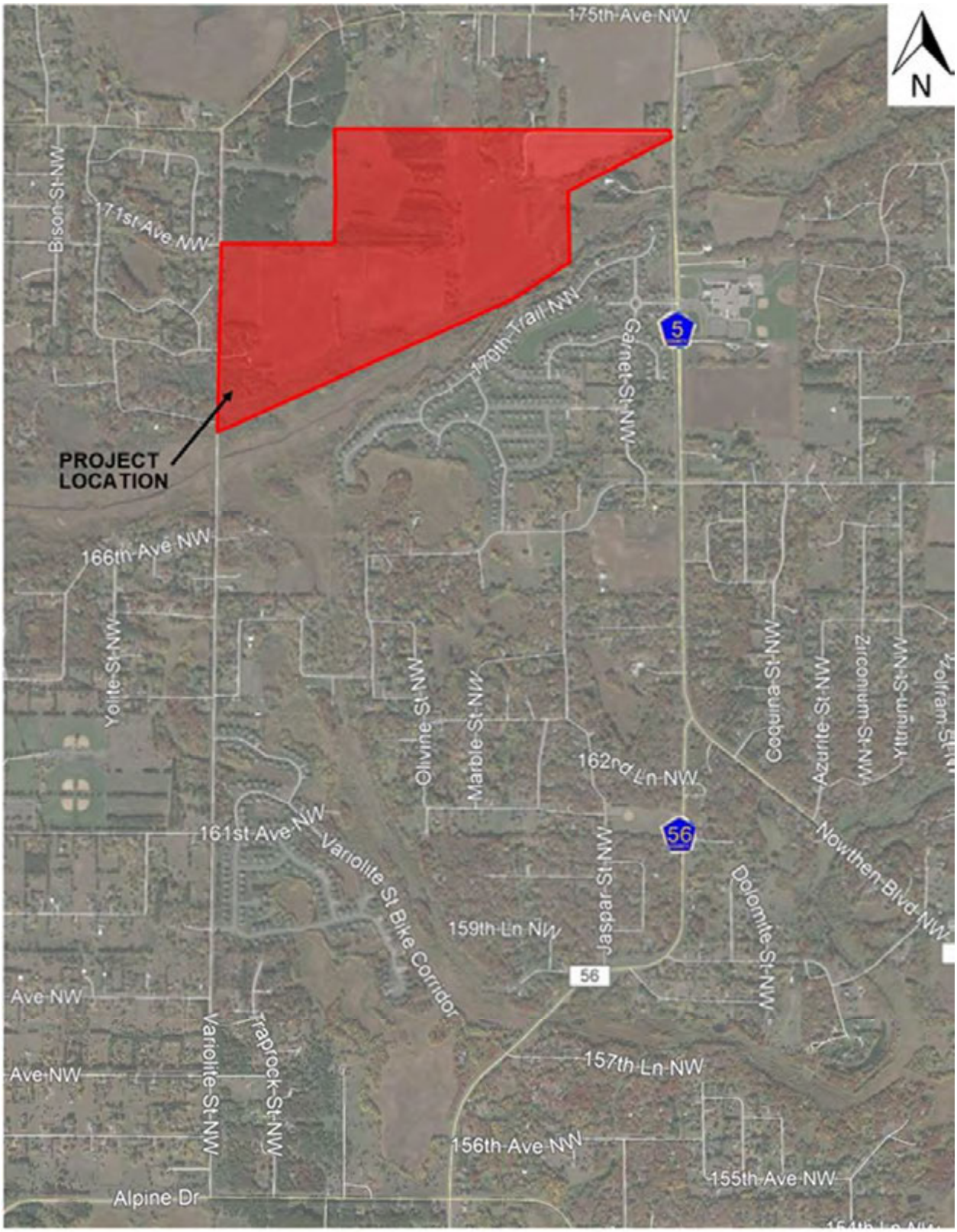

Figure 1 - Project Location

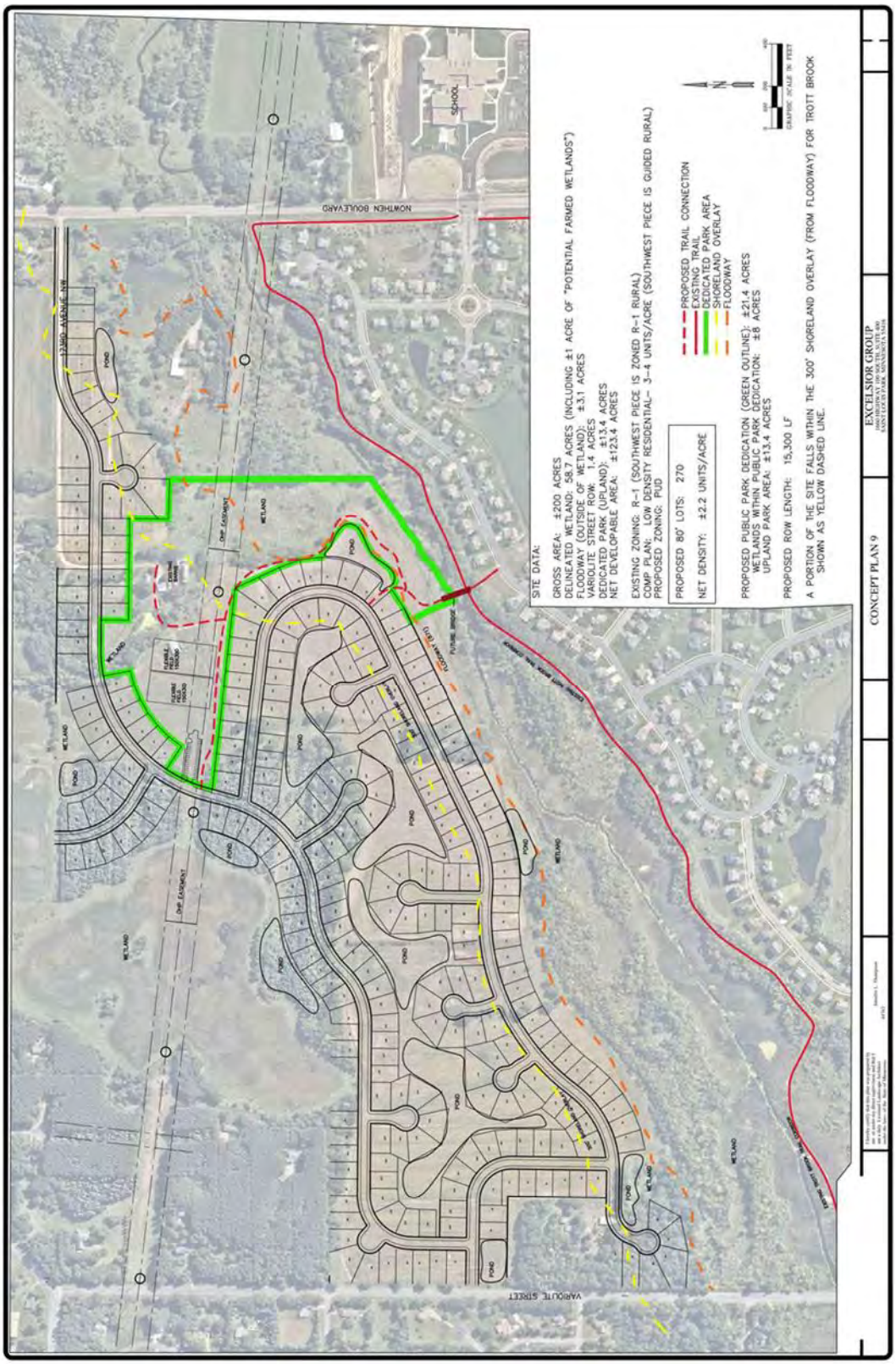

Figure 2 - Site Plan

I. Existing Conditions

A. Data Collection

The existing conditions of the nearby roadway system were documented by a field inventory conducted during the week of July 25, 2021. The purpose was to identify features that affect roadway capacity, including traffic control, sight distances, turn lanes, speed limits, etc. In addition, turning movement traffic counts were conducted revealing the AM Peak hour occurs at 7:00 – 8:00 AM and the PM Peak hour at 4:30 PM – 5:30 PM at the following intersections:

