

ENVIRONMENTAL ASSESSMENT WORKSHEET

Project: Nigon Development

Location: Rochester, MN

October 2025

Prepared for:



Prepared by:



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ENVIRONMENTAL ASSESSMENT WORKSHEET

This most recent Environmental Assessment Worksheet (EAW) form and guidance documents are available at the Environmental Quality Board's website at: <https://www.eqb.state.mn.us/>. The EAW form provides information about a project that may have the potential for significant environmental effects. Guidance documents provide additional detail and links to resources for completing the EAW form.

Cumulative potential effects can either be addressed under each applicable EAW Item or can be addressed collectively under EAW Item 21.

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 Nigon Development

2. Proposer

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3. RGU

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4. Reason for EAW Preparation

Required:	Discretionary:
☐ EIS Scoping	☐ Citizen Petition
☒ Mandatory EAW	☐ RGU discretion
	☐ Proposer Initiated

If EAW or EIS is mandatory give EQB rule category subpart number(s) and name(s):

EAW, Minnesota Rules 4410.4300, Subp. 19(D). Residential development.

5. Project Location

County:	Olmsted County
City/Township:	Cascade Township, Rochester Township (to be annexed into City of Rochester)
PLS Location:	Township 106N, Range 14W, Sections 5 and 6 Township 107N, Range 14W, Section 32
Watershed (81 major watershed scale):	Zumbro River Watershed
GPS Coordinates:	44.018352, -92.537717
Tax Parcel Number:	640522041608, 640611084153 (partial), 743233081149 (partial) See Appendix A, Figure 1: Project Location and Figure 2: USGS Quad Map

6. Project Description

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

The proposed project is a residential development in Cascade and Rochester townships, Minnesota, on property proposed to be annexed into the City of Rochester. The development will be built on approximately 176 acres and will be developed with 317 single-family detached units, stormwater management areas, curvilinear roads, and open spaces.

The Rochester City Council approved the annexation of 120 of the 176 acres into the Rochester city limits on September 8, 2025. The City of Rochester has been coordinating with Cascade and Rochester townships to execute Joint Powers Agreements (JPAs) for administration of the EAW. These JPAs will delegate authority to the City of Rochester to lead the EAW process while keeping the townships closely involved and informed.

- 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 waste, 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.

Pulte Group, Inc. (“Proposer”) is proposing a Del Webb senior residential development that will include 317 single-family detached units, outdoor community gathering spaces, and an amenity center (“Project”). The Project will be developed on approximately 176 acres of land (“Project Site”) which has previously been used for agricultural production. The Project Site is located south of County State Aid Highway (CSAH) 34/Country Club Rd SW, west of 45th Ave SW, north of 8th St SW, and east of CSAH 44/60th Ave SW, and is currently in Cascade Township and Rochester Township, immediately west of the City of Rochester limits. The Project Site is planned to be annexed into the City of Rochester. The Project Site generally slopes toward Cascade Creek, with steeper slopes on the northern portion of the site. There are delineated wetlands on the site.

The portion of the Project north of Cascade Creek is planned to be developed first, following annexation of the property from Cascade and Rochester Townships. The southern portion of the site will be developed later, following a subsequent annexation from Rochester Township approximately 12 months later. Water and sanitary sewer systems will be extended to serve the Project Site.

Existing Property

The 176-acre Project Site includes existing Olmsted County parcel 640522041608 and parts of Olmsted County Parcels 640611084153 and 743233081149 located at 4700 Country Club Rd W and previously owned by the Ralph & Agnew Nigon Family Farm LLC. Parcel 743233081149 is developed with a machine shed, a north hay shed, and pastureland. Parcel 640522041608 is developed with a south hay shed, granary, lean-to, two silos, a feedlot, a feed bunk conveyor, and cultivated agricultural land with Cascade Creek traversing in an east-west orientation through the south portion of the parcel. Parcel 640611084153 is cultivated land with Cascade Creek traversing in an east-west orientation through the south portion of the parcel. The Project Site is currently bound to the north and south by residential development; to the east by Homeward Bound Animal Clinic, Med City Electric, and vacant land; and to the west by cultivated agricultural land and woods.

General Development Plan

Appendix A, Figure 3 Concept Plan shows the extent of the Project and includes both phases of development. The Project includes 317 single-family detached residential units including lots ranging from 44-foot-wide garden lots (120 units), 50-foot-wide classic lots (135 units), and 64-foot-wide estate lots (62 units).

The Concept Plan includes more than 50 acres of open space including parks, wetland areas, stormwater management, and floodplain areas. A development summary is provided in Table 1.

Table 1. Nigon Property Summary Yield and Description

Use	Area/Lot Size (Acres)	# of Lots/Units	Est./Avg. SF	Est. Impervious Surface	Estimated Open Space	Description
Single-family detached residential	110 acres	317 units	4,791,600	30-40%	60-70%	317 single family lots, stormwater management
Cascade Creek	46 acres	-	2,003,760	0%	100%	Cascade Creek floodway and associated floodplain
Right-of-way	20 acres	-	871,200	75%	25%	Right-of way connecting development to 45 th Ave SW and 8 th St SW

Infrastructure and Project Area Improvements

The Project includes the following improvements:

Demolition, Grading, and Utilities

The existing farm structures will be removed as part of the site development process. Mass rough grading and grading of stormwater management facilities will be completed across the site. Watermain and sanitary sewer trunk lines will be extended from the east to serve the development.

There is an existing 15-inch trunk sewer line that is proposed to be extended west, generally following the creek alignment. There is an existing 8-inch watermain stub at the north side of the intersection of Country Club Rd SW and 45th Ave SW, and an existing 12-inch watermain at the southwest corner of County Club Rd SW and CSAH 22/W Circle Drive. Both watermain will be extended to provide service to the development.

Road Improvements

Primary access to the development will be from 45th Ave SW. The first phase of development will construct a street from 45th Ave SW through the northern portion of the Project Site and adjacent local streets with cul-de-sacs. The street will terminate at the west property boundary with a cul-de-sac. A private drive will extend west from the cul-de-sac to serve a remaining Nigon Family farm parcel. Curvilinear roadways and cul-de-sacs will be constructed as shown in the Concept Plan. Streets will include sidewalk on both sides. The second phase of development will construct a second street and bridge spanning the realigned Cascade Creek, connecting to a secondary development access at 8th St SW.

Stormwater Management

The stormwater management system will include the installation of curb and gutter, catch basins, and storm sewer pipes throughout the Project Site which will connect to multiple stormwater ponds in series. Compensatory storage areas will be required to compensate for fill of the floodplain. The stormwater ponds will be designed to meet all City requirements for rate and quality control. Due to existing soils and the proximity of the water table, infiltration is not feasible on the Project Site.

During site construction, erosion and sediment controls (such as silt fence, inlet protection, etc.) will be installed and maintained per the Stormwater Pollution Prevention Plan (SWPPP) and NPDES Construction Stormwater Permit requirements.

An anticipated project schedule is provided in Table 2.

Table 2. Anticipated Project Schedule Summary

Phase	Anticipated Date	Activity
Phase I	Spring 2026	Site mass grading on north portion of property. Public and private utilities installed concurrent with road construction. Buildout of single-family residential units on north side of Cascade Creek.
Phase II	Spring/summer 2027	Site mass graded on south portion of property. Public and private utilities installed concurrent with road construction. Buildout of single-family residential units on south side of Cascade Creek.

c. Project magnitude:

The project magnitude is summarized in Table 3.