- Variolite Street NW and Alpine Drive
- Variolite Street NW and 161st Avenue NW
- Variolite Street NW and 173rd Avenue NW
- Nowthen Boulevard NW and Ramsey Boulevard NW
- Nowthen Boulevard NW and 167th Avenue NW
- Nowthen Boulevard NW and 173rd Avenue NW
- Nowthen Boulevard NW and 175th Avenue NW

Figure 3 illustrates the study area and the traffic control, and Figure 4 shows the existing AM and PM Peak hour turning movement counts. Also, the 2018-2019 average daily traffic volumes in the study area as published by MnDOT are included on Figure 4.

B. Roadway Descriptions

The existing geometrics of the Study Area Roadway Network have been documented based on a field review. The discussion that follows details specific items such as lane and shoulder layout, roadway classifications, and turn lane storage lengths.

- **Variolite Street NW,** runs generally north/south to the west of the site. It is a City of Ramsey Minnesota State Aid (MSA) road and is functionally classified as a future Major Collector. In the vicinity of the site, it is a 2-lane undivided road with designated left (or by-pass) and right turn

lanes at intersections with other streets. It provides indirect access to the site via the proposed new 170th Avenue NW intersection. It is signed for 50 mph, has a rural cross-section.

- **Nowthen Boulevard NW,** runs generally north-south to the east of the site. It is an Anoka County road (CSAH 5) and is functionally classified as an A Minor Expander. It provides indirect access to the site via its intersection with 173rd Avenue NW and is a 2-lane undivided facility with designated right and left (or by-pass) lanes at intersections with other streets. Nowthen Boulevard is signed for 55-mph, and currently has a rural cross-section.

- **175th Avenue NW,** runs generally east-west to the north of the site. To the west of Nowthen Boulevard and prior to its intersection with Variolite Street NW, the alignment shifts to the south and it becomes 173rd Avenue NW to the west of Variolite Street NW. It is an Anoka County Road (CR 63) and is functionally classified as Major Collector. In the vicinity of the site, it is a 2-lane undivided facility with designated right and left (or by-pass) lanes at intersections with other streets. It provides indirect access to the site via Variolite Street NW and Nowthen Boulevard NW and is signed for 50 mph with a rural cross-section.

- **167th Avenue NW,** runs in generally an east-west direction to the south of the site. It is a City of Ramsey Minnesota State Aid (MSA) road and is functionally classified as a future Major Collector to the east of Nowthen Boulevard NW, and as a local street to the west. In the vicinity of the site, it is a 2-lane undivided road. It provides indirect access to the site via the Nowthen Boulevard and 173rd Avenue NW intersection. It is signed for 50 mph to the east of Nowthen Boulevard and for 30mph to the west, and generally has a rural cross-section.

- **161st Avenue NW,** runs in generally an east-west direction to the south of the site. It is a City of Ramsey MSA roadway and is functionally classified as a local street. It provides indirect access to the site via its intersection with Variolite Street NW, is a 2-lane facility and is signed for 30 mph.

- **Ramsey Boulevard NW,** runs generally north-south to the south of the site. It is an Anoka County road (CSAH 56) and is functionally classified as an A Minor Expander. It provides indirect access to the site via its intersection with Nowthen Boulevard and is a 2-lane undivided facility with designated right and left (or by-pass) lanes at intersections with other streets. Ramsey Boulevard is signed for 55-mph, and currently has a rural cross-section.

- **Alpine Drive NW,** runs generally east/west to the south of the site. It is a City of Ramsey Minnesota State Aid (MSA) roadway and is functionally classified as a future Major Collector. In the vicinity of the site, it is a 2-lane undivided road with designated left (or by-pass) and right turn lanes at intersections with other streets. It provides indirect access to the site via its intersection with Variolite Street NW intersection. It is signed for 45 mph, has a rural cross-section to the east of Variolite Street NW and an urban cross-section to the west.