Table 3. Project Magnitude

Description	Size (approximate)
Total Project Acreage	176 acres
Linear project length	N/A

Description	Size (approximate)
Number and type of residential units	317 single-family detached units
Residential building area (in square feet)	110 acres
Commercial building area (in square feet)	N/A
Industrial building area (in square feet)	N/A
Institutional building area (in square feet)	N/A
Other uses – specify (in square feet)	20 acres – right-of-way 46 acres – open space, stormwater, buffer, floodplain, and wetlands
Structure height(s)	Maximum 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 Project is to develop a new residential neighborhood with single-family detached homes for the population aged 55+. Rochester has grown to become the third largest city in Minnesota and the largest city in the state outside of the Twin Cities. Housing in Rochester and surrounding communities has not kept pace with the projected demand, and there is a need for a variety of housing options. According to the City of Rochester's Comprehensive Plan 2040, *Planning 2 Succeed (P2S)*,¹ Rochester expects to add 55,000 new residents and 50,000 new jobs by 2040, necessitating 24,000 new housing units. Ongoing investments in the Mayo Clinic are primarily what is driving the growth.

Per the P2S Comprehensive Plan, by 2040, nearly 1 in 3 residents will be over the age of 60. With an increasing senior population, it is anticipated that a larger share of this population will look for housing options outside of traditional single-family housing developments.

- 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.

- 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.

7. Climate Adaptation and Resilience

- a. Describe the climate trends in the general location of the project (see guidance: *Climate Adaptation and Resilience*) and how climate change is anticipated to affect that location during the life of the project.

Present and anticipated future shifts in Minnesota's climate include greater intensity rainfall events, increased instances of localized flooding, more frequent freeze/thaw cycles, diminished

¹ "Planning 2 Succeed (P2S), Rochester Comprehensive Plan 2040," City of Rochester, MN, April 2018, <https://www.rochestermn.gov/home/showpublisheddocument/24222/636903969909230000>

snow cover, extreme heat, drought, and associated infrastructure damage and safety hazards. The following assesses climate trends as they pertain to the Project Site.

Temperature Trends

The Project Site is situated in the Zumbro River major watershed. Per the Minnesota Climate Explorer tool², the average annual temperature (1895-2024) has trended upward by approximately 0.19°F/decade within the Major Watershed District (Figure 4).

The average annual temperature in 2024 was 48.5°F in the Major Watershed which is higher than the average since 1895. Climate models generally predict an increase in average temperature, with average annual temperature ranges from 15.96°F to 68.58°F during mid-century (2040-2059) (Figure 5). The Minnesota Department of Natural Resources State Climatology Office also anticipates warming winters, a continued increase in the frequency and magnitude of extreme rainfall events, and an increase in the severity, coverage, and duration of heat waves through the end of this century.

Precipitation Trends

Per the Minnesota Climate Explorer tool, the average annual precipitation for the Zumbro River major watershed has trended upward by approximately 0.57 inches/decade (1895-2024). The annual rainfall in 2024 was 38.6 inches, which is higher than the average since 1895 (Figure 6). Climate models generally predict an increase in average annual precipitation with ranges from 16.3 inches to 67.2 inches during mid-century (2040-2059) (Figure 7). The Minnesota Department of Natural Resources State Climatology Office also anticipates warming winters, a continued increase in the frequency and magnitude of extreme rainfall events, and an increase in the severity, coverage and duration of heat waves through the end of this century.

- b. For each Resource Category in the table below: Describe how the project's proposed activities and how the project's design will interact with those climate trends. Describe proposed adaptations to address the project effects identified.

Table 4. Project Resource Category and Climate Trend Interaction

Resource Category	Climate Considerations	Project Information	Adaptations
Project Design	Increase of extreme rainfall and severe thunderstorms or other weather events	The Project will increase the amount of impervious surface cover which may contribute to greater heat island effects and stormwater runoff and/or flooding. The Project is being designed to avoid any grading or construction work in the floodway of the realigned Cascade Creek.	The Project's design will provide effective drainage for the site while capturing and treating stormwater runoff in a manner consistent with local (City and County), state, and federal standards.

² "Minnesota Climate Explorer," MN DNR, accessed July 15, 2025, <https://arcgis.dnr.state.mn.us/climateexplorer/main/historical>

Resource Category	Climate Considerations	Project Information	Adaptations
Land Use	Extreme rainfall and severe thunderstorms or other weather events could impact land use.	The Project will increase the amount of impervious surface coverage within the project area which may contribute to greater heat island effects and stormwater runoff and/or flooding. The Project will reserve approximately 46 acres of open space including ponding, wetlands, floodplain, and buffer area.	The Project's design will provide effective drainage for the site while capturing and treating stormwater runoff in a manner consistent with local (City and County), state, and federal standards.
Water Resources	Addressed in item 12	Addressed in item 12	Addressed in item 12
Contamination/ Hazardous Materials/Wastes	Increased precipitation may lead to greater erosion of exposed soils and higher volumes of contact water needing collection and treatment. Reduced air quality may be due to temperature inversions and wildfires.	The Project will follow the sediment control requirements of the NPDES permit and satisfy the water quality requirements of the City and Watershed.	The Project will implement a Stormwater Pollution Prevention Plan (SWPPP) during construction. The permanent best management practices on site will comply with the water quality requirements of the City and County.
Fish, wildlife, plant communities, and sensitive ecological resources (rare features)	Addressed in item 14.	Addressed in item 14.	Addressed in item 14.

8. Cover types

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

Table 5. Cover Types, Before and After

Cover Types	Before(acres)*	After (acres)**
11 – 25% Impervious	1.1	
26 – 50% Impervious	0.2	

Cover Types	Before(acres)*	After (acres)**
Agricultural land	147.4	
Forest	7.2	
Tall grasses	4.3	
Dry tall grasses	15.8	
Green/Open space (pervious)		119.1
Impervious surface		28.8
Stormwater pond		14.6
Compensatory flood storage		13.9
TOTAL	176.4	176.4

* Source: Minnesota Department of Natural Resources. Minnesota Land Cover Classification System. Available at <https://gisdata.mn.gov/dataset/biota-landcover-mlccs>. See Figure 11 for map of existing cover types.

** Approximated based on Concept Plan. Maximum allowable 25% impervious area for lots within the shoreland district.

Table 6. Tree Canopy, Before and After

Trees	Tree Canopy % / Number of Trees
Percent tree canopy removed or number of mature trees removed during development*	Approximately 40%
Number of new trees planted**	302 trees

*Current tree canopy is approximately 3.9% of site area. **Per City of Rochester Unified Development Code Section 60.400.060³, approximate minimum boulevard trees based on tree spacing of 50 feet **along** lot frontage.

9. 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 7. Permits and Approvals

Unit of Government	Type of Application	Status
Federal		
US Army Corps of Engineers (USACE)	Section 404 Clean Waters Act – Wetland Permit	To be applied for, if required
	MPCA 401 Certification, if required	
State		
Minnesota Pollution Control Agency (MPCA)	National Pollutant Discharge Elimination System (NPDES) Stormwater Construction Permit	To be applied for
	Stormwater Pollution Prevention Plan (SWPPP)	To be applied for

³ “Unified Development Code,” Rochester Community Development, November 4, 2024, <https://www.rochestermn.gov/home/showpublisheddocument/36333/638695059544470000>

Minnesota Department of Natural Resources (DNR)	MN Natural Heritage Database Review	Complete
	Dewatering permit	To be applied for, if needed
Minnesota Department of Health (MDH)	Water main plan review and water supply connection	To be applied for
	Well abandonment	To be applied for
Local		
City of Rochester	Preliminary and Final Plat	To be applied for
	Driveway permits	To be applied for
	Road/access permits	To be applied for
	Sign permits	To be applied for
Olmsted County	Wetland Conservation Act	To be applied for
	SWPPP	To be applied for
	Building permits	To be applied for
	HVAC, plumbing, electrical permits	To be applied for

Cumulative potential effects may be considered and addressed in response to individual EAW Item Nos.10-20, or the RGU can address all cumulative potential effects in response to EAW Item No.22. If addressing cumulative effect under individual items, make sure to include information requested in EAW Item No. 21.

10. Land use

- a. Describe:
 - i. Existing land use of the site as well as areas adjacent to and near the site, including parks and open space, cemeteries, trails, prime or unique farmlands.

The Project Site has predominantly been used for agricultural production and cultivation for the past several decades.

The Project Site is currently bound to the north and south by residential development. Land use designations are described in the City’s P2S Comprehensive Plan and Olmsted County’s General Land Use Plan.⁴ The Rochester City Council approved a Growth Management Map Amendment (GMMA) to amend the Project Site from “Urban Reserve Beyond 2050” to “Near Term Urban Expansion” on September 8, 2025. Concurrent with the GMMA, the City Council approved a Comprehensive Plan Amendment (CPA) to amend the land use designation from “Urban Reserve” to “Low Density Residential”.

Table 8 describes the future land use designations of the Project Site and adjacent properties. Table 9 describes the zoning of the Project Site and adjacent properties.

⁴ “Olmsted County General Land Use Plan,” Olmsted County Planning Department, August 16, 2022, <https://www.olmstedcounty.gov/sites/default/files/2023-01/GLUP2045Final.pdf>

Table 8. Future Land Use Designations

Area	Land Use Designation
Project Site	Low Density Residential
North	Low Density Residential
South	Suburban Development (township)
East	Medium Density Residential, Low Density Residential, Suburban Development (township)
West	Suburban Development (township), Resource Protection (township)

Sources: P2S Comprehensive Plan, Olmsted County General Land Use Plan

Table 9. Zoning

Area	Zoning
Project Site	A3 Agriculture (township)
North	A3 Agriculture (township), R-2 Single Family Small Lot
South	R-1 Single Family (township), RA Rural Residential (township)
East	MX-S Mixed Use Street Oriented, R-3 Medium Density Residential, R-2 Single Family Small Lot, R-1 Single Family (township)
West	A3 Agriculture (township), RA Rural Residential (township)

Sources: P2S Comprehensive Plan, Olmsted County General Land Use Plan

Within one mile of the Project Site, there are several City parks including Manor Lakes Park, Bamber Valley Estates Park, Manor Park, and Judd Park. There is a striped shoulder along Country Club Rd W, and along and east of West Circle Drive SW there are off-street, paved trails. There are no nearby cemeteries. The Project Site is not within or adjacent to any Wildlife Management Areas (WMA), Waterfowl Production Areas (WPA), or National Wildlife Refuges (NWR).⁵

Approximately 128 acres or 72% of the Project Site is prime farmland or prime farmland if drained and either protected from flooding or not frequently flooded during the growing season. Prime Farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses.

- 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.

A CPA was approved by the Rochester City Council to amend the land use designation of the Project Site from Urban Reserve to Low Density Residential (Figure 8).

As outlined in its Comprehensive Plan, the City of Rochester anticipates its population to increase by approximately 55,000 people to 165,000 between 2018 and 2040. The Project Site was within the Urban Reserve Area – Expected Growth Beyond 2050 per the Comprehensive Plan. The Urban Reserve Area defines those areas most suitable for urbanization beyond the Urban Expansion area. A GMMA was approved by the Rochester City Council to amend the Project Site from Urban Reserve to Near Term Urban Expansion in the map (Figure 9).

⁵ “Minnesota Natural Resource Atlas,” Natural Resources Research Institute, accessed July 15, 2025, https://mnatlas.org/gis-tool/?id=k_0047

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

The Project Site will be annexed into the City of Rochester from Cascade Township and Rochester Township in two separate annexation petitions. After annexation, the City of Rochester will be responsible for administering zoning and land use. Joint Powers Agreements (JPAs) with the townships will delegate authority to the City of Rochester to lead the EAW process while keeping the townships closely involved and informed. An Annexation Petition for the northernmost 120 acres of the Project Site was approved by the Rochester City Council on September 8, 2025.

Following the CPA discussed above, the property will be rezoned to R-2, Low Density Small Lot. Per the City of Rochester's Unified Development Code, the R-2 district is intended to maintain and promote areas with a mixture of residential dwelling types that are an overall low-density.

Creek Realignment Impacts

Cascade Creek runs from west to east through the Project Site. The Minnesota Department of Natural Resources (DNR) will be undertaking a project to realign the creek to be more meandering through the Project Site to create greater upland storage and improve water quality. The Concept Plan reflects a design based on floodplain limits established by the current FEMA Letter of Map Revision (LOMR).⁶ When creek realignment occurs, the City of Rochester may model the updated floodplain limits and file a new LOMR. The development's phasing and layout will be coordinated with the creek realignment project.

There are no wild and scenic rivers or other critical areas in or near the Project Site.

The Project Site is not enrolled in the Agricultural Preserves program.

- iv. If any critical facilities (i.e. facilities necessary for public health and safety, those storing hazardous materials, or those with housing occupants who may be insufficiently mobile) are proposed in floodplain areas and other areas identified as at risk for localized flooding, describe the risk potential considering changing precipitation and event intensity.

The Project is designed so that all development activities are outside of the designated floodplain of the realigned Cascade Creek based on current FEMA mapping. A LOMR may be prepared to establish new floodway, floodplain, and fringe floodplain limits associated with the realignment of Cascade Creek west of 45th Ave SW. Depending on timing of the Project with respect to Cascade Creek realignment, all Project development activities are proposed to take place outside of the current LOMR's floodplain limits. Depending on timing of the final plat with respect to updated FEMA mapping and floodplain limits, a plat amendment may be necessary to ensure that development occurs outside of all designated floodplain areas.

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

⁶ "FEMA Flood Map Service Center – FIRM Panel 27109C0143E," FEMA, April 4, 2017, <https://msc.fema.gov/portal/home>

The Project is compatible with existing residential development to the north and south of the site. The P2S Comprehensive Plan has been amended to assign a Low Density Residential land use designation, and a GMMA has been approved to amend the site to Near Term Urban Expansion.

As shown on the Concept Plan (Figure 3), the Project will protect existing natural wetlands and incidental wetlands and any potential impact must comply with mitigation and replacement requirements. A buffer conservation easement will be established adjacent to the wetlands as required by the City's ordinances.