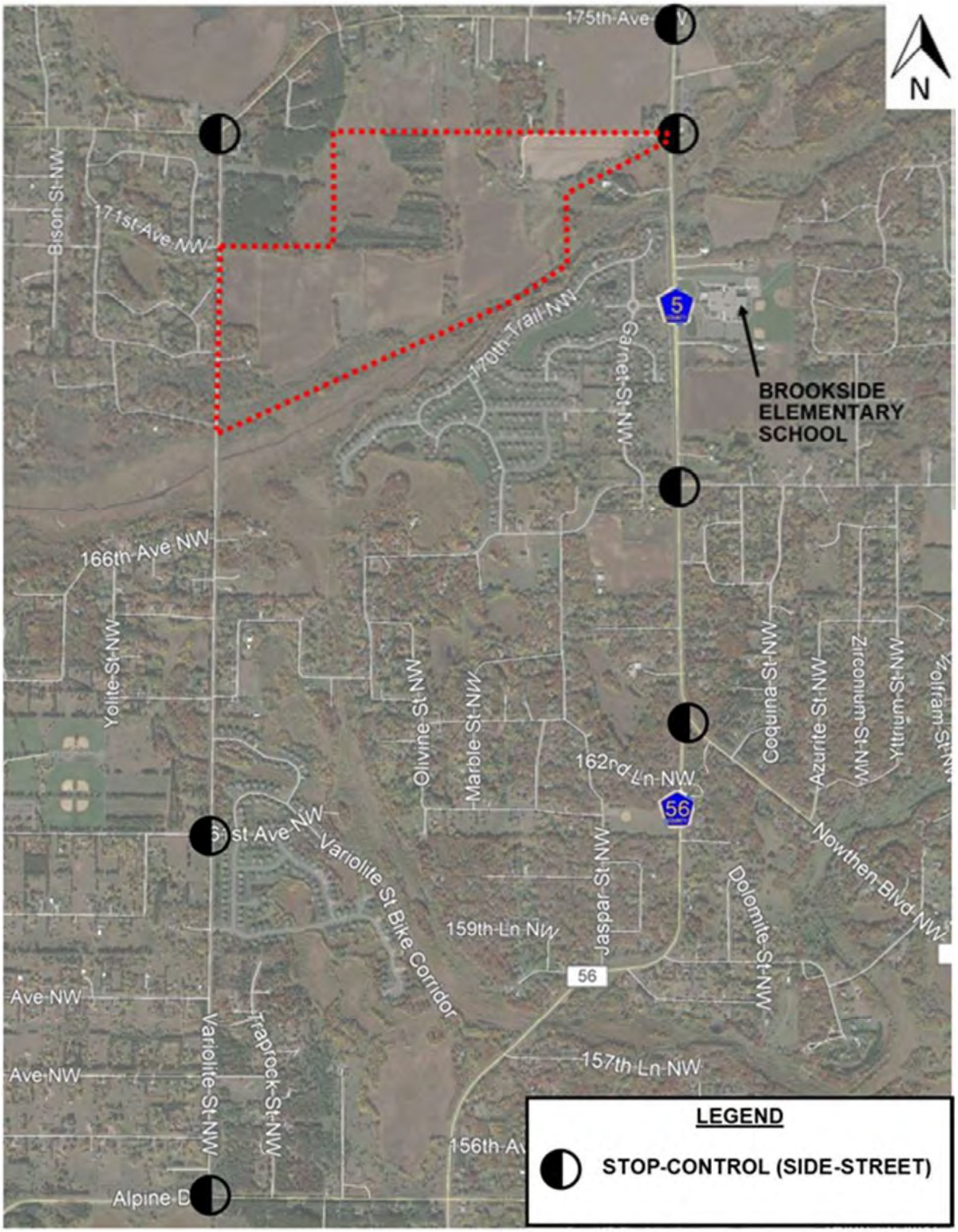

Figure 3 - Study Area

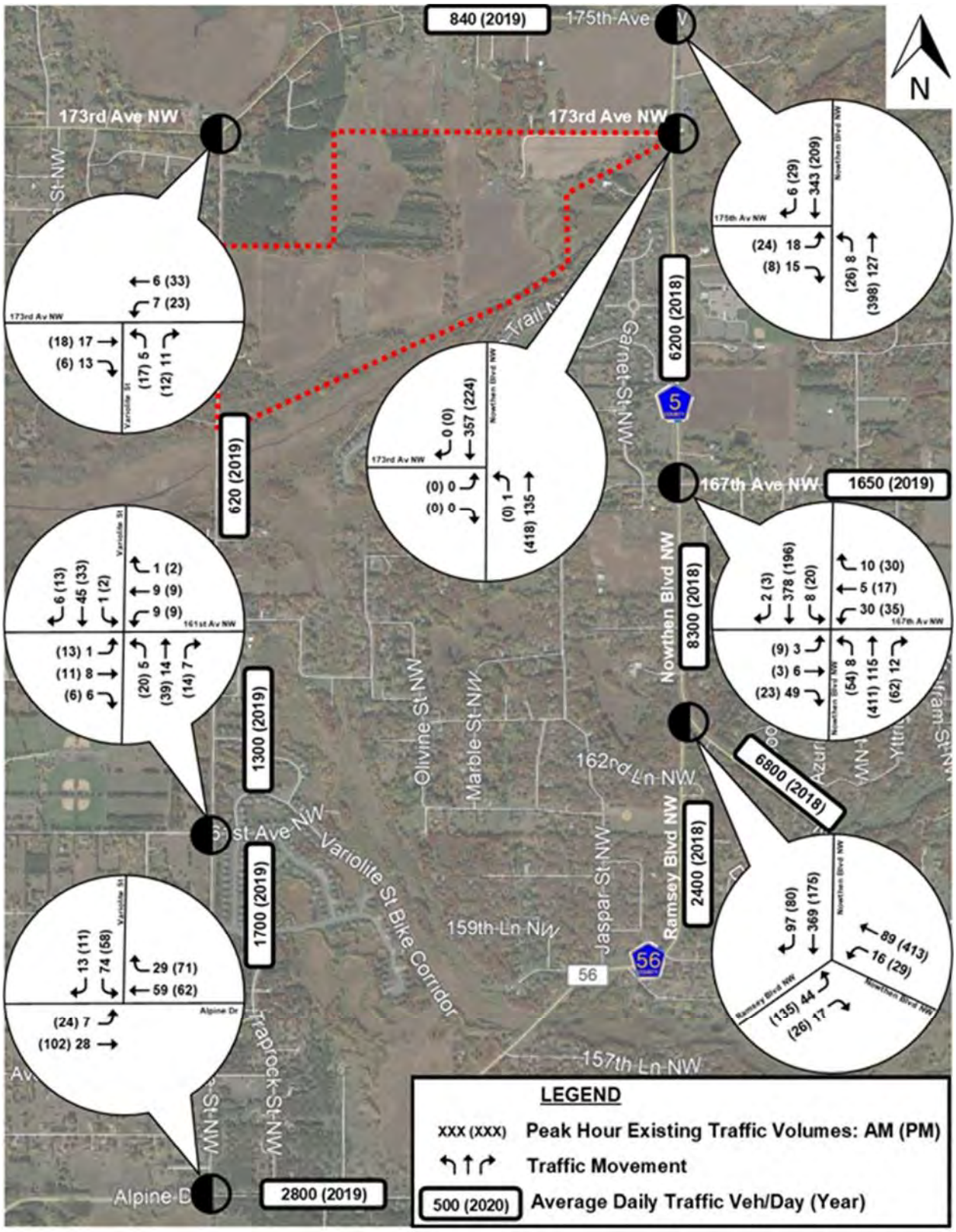

Figure 4 - Existing Traffic Volumes

C. Intersection Descriptions

- **175th Avenue NW and Nowthen Boulevard NW,** form a three-legged unsignalized intersection north of the site. The Nowthen Boulevard approaches are free flowing and include a northbound left turn by-pass lane and a southbound dedicated right turn lane. The eastbound 175th Avenue NW approach is stop controlled and includes a dedicated right turn lane.

- **175th Avenue NW/173rd Avenue NW and Variolite Street NW,** form a three-legged unsignalized intersection to the north of the site. The intersection is stop controlled on the minor Variolite Street NW approach with one approach lane and one departure lane. The 175th Avenue NW/173rd Avenue NW approaches include a westbound by-pass lane and an eastbound right turn lane.

- **173rd Avenue NW and Nowthen Boulevard NW,** form a three-legged unsignalized intersection providing access to the site from the east. The Nowthen Boulevard NW approaches are free flowing and include a southbound dedicated right turn lane and a northbound left turn by-pass lane. The eastbound 173rd Avenue NW approach is stop controlled with one lane in each direction. It is recommended it include a dedicated right turn lanes for the Build condition.

- **167th Avenue NW and Nowthen Boulevard NW,** form a four-legged unsignalized intersection south of the site. The 167th Avenue approaches include one lane in each direction and are stop controlled. The Nowthen Boulevard approaches are free flowing and include dedicated northbound and southbound dedicated right turn lanes.

- **161st Avenue NW and Variolite Street NW,** form a four-legged unsignalized intersection to the southwest of the site. 161st Avenue NW approaches are stop controlled and include one lane in each direction. The Variolite Street NW approaches are free flowing and include dedicated northbound and southbound right turn lanes.

- **Ramsey Boulevard NW and Nowthen Boulevard NW,** form a three legged unsignalized intersection to the southeast of the site. The Ramsey Boulevard approach is stop controlled and includes a dedicated right turn lane. The Nowthen Boulevard approaches are free flowing and the southbound approach includes a dedicated right turn lane and the northbound approach includes a left turn by-pass lane.

- **Alpine Drive NW and Variolite Street NW**, form a three legged unsignalized intersection to the southwest of the site. The Variolite Street NW approach is stop controlled and includes one lane entering and one lane exiting the intersection. The Alpine Drive NW approaches are free flowing, with the westbound approach including a dedicated right turn lane, while the eastbound approach only has one lane entering and exiting the intersection.

III. NO-BUILD ALTERNATIVE

To address the impacts of a development on the surrounding roadway system, it is necessary to predict the traffic that would be present on the roadway system at the time (the design year) of completion of the proposed development, without the inclusion of the proposed development. This is considered the No-Build scenario, and serves as a basis with which to compare Build scenarios. In this study two design years were analyzed 2026, the year after the development is fully built and occupied, and 2040, the current planning year horizon.