- c. Identify measures incorporated into the proposed project to mitigate any potential incompatibility as discussed in Item 10b above and any risk potential.

On July 11, 2025, the Proposer applied to the City of Rochester for a General Development Plan (GDP), a Petition for Annexation, GMMA, and CPA. The City Council voted to approve the petition for annexation, the GMMA, and the CPA on September 8, 2025. The GDP is a concept site plan application that identifies lot and street layout along with stormwater design. The GDP is approved at the City staff level and the Proposer received approval of their GDP on September 22, 2025.

11. Geology, soils and topography/landforms

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.

Plate 6, Bedrock Topography of the C-49 Geologic Atlas of Olmsted County⁷ notes that the depth to bedrock is between 0-25 feet for most of the Project Site with the south portion of the site having bedrock at up to 50 feet. Per Plate 2, Bedrock Geology of the Geologic Atlas⁸, general bedrock on the Project Site includes Cummingsville Formation, Decorah Shale, Platteville and Glenwood Formations, St. Peter Sandstone, and Prairie du Chien Group. The Cummingsville Formation and Decorah Shale are limited to the topographic high in the northwest portion of the Project Site.

Braun Intertec prepared a Geotechnical Evaluation Report dated October 1, 2025 (Appendix C). Twenty-five standard penetration test borings were performed, and auger and sampler refusal were encountered in Borings ST-7 and ST-17 on apparent bedrock material at depths of about 19.5 and 8 feet respectively below existing grade.

Bay West LLC (Bay West) completed a Desktop and Field Verification Decorah Edge Study for the Project Site in September 2025 (Appendix D). The purpose of the study was to assess the potential presence of Decorah Shale geologic features associated with a wetland delineated by Kjolhaug Environmental Services (Kjolhaug) on the Project Site.

The "Decorah Edge" is defined as follows in the Olmsted County Wetland Conservation

⁷ "C-49 Geologic Atlas of Olmsted County – Plate 6," University of Minnesota, 2020, <https://conservancy.umn.edu/bitstreams/2bdcedcf-0f95-430e-a359-e37669a08b79/download>

⁸ "C-49 Geologic Atlas of Olmsted County – Plate 2," University of Minnesota, 2020, <https://conservancy.umn.edu/bitstreams/b921b028-2065-4ec1-9e62-365175577b8c/download>

Ordinance⁹ as the area:

- In which the Decorah, Platteville, or Glenwood formation is the first encountered bedrock according to the “Bedrock Geology: Steele, Dodge, Olmsted and Winona Counties” data plate produced by the Minnesota Geological Survey, University of Minnesota, 2020, specifically Plate 2 Bedrock Geology; AND
- Having a depth to bedrock of less than twenty-five feet according to the according to “C-49 Geologic Atlas of Olmsted County, Minnesota”, specifically Plate 6 Bedrock Topography, as modified by field investigation, reliable well logs, or more precise mapping; AND
- For which there are contiguous areas with the Cummingsville or higher formations as the first encountered bedrock according to “C-49 Geologic Atlas of Olmsted County, Minnesota” produced by the Minnesota Geological Survey, University of Minnesota, 2020, specifically Plate 2 Bedrock Geology.

The Rochester-Olmsted Planning Department Long Range Division prepared the City of Rochester Decorah Edge Feature Map, dated October 24, 2006 (see Appendix D, Figure 2). The map indicates potential edge soil is present along the northwest portion of the Project Site, along with an area denoted as 1,000-foot Edge Support Area (ESA) buffer. ESAs include non-wetland areas with features associated with perched groundwater tables, groundwater discharges, or groundwater supported wetlands located in the Decorah Edge.

Each bedrock unit on the Project Site is important to the Decorah Edge investigation, from youngest (top) to oldest (bottom) rocks are as follows:

Stewartville Formation – Yellowish-gray, dolomitic limestone and dolostone

Prosser Formation – Light tan to grayish-brown, very fine-grained, thin bedded limestone

Cummingsville Formation – Limestone interbedded with shale

Decorah Shale – Fossiliferous, green-gray shale with thin interbeds of blue-gray, densely fossiliferous limestone

Platteville and Glenwood Formations – Tan to gray limestone and dolostone

St. Peter Sandstone – Fine-to medium-grained, whitish tan, quartzose sandstone

Shakopee Formation – Tan to gray dolostone, sandy dolostone, and sandstone

The study also reviewed well logs from the Minnesota Department of Health’s Minnesota Well Index indicates that wells west and northwest of the Project Site all encountered Decorah Shale with the exception of one well.

Based on the desktop study, a field study was conducted on July 31, 2025 which included one test boring and ten test pits to determine the presence of Decorah Shale associated with the wetland and the influence associated with the wetland.

The study concluded that the delineated hillside wetland is influenced by the Decorah Shale. The Decorah Shale influence boundaries are outlined in Appendix D, Figure 6, as well as the TEP revised delineated wetland boundary (see Appendix E).

Per Olmsted County Wetland Conservation Ordinance Chapter 3700, Section 3706, activities

⁹ “Chapter 3700 – Wetland Conservation Ordinance,” Olmsted County Code of Ordinances, updated October 26, 2010, <https://www.olmstedcounty.gov/sites/default/files/2020-10/Chapter%203700%20Wetland%20Conservation%20Ordinance.pdf>

carried out in Decorah Edge sites shall protect ESAs from disturbance and shall provide for their management through conservation easements or equivalent mechanisms, subject to certain exceptions outlined in subsection 6.5.

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 or 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 12.b.ii.

The Project Site has a gradually sloping topography and generally slopes toward Cascade Creek which runs from west to east through the Project Site.

The site is planned to be mass graded as part of the initial site development, and earthwork is anticipated to be balanced across the site. Preliminary grading plans are not yet available; however, approximately 400,000 cubic yards of excavation is estimated. Any soil correction work could add or subtract to the cut and fill depths.

Impacts from Construction Activities

The Geotechnical Evaluation Report indicates that the site generally appears suitable for development; however, soil corrections will be required to address soft Loess soils and any significant grade changes. Spread footing foundations bearing on engineered fill and/or native soils can support the proposed houses after performing typical subgrade preparation of removing existing vegetation, topsoil or slope wash soils, along with areas of soft clays or very loose silts. Some house pads may require more than 10 feet of compacted fill which will result in varying degrees of long-term consolidation and could lead to construction delays. Non-organic, clayey soils are generally suitable for reuse as engineered fill; however, they may require moisture conditioning before placement and compaction. Additionally, sandy soils are suitable for reuse after moisture conditioning. Silty soils on the site are expected to be highly moisture-sensitive, making them challenging to reuse and compact, and should generally not be used as compacted fill.

Bedrock is expected to be encountered in parts of the Project Site, including limestone or dolostone bedrock, and sandstone. Removed limestone should only be used if permitted, and if sized and blended appropriately with engineered soil. Shale, if encountered, should not be reused for support of structures or pavements. Sandstone may be reused for fill within utility trenches or other site features, provided it meets the project compaction requirements.

Per the Geotechnical Evaluation Report, some on-site silty and clayey soils are highly susceptible to disturbance, due to repeated construction traffic. This disturbance can be destabilized and require additional conditioning and compacting.

The Project should avoid disturbing the Decorah Edge Support Areas from disturbance except where exemptions exist as outlined in subsection 6.5 of Chapter 3700 – Wetland Conservation Ordinance of the Olmsted County Code of Ordinances.

The Project will not be allowed to excavate or fill in the floodway of Cascade Creek. The Project may fill in the fringe floodplain, but a compensatory storage volume equal to the volume lost by fill must be provided in the form of stormwater detention.

Table 10 identifies soils found at the Project Site, as determined by the NRCS web soil survey which is supplemented by the findings of the Geotechnical Evaluation Report shown in Table 11. Figure 10 depicts NRCS soil classification mapping.

Table 10. NRCS Soil Classifications

Soil Classification	Name	Acres	% of Total Project Area
19	Chaseberg silt loam, moderately well drained, 0 to 2 percent slopes	2.4	1.3%
289	Radford silt loam	90.6	50.8%
322D2	Timula silt loam, 12 to 20 percent slopes, moderately eroded	38.8	21.7%
467	Sawmill silty clay loam	7.7	4.3%
473D	Dorerton loam, 12 to 25 percent slopes	4.2	2.4%
477B	Littleton silt loam, 1 to 4 percent slopes	2.1	1.2%
593E	Elbaville silt loam, 18 to 30 percent slopes	1.0	0.5%
N150E	Brodale channery loam, deep, 20 to 30 percent slopes	2.4	1.4%
N501D2	Downs silt loam, 12 to 18 percent slopes, moderately eroded	2.5	1.4%
N518B	Lindstrom silt loam, 2 to 6 percent slopes	25.2	14.1%
N518C	Lindstrom silt loam, 6 to 12 percent slopes	1.7	0.9%
Total for Project Area		178.5	100%

*Note: AOI extends slightly beyond Project Site boundaries

Source: United States Department of Agriculture: Natural Resources Conservation. *Web Soil Survey*. Available at <https://websoilsurvey.nrcs.usda.gov/app/>

Table 11. Subsurface Soil Summary

Strata	Soil Type – ASTM Classification	Range of Penetration Resistance	Commentary and Details
Topsoil/Slope wash	CL, OL	3 to 19* blows per foot (BPF)	- Encountered in all borings at the surface. - Thicknesses at the boring locations varied from about ½ to 7 feet. - Some of the deeper topsoil observed in Borings ST-9, ST-10, ST-11, ST-14, and ST-16 is likely attributed to slope and wash deposits. - Predominantly consisted of lean clay, some organic clay. - Dark brown to black in color. - Moisture condition was generally moist.
Loess	CL, ML, CL-ML, SM	3 to 50 blows over 5 inches of	- Encountered in most borings beneath the topsoil except in Borings ST-8, ST-9, ST-10, ST-15, ST-16, and ST-17 along with

Strata	Soil Type – ASTM Classification	Range of Penetration Resistance	Commentary and Details
		penetration	test pits TP-9 through TP-12, and extended to depths ranging from 7 to 21 feet below existing grade. - Generally underlain by alluvial soils, except in Borings ST-6, ST-7, and ST-12, which were terminated within loess soils. - Predominantly clays and silts with intermixed seams and lenses of each other. - Silts were encountered in a very loose to medium dense condition. - Excluding frost affected soils, clays were encountered in a soft to stiff condition but were typically in a soft to medium condition. - Practical auger and sample refusal was encountered within loess soils in Boring ST-7 at approximately 19.5 feet likely due to underlying bedrock. - Generally light brown to brown in color. - Moisture condition was generally moist.
Alluvial	SP, SP-SM, SM, CL, SC	6 to 50 blows for 4 inches of penetration	- Generally encountered beneath the loess soils in all borings, except in Borings ST-6, ST-7, and ST-12 along with test pits TP-1 through TP-10, and extended to the termination depths of the borings. - Predominantly sandy; sands were generally more prevalent in the southern portion of the site. - Practical auger and sample refusal was encountered within alluvial soil in Boring ST-17 at approximately 19.5 feet. Additionally, limestone fragments were observed in Borings ST-1, ST-3, and ST-11 near termination depths. - Alluvial sands were encountered in a loose to very dense condition but were typically in loose to medium dense condition. - Generally light brown to brown in color. - Variable amounts of gravel. - Moisture condition was generally moist to wet.

* Blow counts likely influenced by frost.

Source: Geotechnical Evaluation Report, Nigon Property, Braun Intertec (Appendix C)

12. 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, shoreland classification and

floodway/floodplain, trout stream/lake, wildlife lakes, migratory waterfowl feeding/resting lake, and outstanding resource value water. Include the presence of aquatic invasive species and the 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.

Within one mile of the Project Site, there are no public water basins, no public wetlands, and one (1) public watercourse. The associated PWI number and name of the public watercourse is provided in Table 12. Cascade Creek is classified as an impaired water due to turbidity which affects aquatic life downstream to the Zumbro River.

Table 12. Public Waters within 1 Mile of Project Site

Public Water Name	Type	AUID	PWI Number(s)	303d Impaired Waters
Cascade Creek	Public Watercourse	07040004-991	55035a	Yes

Source: DNR Public Waters Inventory (PWI) Maps. Available at:
https://www.dnr.state.mn.us/waters/watermgmt_section/pwi/maps.html

The DNR will be undertaking a project to realign the creek to be more meandering through the Project Site to create greater upland storage and improve water quality. Development activities will take place outside of the established floodplain limits at the time of construction. Timing and phasing will be coordinated with the creek realignment project.

As reported in the Wetland Delineation Report (Appendix E), there are approximately 0.40 acres of naturally occurring wetlands on the Project Site and no wetland impacts are anticipated as a result of the Project.

There are no trout streams/lakes, wildlife lakes, migratory waterfowl feeding/resting lakes, or outstanding resource value waters within or adjacent to the Project Site.

- ii. **Groundwater – aquifers, springs, seeps.** Include: 1) depth to groundwater; 2) if project is within a MDH wellhead protection area; 3) identification of any onsite 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.

The Minnesota Natural Resources Atlas¹⁰ identifies the depth to the water table as between 1 to 10 feet for most of the Project Site, and up to 50 feet or more in the northwest corner of the site. Per the Geotechnical Evaluation Report, groundwater was encountered between 6 and 15 feet of depth in 15 of the 25 soil borings, and between 3 and 8 feet of depth in 6 of 12 test pits. The corresponding elevations at which groundwater was conservatively observed were 1009 (TP-2) and 1105.5 (ST-24) above mean sea level (amsl).

The Minnesota Department of Health Well Index¹¹ identifies no existing wells on the Project Site. However, the Phase I Environmental Site Assessment (Appendix F) lists an active water well located near the granary and two unused 6- to 10-foot hand dug wells located west of the machine shed in the pasture area. Wells encountered during future earthwork or redevelopment activities that will no longer be used should be properly sealed.

¹⁰ “Minnesota Natural Resources Atlas,” Water Table – Depth, MN DNR, accessed July 15, 2025, <https://mnatlas.org/gis-tool/>

¹¹ “Minnesota Well Index”, MN Department of Health, accessed July 15, 2025, <https://mnwellindex.web.health.state.mn.us/>

The Project Site is within a wellhead protection area. Wellhead protection areas are the Minnesota Department of Health (MDH)-approved surface and subsurface areas surrounding a public water supply well or well field that supplies a public water system, through which contaminants are likely to move toward and reach the well or well field.