A. Background Growth

Review of the latest City of Ramsey Comprehensive Transportation Plan and Anoka County 2040 Transportation Plan indicate the traffic in the area is expected to increase. Two methods of estimating future conditions were employed in the comprehensive plan, a factor was applied to background conditions, and traffic from Transportation Analysis Zones (TAZs) was considered. The results show traffic will grow by approximately 2.0 percent per year between now and 2040. That said, the development of this site was considered and included in the TAZ forecast of future traffic on the roadways surrounding the site, accounting for more than 80 percent of the future estimates. To ensure a conservative estimate this study includes a growth factor of 1.0 percent per year added to the existing traffic. It is noted, the growth factor plus the traffic from proposed development exceeds the traffic forecast by Anoka County and the City of Ramsey estimates. Further, this rate is likely conservative as ITE and the Transportation Research Board suggest traffic patterns will permanently change due to the impact of COVID-19 with fewer home to work and work to home trips likely to occur in the future. Figures 5 and 6 illustrate the anticipated 2026 and 2040 No-Build peak hour traffic volumes.

B. Anticipated Improvements for No-Build Conditions

There are no programmed improvements identified for the roadways surrounding the site. For the purposes of this study it is assumed that the current roadway condition will remain as is.

C. Results of Analysis

The study area intersections identified in Section II were analyzed for the 2026 and 2040 No-Build scenarios. Complete discussion of the results of these analyses is provided in Section IV, where a comparison with corresponding design year Build alternatives are made.