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.

Per the City of Rochester's P2S Comprehensive Plan, wastewater managed by the sanitary sewer system is discharged to the City-owned and operated Water Reclamation Plant.

An existing 15-inch sanitary sewer trunk main west of W Circle Dr serves properties east of the Project Site. The City of Rochester will be extending the trunk main west to serve the Project Site and potentially future urban expansion farther west. The alignment of the trunk main will generally follow the lower topography of Cascade Creek. Upgrades to the City of Rochester's sanitary sewer system or Water Reclamation Plant will be evaluated to confirm capacity.

There are no identified pre-treatment measures included in the Project scope.

Table 13. Estimated Sanitary Sewer Flow Rates

Land Use	Households	Rate (Gallons/Day)*	Total Gallons per Day (gpd)
Single-family detached residential	317	125	39,625

* Source: City of Rochester average sanitary sewer flow rates

- 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. If septic systems are part of the project, describe the availability of septage disposal options within the region to handle the ongoing amounts generated as a result of the project. Consider the effects of current Minnesota climate trends and anticipated changes in rainfall frequency, intensity and amount with this discussion.

Wastewater discharge will not be to a subsurface sewage treatment system (SSTS) or septic system.

- 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, taking into consideration how current Minnesota climate trends and anticipated climate change in the general location of the project may influence the effects.

Wastewater will not be discharged to any surface water due to the Project. No effects are anticipated to surface or groundwater as effluent will be directed to the City-owned and operated Wastewater Reclamation Plant.

- ii. **Stormwater** - Describe changes in surface hydrology resulting from change of land cover. Describe the routes and receiving water bodies for runoff from the project site (major downstream water bodies as well as the immediate receiving waters). Discuss environmental effects from stormwater discharges on receiving waters post construction including how the project will affect runoff volume, discharge rate and change in pollutants. Consider the effects of current Minnesota climate trends and anticipated changes in rainfall frequency, intensity and amount with this discussion. For projects requiring NPDES/SDS Construction Stormwater permit coverage, state the total number of acres that will be disturbed by the project and describe the stormwater pollution prevention plan (SWPPP), including specific best management practices to address soil erosion and sedimentation during and after project construction. Discuss permanent stormwater management plans, including methods of achieving volume reduction to restore or maintain the natural hydrology of the site using green infrastructure practices or other stormwater management practices. Identify any receiving waters that have construction-related water impairments or are classified as special as defined in the Construction Stormwater permit. Describe additional requirements for special and/or impaired waters.

Existing Conditions

The existing condition and use on the Project Site includes agricultural land. Typically, agricultural fields are irrigated and fertilizers containing nitrogen, phosphorous, and potassium are commonly applied. Currently, there is no on-site stormwater management. In storm events where runoff exceeds any infiltration capacity, runoff enters wetland areas, natural depressions, and tributaries. The existing site has a gently sloping topography and generally slopes toward Cascade Creek. The portion of the Project Site north of Cascade Creek drains to two 42-inch corrugated metal pipe (CMP) culverts under 45th Ave SW in low flow rainfall events. In high flow rainfall events, runoff that exceeds the capacity of the two culverts flows overland to Cascade Creek. Runoff from the portion of the Project Site south of Cascade Creek flows to the creek. Cascade Creek ultimately drains to Interlachen Lake, northeast of the Project Site.

Construction and Post-Construction Conditions

The post-construction condition will be required to manage and store stormwater on site which is anticipated to be an improvement over the existing conditions since the existing site is used for agricultural production, and stormwater runoff is not currently managed in a storm event.

The change in land use to a suburban residential development will likely decrease the amount of suspended solids and increase other components typical of urban runoff, such as oil, grease, and chemicals. The creation of open space within the development will provide some mitigation of potential adverse effects from the increased impervious surfaces. However, it is expected that the volume of runoff will increase over existing conditions during significant storm events because of the increase in impervious surface area. Climate trends indicate future rainfall volumes will increase, potentially leading to increased stormwater volumes and discharge rates.

Stormwater will be managed onsite through a system of curb and gutter, catch basins, pipes, and stormwater ponds. Stormwater will be managed in accordance with applicable City,

Olmsted County, MPCA, and DNR requirements. All stormwater that leaves the site must meet rate control and quality standards and must account for the increased impervious surface associated with development. In addition to compensatory stormwater storage for areas filled within the fringe floodplain of Cascade Creek, detention storage will need to be sized for additional volume for a 100-year storm event. As infiltration is not viable due to underlying soil type and proximity of the water table, rate control will be provided by extended detention in ponds to slow the rate of discharge to 5.66 cubic feet per second/acre. Stormwater management areas will be physically separated but hydraulically linked to the Cascade Creek floodplain, with pipes sized for the 10-year storm event. Water that does not naturally infiltrate or directly enter the storm sewer system will generally flow toward the constructed stormwater detention areas on either side of Cascade Creek.

As Cascade Creek is designated as impaired due to turbidity, habitat for small, burrowing species may be impacted if sediment load from runoff increases. Land disturbing activities, including material export, will comply with the policies identified in the City's Comprehensive Surface Water Management Plan and the MPCA through the National Pollutant Discharge Elimination System (NPDES) General Construction Permit. The Project will be required to utilize best management practices (BMPs) to prevent erosion and control sedimentation. All BMPs will be described in the Stormwater Pollution Prevention Plan (SWPPP) prepared for the Project. The grading and erosion control plans for the Project will be reviewed as a part of the City of Rochester's land use, development and building permit processes, including review for consistency with the City's water resource management plan.

Ultimately, Cascade Creek will be realigned through the Project Site, and that creek realignment project could implement strategies such as changing channel geometry to address potential habitat issues.¹²

- 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. Discuss how the proposed water use is resilient in the event of changes in total precipitation, large precipitation events, drought, increased temperatures, variable surface water flows and elevations, and longer growing seasons. Identify any measures to avoid, minimize, or mitigate environmental effects from the water appropriation. Describe contingency plans should the appropriation volume increase beyond infrastructure capacity or water supply for the project diminish in quantity or quality, such as reuse of water, connections with another water source, or emergency connections.

Dewatering

Per the Geotechnical Evaluation Report, most excavations are anticipated to be in clayey/silty soils, therefore sumps and pumps could be used to manage the groundwater conditions where granular soils are encountered. Dewatering may be necessary, especially in granular soils closer to Cascade Creek. Excavation in granular soils below elevation 1030 msl may require well points for dewatering.

Any groundwater encountered during utility installation or other excavation will be discharged

¹² "Comprehensive Watershed Management Plan: 2022-2031," Watershed Alliance for the Greater Zumbro, November 2021, https://www.olmstedcounty.gov/sites/default/files/2021-12/Zumbro_CWMP_Final_11242021.pdf

into temporary sediment basins within the Project Site. If water use exceeds 10,000 gallons per day (GPD) or one million gallons per year, a water appropriation permit must be obtained from the Minnesota DNR. The Proposer must evaluate the expected water usage as part of the land use permit process and is required to obtain the necessary permit from the DNR.

Existing Wells

The Phase I Environmental Site Assessment lists an active water well located near the granary and two unused 6- to 10-foot hand dug wells located west of the machine shed in the pasture area. Wells encountered during future earthwork or redevelopment activities that will no longer be used should be properly sealed, and a Well and Boring Sealing Record should be provided by the contractor to the MDH.

Post-Construction

Rochester Public Utilities (RPU) currently operates 31 municipal water supply wells. Most wells are 24 inches in diameter and extend 400-1,000 feet in depth. The well adjacent to and supplying the Project Site is Well 26 which is 624 feet deep and pumps from the Shakopee and Jordan aquifers, deep sedimentary units that underlie much of southeastern Minnesota. MDH evaluated the vulnerability of the RPU municipal wells to contamination from contaminants released at the surface. RPU Well 26 was classified as “vulnerable”.¹³ To protect groundwater sources, any stormwater features located in areas with less than three feet of separation to the water table are recommended by the Minnesota Stormwater Manual to have a Level 1 liner to prevent groundwater contamination.¹⁴

There is an 8-inch watermain stub at the intersection of Country Club Rd SW & 45th Ave SW, and a 12-inch watermain at the southwest corner of Country Club Rd SW and W Circle Drive. The existing watermain will be extended to serve the Project Site via a network of pipes. There is also watermain to the southeast of the Project Site that may eventually be connected to complete a watermain loop. Upgrades to the RPU’s municipal water system will be evaluated to confirm capacity, pressure, and needs for a booster station.

Table 14. Estimated Water Supply provides an estimate of the anticipated gallons per day for the Project and assumes that the development will accommodate household sizes that are roughly the average for the State of Minnesota.

Table 14. Estimated Water Supply

Use	Proposed Development	Estimated Residents*	Use per Resident (gpd/person)**	Gallons per Day (gpd)
Single-family detached residential	317 units	555	125	69,375

*Assumes 1.75 residents/unit

** Source: City of Rochester water usage rates

¹³ “Rochester Public Utilities Wellhead Protection Plan Amendment, Part 1: Delineation of the WHPA, DWSMA, and Assessments of Well and DWSMA Vulnerability,” RPU, July 2017, https://cms.cws.net/content/rpu.org/files/education-environment/water-quality/RPU%20Part%201%20WHPA%20Amendment_Final_072017.pdf

¹⁴ “Minnesota Stormwater Manual – Shallow Groundwater,” MPCA, February 15, 2023, https://stormwater.pca.state.mn.us/index.php/Shallow_groundwater

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, taking into consideration how current Minnesota climate trends and anticipated climate change in the general location of the project may influence the effects. 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.

Table 15 provides a summary of delineated wetlands on the Project Site.

Table 15. Delineated Wetlands on Project Site

Wetland ID	Wetland Type				Dominant Vegetation	Onsite Area (acres)
	Circular 39	Cowardin	HGM Class	Eggers and Reed		
Wetland 1	Type 2	PEM1Ad	Slope (groundwater seep)	Partially drained (sloping) wet meadow seep	Sedge, woolgrass, bulrush, reed canary grass	0.40
Incidental Wetland A	Type 5	PUBFh	Depression	N/A	Unvegetated	0.18
TOTAL						0.58

Source: Wetland Delineation – TEP Revised Existing Conditions, Kjolhaug Environmental Services Company, Inc.

Any wetland or buffer impact must comply with all wetland replacement or mitigation rules and regulations established by the City, County, and watershed district. A Notice of Determination has not been approved; however, the TEP revised delineation figures which have been submitted for review is included in Appendix E.

- 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, taking into consideration how current Minnesota climate trends and anticipated climate change in the general location of the project may influence the effects. 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.

The DNR is planning a project to realign the existing straight Cascade Creek alignment to meander through the Project Site to create greater upland storage and improve water quality. Development activities will take place outside of the floodplain limits. Cut and fill activities will not be allowed to take place in the floodway, so the proposed roadway connecting the northern and southern

development areas will be required span over the floodway. While no fill will be allowed in the floodway, bridge piers can be constructed in the floodway provided the piers are designed to standards required by the DNR.

Stormwater ponds will be constructed and designed to manage quantity and quality including rate and volume control. To protect groundwater sources, any stormwater features located in areas with less than three feet of separation to the water table are recommended to have a Level 1 liner to prevent groundwater contamination.

The post-construction condition will be required to comply with all stormwater management rules established by the City of Rochester, Olmsted County, MPCA, and the DNR for Cascade Creek, and the condition may be improved from the existing agricultural condition since buffer areas will be reestablished, and surface waters will be managed. Current Minnesota climate trends indicate that the area will experience greater rainfall and precipitation. The construction of wetland buffers, stormwater management areas, and open spaces will help to reduce the quantity and improve the quality of stormwater leaving the site post-construction.

13. Contamination/Hazardous Materials/Wastes

a. Pre-project site conditions

Describe existing contamination or potential environmental hazards on or proximate 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.

A Phase I Environmental Site Assessment (ESA) dated February 21, 2025 was prepared for the Project by Braun Intertec Corporation (Appendix F). Three Recognized Environmental Conditions (RECs) were identified in the assessment:

- One approximately 1,000-gallon diesel fuel above-ground storage tank (AST) was located along the west exterior wall of the north hay shed. Staining was noted primarily along the south side of the tank on the concrete and gravel beneath the tank. A 200-gallon gasoline AST supported on stilts was reportedly formerly located near the southern silo on the Site and has since been relocated to a parcel owned by the Nigon family north of the Site. Based on the observations at time of the Site reconnaissance, it is Braun's opinion that the staining and potential for releases of petroleum from the tanks to the subsurface represents a REC.
- The existing machine shed has been located on the north portion of the Project Site since approximately 1980. According to the property owner, a former machine shed was located directly north of the granary from the 1960s until approximately 2018. Based on the long history of farm equipment used, stored and maintained at the Site in those buildings, there is a potential that releases of hazardous substances or petroleum products may have occurred. This potential represents a REC.
- Reportedly sludge from the septic system connected to the Nigon family farmhouse located northwest of the Site at 4905 Country Club Road West was spread on the cultivated portion of the Site repeatedly whenever the septic tank was pumped out. Low concentrations of polyfluoroalkyl substances (PFAS) compounds, including perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA), are present in many household products; therefore, there

was a potential that PFAS compounds may have been discharged to the septic system and spread onto the fields at the Site. It is Braun's opinion that the potential PFOS and PFOA impacts at the Site from spreading residential septic system biosolids on the Site fields represents a REC.

A subsequent Phase II ESA was prepared by Braun Intertec, dated September 23, 2025 (Appendix G). The purpose of the Phase II ESA was to investigate RECs discovered during the Phase I ESA, and evaluate whether the soil, soil vapor, and/or groundwater beneath the Project Site has been impacted due to the RECs. The Phase II ESA concluded the following:

- Naphthalene detected in sub-slab soil vapor sample SSV-1 (inside the current machine shed building) appears to be related to an isolated area of petroleum impacts and not a significant petroleum release. Additional targeted soil screening beneath the machine shed and/or remediation during redevelopment is warranted to evaluate the potential vapor exposure to the residential receptors in the vicinity of the machine shed.
- Groundwater in the vicinity of the former gasoline AST is contaminated with lead at concentrations exceeding the drinking water criteria. Lead was historically used in gasoline as an anti-knock additive. However, no evidence of a petroleum release was identified in the vicinity of the former AST based on field screening, soil sampling, and groundwater sampling. The source of the lead in groundwater is not clear.
- No evidence of an actionable PFAS release to soil in the cultivated agricultural fields at the Site was identified based on the results of the Phase II ESA. Based on the results of this investigation, it does not appear that the application of residential septic sludge from the north adjoining property has impacted the Site with PFAS.