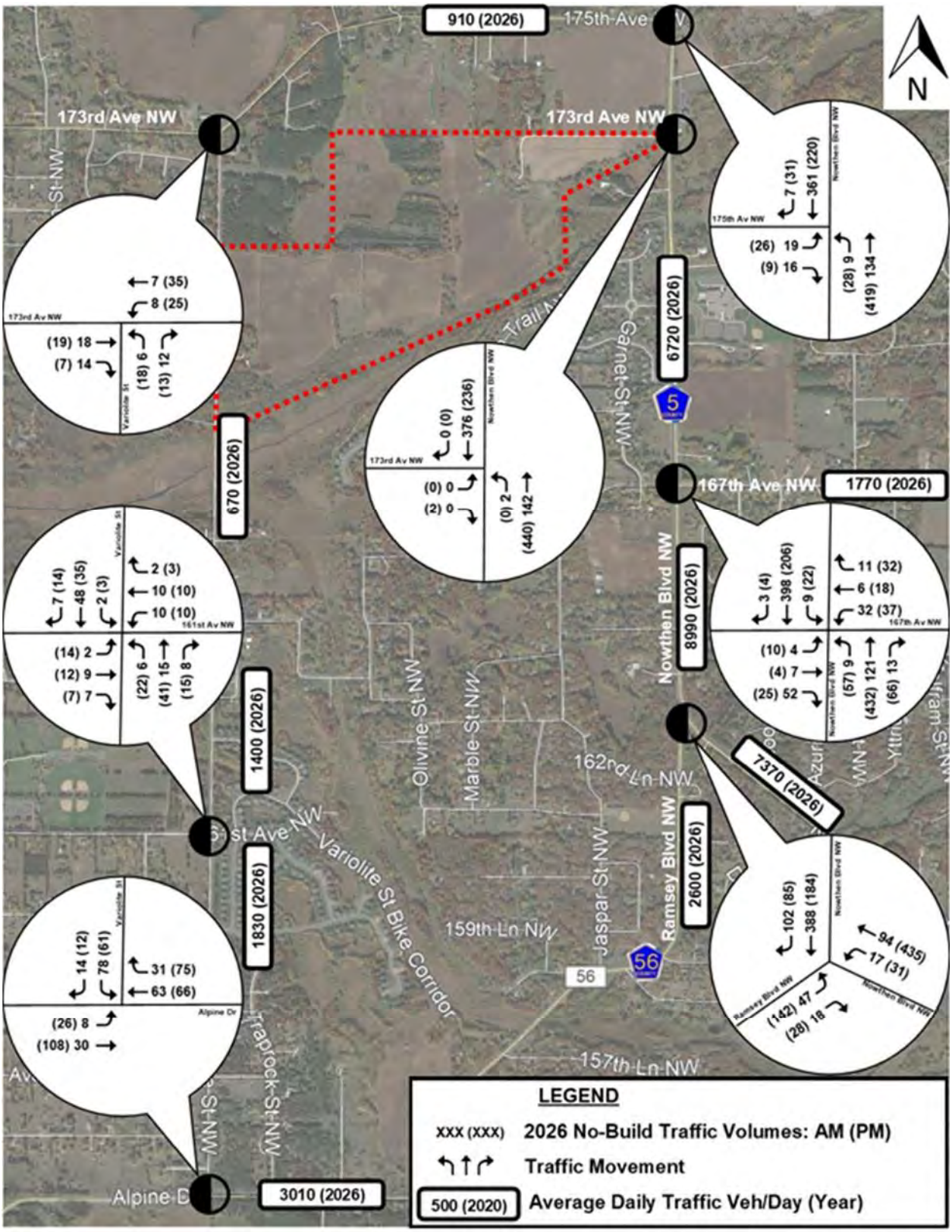

Figure 5 - 2026 No-Build Traffic Volumes

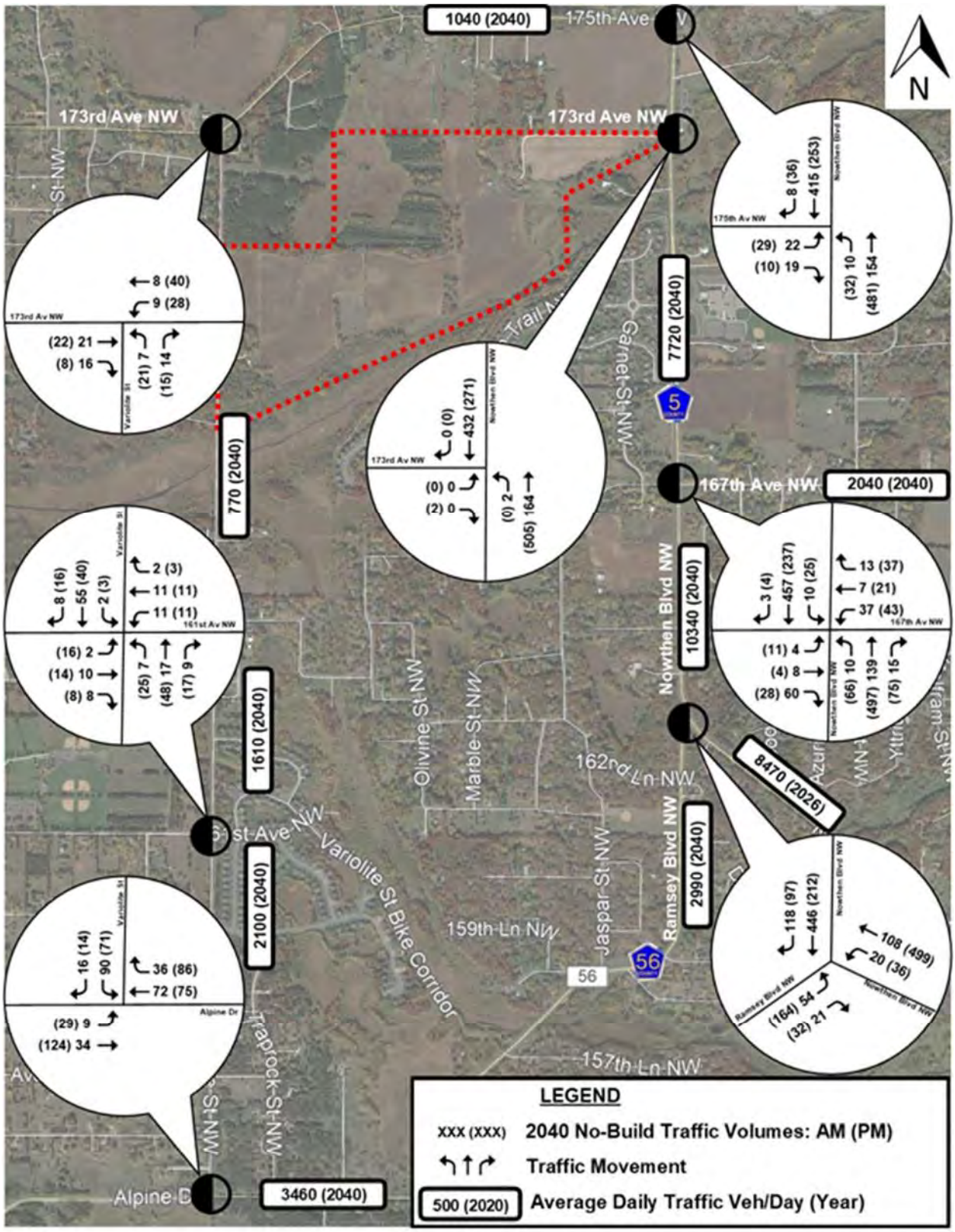

Figure 6 - 2040 No-Build Traffic Volumes

IV. BUILD ALTERNATIVE

A. Site-Generated Traffic

The number of vehicle trips generated by the 270 single family homes to be developed as part of the Sotarra - Trott Brook residential development were estimated for the weekday daily, and AM and PM traffic peak hours using the data and methodologies contained in the 10th Edition of Trip Generation, published by the Institute of Transportation Engineers (ITE). The proposed development will include single-family homes corresponding to ITE Land Use Code 210. Table 1 summarizes the trip generation estimates.

Table 1
Trip Generation

Land Use	Land Use Code	Size		Trips Generated				
				AM peak		PM Peak		Weekday ADT
				Enter	Exit	Enter	Exit	
Single Family Housing	210	270	Units	49	147	166	98	2593
Totals				**49**	**147**	**166**	**98**	**2593**
				196		**264**		

1. Per the data and methodologies in Trip Generation, 10th Edition, published by ITE.

B. Trip Distribution and Assignment

The distribution of site-generated traffic from and to the adjacent street system was based on existing traffic patterns. Figure 7, titled "Trip Distribution and Trip Assignment," depicts the distribution of the estimated site-generated traffic entering and exiting the study area roadway network, with 33 percent destined to/from the south on 8 percent on Variolite Street and Ramsey Boulevard, 15 percent destined to/from the north, 50 percent to/from the southeast via Nowthen Boulevard, and 2 percent to and from the west. Site-generated traffic was assigned to the network accordingly and is also illustrated on Figure 7.

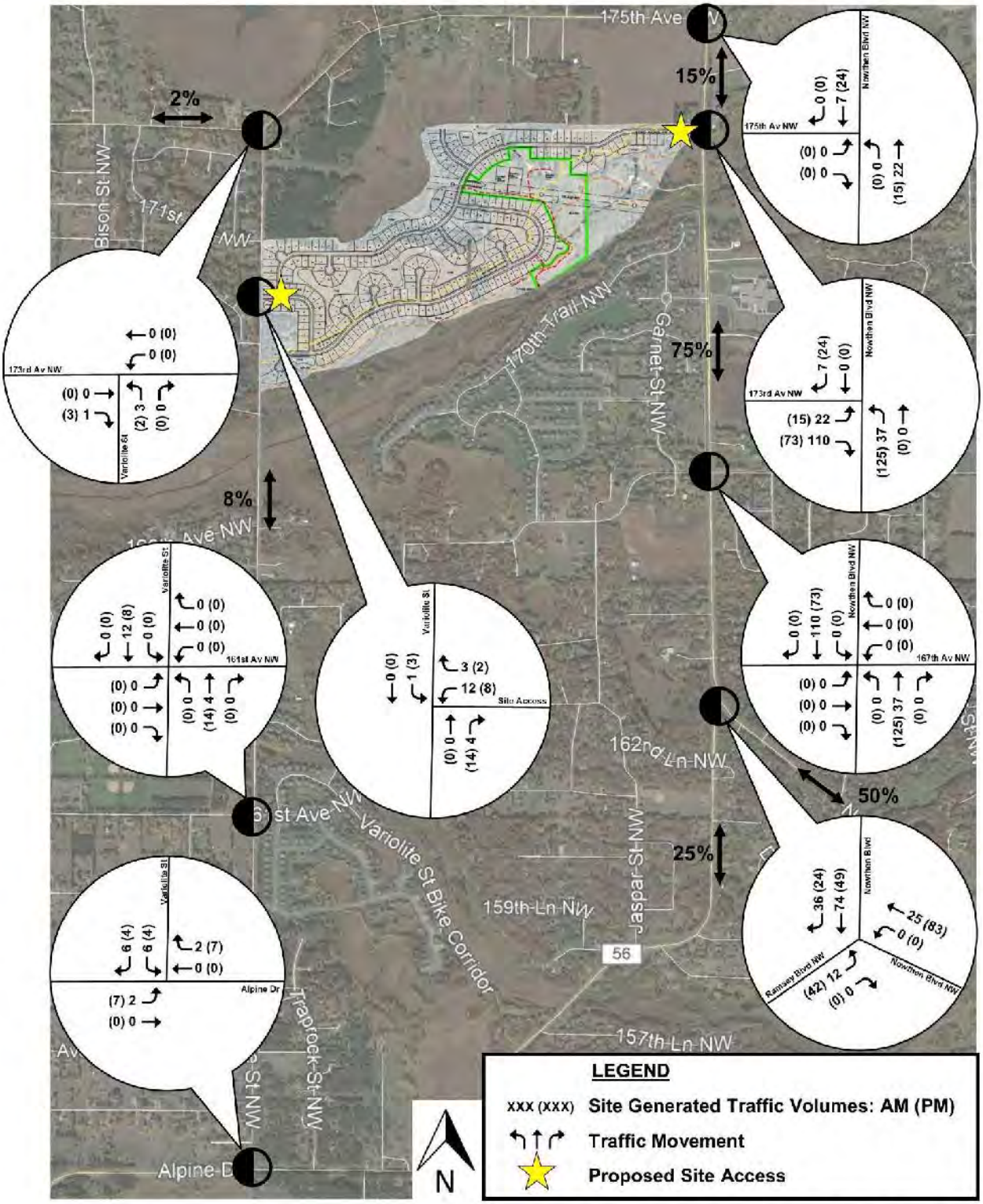

Figure 7 - Trip Assignment & Distribution

C. Build Traffic Volumes

When combined, the site-generated traffic volumes and No-Build scenario traffic volumes result in the Build scenario traffic volumes, shown on Figures 8 and 9 for the 2026 and 2040 design years, respectively.

D. Intersection Operational Analysis Description

The operating conditions of transportation facilities, such as roadways, traffic signals and stop-controlled intersections, are evaluated based on the relationship of the theoretical capacity of a facility to the actual traffic volume on that facility. Various factors affect capacity including travel speed, roadway geometry, grade, number of travel lanes, and intersection control. The current standards for evaluating capacity and operating conditions are contained in the 6th Edition of Highway Capacity Manual, published by the Transportation Research Board. The procedures describe operating conditions in terms of driver delay represented as a Level of Service (LOS). Operations are given letter designations with "A" representing the best operating conditions and "F" representing the worst. Generally, level of service "D" represents the threshold for acceptable overall intersection operating conditions during a peak hour. The Chart below summarizes the level of service and delay criteria for signalized and unsignalized intersections.

LOS Designation	Signalized Intersection Average Delay/Vehicle (Sec.)	Unsignalized Intersection Average Delay/Vehicle (Sec.)
A	≤ 10	≤ 10
B	> 10-20	> 10-15
C	> 20-35	> 15-25
D	> 35-55	> 25-35
E	> 55-80	> 35-50
F	> 80	> 50

A final fundamental component of operational analyses is a study of vehicular queuing, or the line of vehicles waiting to pass through an intersection. An intersection can operate with an acceptable Level of Service, but if queues from the intersection extend back to block entrances to turn lanes or accesses to adjacent land uses, unsafe operating conditions could result. In this report, the Industry Design Standard 95th percentile queue length is used. The 95th Percentile Queue Length refers to that length of vehicle queue that has only a five-percent probability of occurring during an analysis hour.

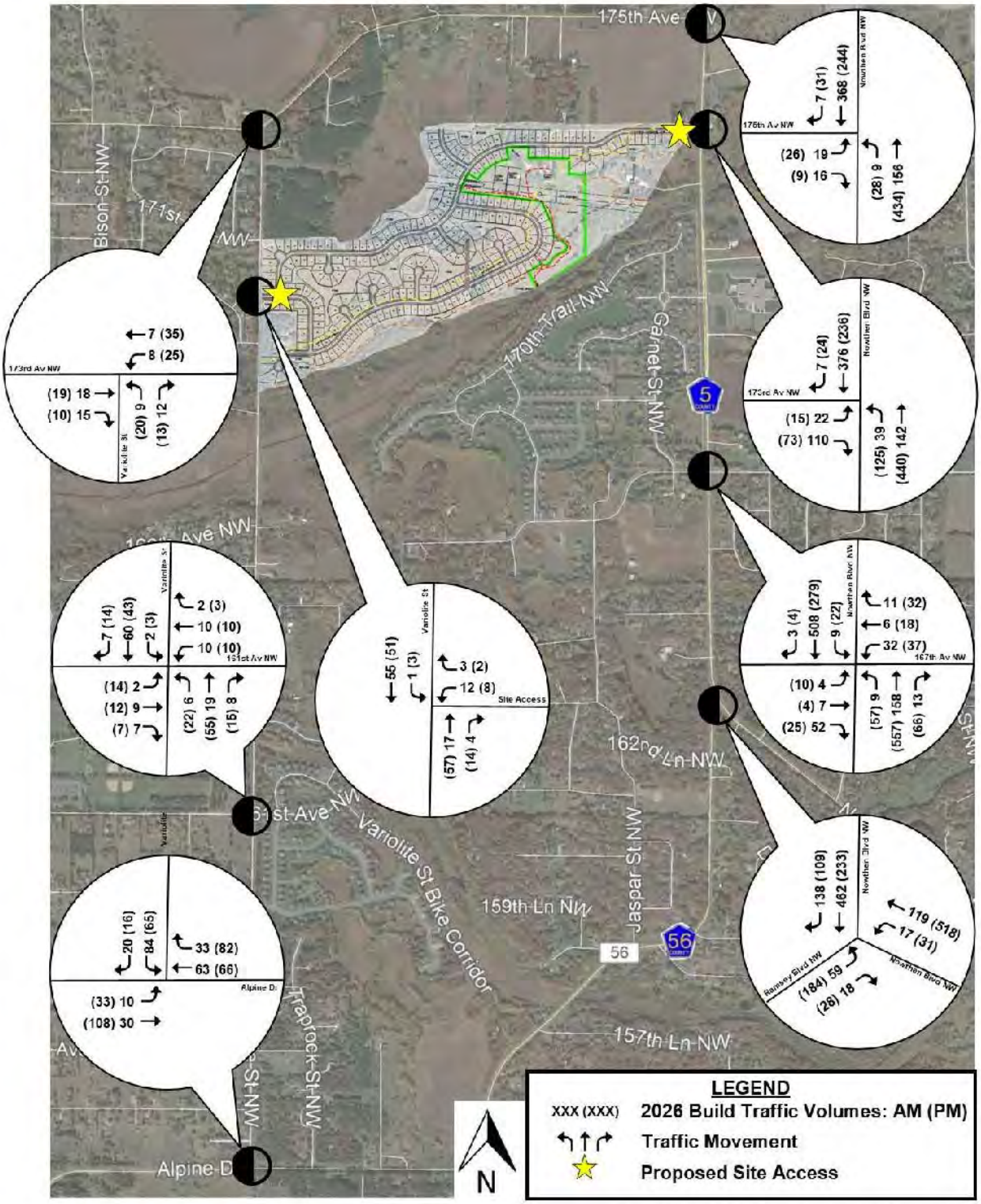

Figure 8– 2026 Build Traffic Volumes

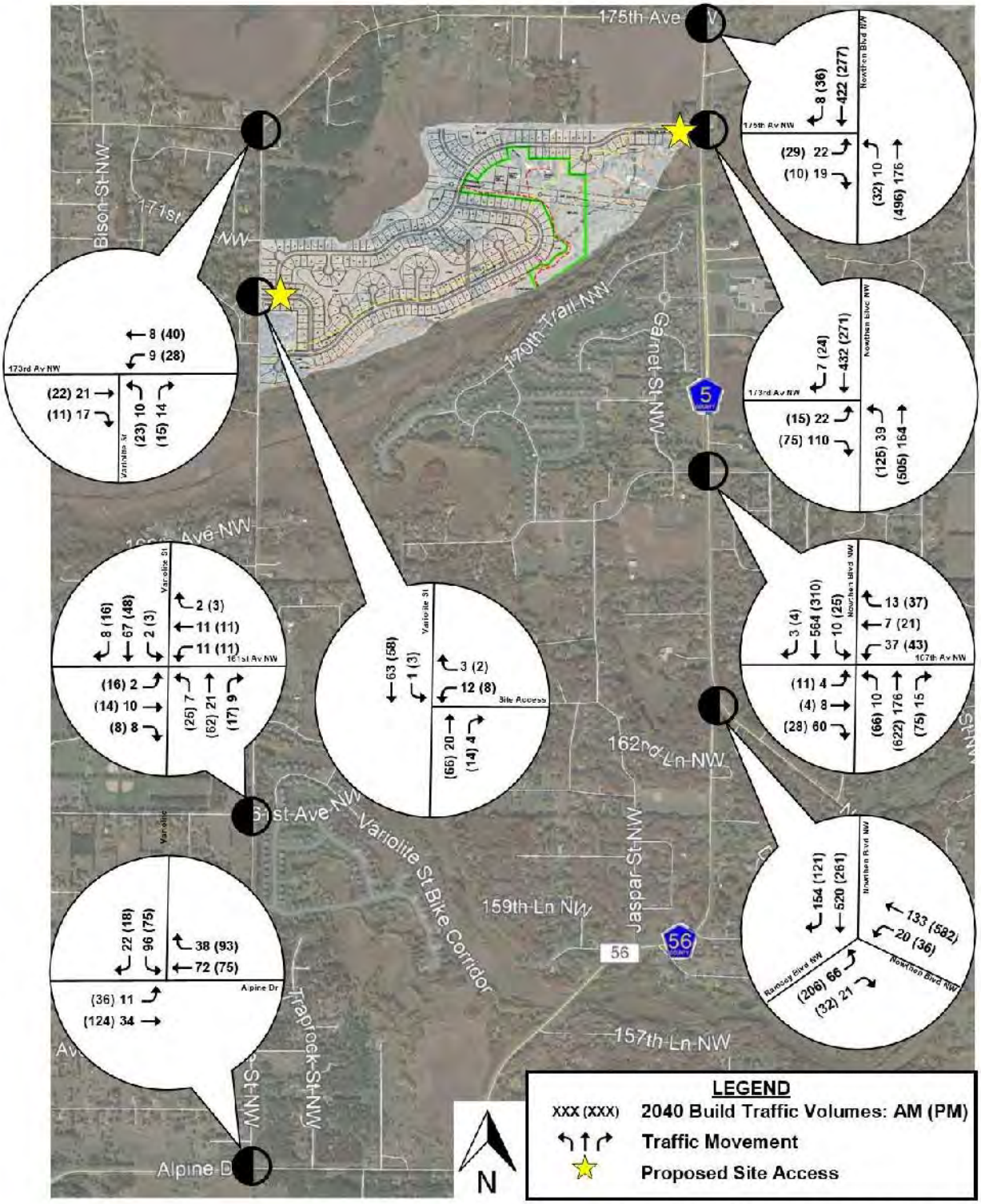

Figure 9– 2040 Build Traffic Volumes

E. Results of Analysis

This section contains the results of the intersection operational analyses based on Synchro/Simtraffic, 11th Edition, and provides recommendations, as necessary to mitigate the impacts. It is noted, the reported results are from the aggregate of 10 SimTraffic simulations which use a random number generator to seed the network with vehicles. These results reflect dynamic conditions and a more accurate than the results of the static analysis reported by Synchro, however, due to random number generator can sometimes show slightly better results on minor movements under higher traffic conditions when the intersections are operating at very good LOS. Table 2 summarize the results of the operational analyses for the 2026 No Build scenario (assumes 1.0 percent annual growth in traffic from existing conditions).

Table 2
2026 No-Build Operations

Intersection	Overall/Worst Movement LOS & Delay (sec)		Notes/95th Percentile Q
	AM Peak Hour	PM Peak Hour	
Variolite St NW & 173rd Ave NW/ 175th Ave NW	a (0.4)/a nbl (1.7)	a (1.2)/a nbl (6.1)	NB Q is 27 ft in AM; NB Q is 32 ft in PM
Variolite St NW & 161st Avenue NW	a (1.4)/a wbt (6.6)	a (1.7)/a wbt (5.7)	EB Q is 37 ft in AM; EB Q is 43 ft in PM
Variolite St NW & Alpine Dr NW	a (1.9)/a sbl (3.8)	a (1.5)/a sbl (3.9)	SB Q is 45 ft in AM; SB Q is 32 ft in PM
Nowthen Blvd NW & 175th Avenue NE	a (1.2)/a ebl (4.5)	a (2.3)/a ebl (5.6)	EBL Q is 43 ft in AM; EBL Q is 30 ft in PM
Nowthen Blvd NW & 173rd Avenue NW	a (0.8)/a nbt (1.1)	a (2.4)/a nbt (3.5)	NBL Q is 8 ft in AM; EBR Q is 14 ft in PM
Nowthen Blvd NW & 167th Avenue NW	a (3.4)/b ebl (11.1)	a (3.8)/b wbl (12.7)	EB Q is 30 ft in AM; WB Q is 64 ft in PM
Nowthen Blvd NW & Ramsey Blvd NW	a (3.9)/a ebl (8.1)	a (3.9)/b ebl (11.1)	EBL Q is 46 ft in AM; EBL Q is 71 ft in PM

1. Overall Level of Service reported from SimTraffic delay, first letter represents intersection LOS, while second letter represents worst LOS of individual approach. Upper case letters indicate signalized intersection, and lower-case letters indicate unsignalized intersection
2. 95th percentile queues are a result from an average of 10 SimTraffic simulations.

The results shown in Table 2 indicate all intersections and worst movements are expected to operate at acceptable LOS in 2026 without the proposed project. Further, the results indicate all intersections will experience short vehicle queues. No intersection modifications are suggested for the 2026 No-Build

condition. Table 3 summarizes the operational analyses results for the 2026 Build conditions. Note it is assumed the new intersection at Variolite Street NW and 170th Avenue NW will include a dedicated northbound right turn lane and a southbound left turn by-pass lane, and the 173rd Avenue NW approach to Nowthen Boulevard will include a dedicated right turn lane.

Table 3
2026 Build Operations

Intersection	Overall LOS & Delay (sec)		Notes/95th Percentile Q
	AM Peak Hour	PM Peak Hour	
Variolite St NW & 173rd Ave NW/ 175th Ave NW	a (0.7)/a nbl (2.7)	a (0.6)/a nbl (1.8)	NB Q is 31 ft in AM; NB Q is 33 ft in PM
Variolite St NW & Site Access (170th Ave NW)	a (0.6)/a wbl (3.8)	a (0.7)/ a wbl (4.0)	WB Q is 25 ft in AM; WB Q is 20 ft in PM
Variolite St NW & 161st Avenue NW	a (1.5)/a wbt (6.3)	a (1.5)/a ebt (7.0)	EB Q is 38 ft in AM; EB Q is 45 ft in PM
Variolite St NW & Alpine Dr NW	a (2.3)/a sbl (4.5)	a (1.6)/a sbl (4.3)	SB Q is 54 ft in AM; SB Q is 34 ft in PM
Nowthen Blvd NW & 175th Avenue NE	a (1.1)/a ebl (8.5)	a (2.5)/b ebl (11.2)	EBL Q is 26 ft in AM; EBL Q is 37 ft in PM
Nowthen Blvd NW & 173rd Avenue NW	a (2.4)/a ebl (9.3)	a (3.5)/b ebl (13.4)	EBL Q is 68 ft in AM; EBL Q is 48 ft in PM
Nowthen Blvd NW & 167th Avenue NW	a (3.3)/a wb (9.8)	a (4.1)/c wb (21.1)	EB Q is 40 ft in AM; WB Q is 53 feet in PM
Nowthen Blvd NW & Ramsey Blvd NW	a (4.1)/a ebl (9.9)	a (5.2)/c ebl (17.2)	EBL Q is 38 ft in AM; EBL Q is 103 ft in PM

1. Overall Level of Service reported from SimTraffic delay, first letter represents intersection LOS, while second letter represents worst LOS of individual approach. Upper case letters indicate signalized intersection, and lower-case letters indicate unsignalized intersection.
2. 95th percentile queues are a result from an average of 10 SimTraffic simulations.

The results shown in Table 3 indicate all intersections and worst movements are expected to operate at acceptable LOS in 2026 with the proposed project. Further, the results indicate all intersections will experience short vehicle queues. (Again, when the operations of the intersection and critical movements are at LOS A, the random number generator can sometimes show slightly better delay or queuing results on minor movements even with higher traffic conditions.)

F. 2040 Operations

The long-range planning horizon year is 2040, as mentioned in the No-Build section. The results of the analysis of the 2040 No-Build traffic conditions, which continue to reflect a 1.0 percent annual growth rate,

assume the roadways surrounding the site have the current configuration. Table 4 summarizes the 2040 No-Build operations at the study area intersections.

Table 4
2040 No-Build Operations

Intersection	Overall/Worst Movement LOS & Delay (sec)		Notes/95th Percentile Q
	AM Peak Hour	PM Peak Hour	
Variolite St NW & 173rd Ave NW/ 175th Ave NW	a (0.7)/a nbl (2.8)	a (0.8)/a nbl (3.4)	NB Q is 28 ft in AM; NB Q is 40 ft in PM
Variolite St NW & 161st Avenue NW	a (1.8)/a eb (5.8)	a (2.2)/a wb (6.6)	EB Q is 41 ft in AM; EB Q is 45 ft in PM
Variolite St NW & Alpine Dr NW	a (2.0)/a sbl (3.9)	a (1.8)/a sbl (5.0)	SB Q is 45 ft in AM; SB Q is 43 ft in PM
Nowthen Blvd NW & 175th Avenue NE	a (1.2)/a ebl (4.8)	a (2.4)/a ebl (7.6)	EBL Q is 33 ft in AM; EBL Q is 28 ft in PM
Nowthen Blvd NW & 173rd Avenue NW	a (0.8)/a nbt (0.9)	a (2.4)/a nbt (3.3)	NBL Q is 8 ft in AM; EBR Q is 9 ft in PM
Nowthen Blvd NW & 167th Avenue NW	a (3.4)/b ebl (12.2)	a (3.8)/b wbl (15.0)	EB Q is 32 ft in AM; WB Q is 62 ft in PM
Nowthen Blvd NW & Ramsey Blvd NW	a (3.9)/b ebl (10.8)	a (4.7)/c ebl (15.4)	EBL Q is 49 ft in AM; EBL Q is 80 ft in PM

3.
1. Overall Level of Service reported from SimTraffic delay, first letter represents intersection LOS, while second letter represents worst LOS of individual approach. Upper case letters indicate signalized intersection, and lower-case letters indicate unsignalized intersection
2. 95th percentile queues are a result from an average of 10 SimTraffic simulations.

The results shown in Table 4 indicate all intersections and worst movements are expected to operate at acceptable LOS in 2040 without the proposed project. Further, the results indicate all intersections will experience short vehicle queues. (Again, when the operations of the intersection and critical movements are at LOS A, the random number generator can sometimes result in slightly better delay or queuing results on minor movements even with higher traffic conditions.) It is note, the left turning volume from Ramsey Blvd to Nowthen Blvd is great enough to consider a change in traffic control in 2040 at this intersection, however, the forecast operations and queues are acceptable. It is suggested this intersection be monitored as volumes in the area grow to determine if safety or traffic control changes are needed. Table 5 summarizes the results of the 2040 Build traffic operational analysis, assuming no improvements or mitigation.

Table 5
2040 Build Operations

Intersection	Overall LOS & Delay (sec)		Notes/95th Percentile Q
	AM Peak Hour	PM Peak Hour	
Variolite St NW & 173rd Ave NW/ 175th Ave NW	a (0.5)/a nbl (2.3)	a (0.4)/a nbl (2.3)	NB Q is 30 ft in AM; NB Q is 31 ft in PM
Variolite St NW & Site Access (170th Ave NW)	a (0.9)/a wbl (3.9)	a (0.8)/ a wbl (4.7)	WB Q is 30 ft in AM; WB Q is 21 ft in PM
Variolite St NW & 161st Avenue NW	a (2.1)/a eb (5.8)	a (1.8)/a wb (6.4)	EB Q is 43 ft in AM; EB Q is 46 ft in PM
Variolite St NW & Alpine Dr NW	a (2.2)/a sbl (4.2)	a (2.0)/a sbl (5.6)	SB Q is 46 ft in AM; SB Q is 44 ft in PM
Nowthen Blvd NW & 175th Avenue NE	a (1.3)/a ebl (6.2)	a (2.8)/b ebl (11.9)	EBL Q is 26 ft in AM; EBL Q is 45 ft in PM
Nowthen Blvd NW & 173rd Avenue NW	a (2.2)/a ebl (8.9)	a (3.8)/b ebl (13.6)	EBL Q is 56 ft in AM; EB Q is 44 ft in PM
Nowthen Blvd NW & 167th Avenue NW	a (3.8)/a wb (9.4)	a (4.9)/c wb (20.3)	EB Q is 40 ft in AM; WB Q is 70 ft in PM
Nowthen Blvd NW & Ramsey Blvd NW	a (5.0)/c ebl (18.1)	a (8.9)/e ebl (36.9)	EBL Q is 38 ft in AM; EBL Q is 187 feet in PM

3.
1. Overall Level of Service reported from SimTraffic delay, first letter represents intersection LOS, while second letter represents worst LOS of individual approach. Upper case letters indicate signalized intersection, and lower-case letters indicate unsignalized intersection.
2. 95th percentile queues are a result from an average of 10 SimTraffic simulations.

The results shown in Table 5 indicate all intersections are expected to operate at acceptable overall LOS in 2040 with the proposed project. Further, the results indicate all intersections will experience short to moderate vehicle queues, which are typical for peak hour conditions. (Again, when the operations of the intersection and critical movements are at LOS A, the random number generator can sometimes result in slightly better delay or queuing results on minor movements even with higher traffic conditions.) However, the eastbound approach to Nowthen Boulevard NW from Ramsey in the PM Peak hour will be at capacity, and changes to the traffic control should be considered. Preliminary review of traffic signal and roundabout warrants suggest this intersection will satisfy peak hour warrant in the 2040 planning horizon year. Operational analysis of the potential traffic control change options indicates all movements will operate at LOS B or better, with short queues. It is noted if traffic control changes occur modifications to the intersection geometry will be needed. Review of minor modifications such as converting the northbound by-pass lane to a dedicated left turn lane will improve safety and show a slight reduction in northbound left

turn queues but do not address the critical eastbound movement. Crash data has been provided by Anoka County and shows the intersection has a crash rate that is 0.56 per million entering vehicles which is greater than the statewide average of 0.26 for similar intersections. It is suggested that this intersection be monitored to determine if safety or traffic control changes may be needed. No other intersection modifications are suggested for the 2040 Build condition to improve operations.

V. SUMMARY AND SUGGESTIONS

The preceding analysis has evaluated the potential traffic impacts of the proposed development of the Sotarra - Trott Brook residential project, on the operations of the study area intersections. The site is located adjacent to the west side of Nowthen Boulevard NW and east side of Variolite Street NW just north of Trott Brook and south of 173rd Avenue NW in Ramsey, Minnesota.

Two design years were considered in this study, 2026 to correspond to the year after build-out and 2040 to remain consistent with the long range planning horizon. For both design years a No-Build and Build scenario, was analyzed and compared to assess the development's impact, and the area's future infrastructure needs. Development of the Sotarra - Trott Brook residential project on the site by 2026 is expected to result in approximately 2,593 new vehicle trips on the study area roadway network per average weekday. Peak hour trips generated by the development are estimated at 196 during the AM peak hour and 264 during the PM peak hour.

The site access will include the extension 173rd Avenue NW westward from Nowthen Boulevard NW into the site and the construction of a new intersection on Variolite Street NW at approximately 170th Avenue NW. It is assumed the new 170th Avenue NW intersection with Variolite Street NW will include a dedicated northbound right turn lane and a southbound left turn by-pass lane on Variolite Street NW.

Growth in background traffic at a rate of 1.0 percent per year was accounted for in the analysis. Results of the operational analyses in the 2026 and 2040 No-Build and 2026 and 2040 Build scenarios indicate all the intersections will operate at acceptable levels of service with typical Peak Hour short to moderate vehicle queues. It is recommended that the new intersection at 170th Avenue NW and Variolite Street include a northbound right turn lane and a southbound left turn by-pass lane, and it is recommended the 173rd Avenue NW approach to Nowthen Boulevard include a dedicated right turn lane. No other improvements to the

roadways or intersections within the study area are required. However, it is suggested the intersection of Ramsey Boulevard NW and Nowthen Boulevard NW be monitored for to determine if future safety and/or traffic control changes are warranted by 2040.