The Phase II ESA provided the following recommendations:

- The Site should be enrolled in the MPCA Brownfield Program, specifically the Voluntary Investigation and Cleanup (VIC) and Petroleum Brownfield (PB) Programs to obtain applicable approvals and assurances from the MPCA regarding the soil vapor and groundwater impacts and the proposed redevelopment.
- Environmental response actions will be required during redevelopment. Potential response actions might include segregation and disposal of petroleum-contaminated soil during redevelopment (i.e., source removal) with associated reevaluation of vapor conditions after site grading. Note that additional vapor testing in the vicinity of SSV-1 will likely be required to obtain MPCA technical approvals and to determine if vapor mitigation controls are required for the proposed homes in the vicinity. Response actions should be conducted in accordance with an MPCA-approved Response Action Plan/Construction Contingency Plan (RAP/CCP).
- The dissolved lead groundwater impacts identified in the vicinity of the former gasoline AST are likely not actionable. However, if dewatering, irrigation wells, or other improvements are planned that will include accessing or using groundwater in this area, additional evaluation and planning will be warranted to manage the contaminated groundwater.

A review of the MPCA's What's in my Neighborhood (WIMN) database was conducted to identify potentially contaminated sites within or in the vicinity of the Project Area. No MPCA sites were identified within the Project Site boundaries. Within one mile of the Project Site, twenty (20) sites were identified. Table 16 summarizes potential sites within one mile of the Project Site.

Table 16. Potentially Contaminated Sites within One Mile of Project Site

Site ID	Location	MPCA Program	Status
98457	New Horizon Services, Inc.	Hazardous Waste	Inactive (registered 2009)

Site ID	Location	MPCA Program	Status
5923	Manor Woods W 10 th Add.	Construction Stormwater	Inactive (registered 1998)
53306	Erickson Randy	Hazardous Waste	Inactive (registered 2006)
42775	Riess Racing	Hazardous Waste	Inactive (registered 1985)
102107	Fox Ridge Association	Wastewater	Active (registered 2005)
84188	Gary L Krahn Painting	Hazardous Waste	Inactive (registered 2004)
89539	MJ Painting	Hazardous Waste	Inactive (registered 2003)
258141	Brogan Heating and Air	Hazardous Waste, one time generator	Active (registered 2024)
66757	Stephen Nigon Farm	Feedlots	Active (registered 2001)
212509	Cascade Creek Rehabilitation	Construction Stormwater	Inactive (registered 2020)
212733	Meadow Lakes Preserve	Construction Stormwater	Inactive (registered 2020)
46889	Schwicker's of Rochester	Hazardous Waste	Inactive (registered 2010)
47316	Bathmasters of Minnesota	Hazardous Waste	Inactive (registered 1985)
232394	Lilly Farms III – MERC	Construction Stormwater	Inactive (registered 2019)
225868	Lilly Farm Third & 8 th Street	Construction Stormwater	Inactive (registered 2018)
252984	Lilly Farm Fourth	Construction Stormwater	Active (registered 2025)
150129	Lilly Farm	Construction Stormwater	Active (registered 2015)
251133	Pavilion Estates	Construction Stormwater	Inactive (registered 2022)
188094	John Stewart Residence	Petroleum Remediation, Leak Site	Inactive (registered 2011)
190228	Payne Residence	Petroleum Remediation, Leak Site	Inactive (registered 2002)

Source: MPCA What's in My Neighborhood, available at

<https://mpca.maps.arcgis.com/apps/webappviewer/index.html?id=9d45793c75644e05bac197525f633f87>

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 solidwaste including source reduction and recycling.

During construction, the Project will generate solid waste and construction waste material. All waste generated will be properly disposed of off-site. Post-construction, residents and tenants will generate municipal solid waste which will be hauled away by licensed garbage haulers. Residents will be encouraged to recycle. Waste generation estimates are provided in Table 17 and are based on the MPCA's municipal solid waste generation per person.

Table 17. Estimated Waste

Use	Estimated Size	Estimated Residents	Rate (lbs/person/day)	Total (lbs/day)
Residential	317 units/lots	555	2.4	1,332

Source: Environmental Protection Agency (EPA). Advancing Sustainable Materials Management: 2018 Fact Sheet.

Available at: https://www.epa.gov/sites/default/files/2020-11/documents/2018_ff_fact_sheet.pdf

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 new above or below ground tanks to store petroleum or other materials. Indicate the number, location, size and age of existing tanks

on the property that the project will use. 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 and related site work will be required to comply with all City, County, NPDES, and other regulatory permits necessary to complete the work. Storage of hazardous materials on the Project Site during construction will be limited to construction vehicles and machinery. This equipment, in addition to temporary storage tanks for diesel fuel or hydraulic fluids, may be left onsite through the duration of construction depending on phasing and scheduling. Construction vehicles, as well as associated storage of their fuels, will be required to follow a spill prevention plan, if applicable. No hazardous materials will be permitted or stored on the Project Site post-construction.

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

During construction and site work, vehicles containing gasoline will be present onsite. The construction and development process will not involve significant amounts of hazardous waste. Any hazardous waste generated will be properly disposed of in accordance with state and federal laws.

14. 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.

As shown in Table 5. Cover Types Before and After, and Figure 9 sourced from the Minnesota Land Cover Classification System (MLCCS), the existing site's coverage is predominantly classified as agricultural land, which is consistent with the existing land use. The Project Site has been used for agricultural production for the past several decades. Wildlife typically found in agricultural settings include small mammals such as rabbits, squirrels, deer, and birds. Cascade Creek provides habitat for a variety of fish, birds, and insects. An existing stand of trees in the middle western part of the site will largely remain intact after development.

Land north, south and east of the Project Site has been developed, while land to the west remains cultivated agricultural and woods.

b. Describe rare features such as state-listed (endangered, threatened or special concern) species, native plant communities, Minnesota Biological Survey Sites of Biodiversity Significance, and other sensitive ecological resources on or proximate to the site. Provide the license agreement number (LA-__) and/or correspondence number (MCE-__) from which the data were obtained and attach the Natural Heritage Review letter from the DNR. Indicate if any additional habitat or species survey work has been conducted within the site and describe the results.

The Minnesota Biological Survey Sites of Biodiversity Significance, Natural Communities and Rare Species of Olmsted County, Minnesota map was reviewed, and no natural communities or

rare species are identified on or proximate to the Project Site¹⁵.

The DNR's Natural Heritage Information System (NHIS) was queried to determine if known occurrences of rare, endangered, or special concern species or other sensitive ecological habitats exist within the Project Site. Results are attached to this document (see Appendix B) (MCE# 2025-00152). A summary of potential effects to rare features as outlined in the results is as follows:

- All of Minnesota's bats, including the federally endangered northern long-eared bat, can be found throughout Minnesota. However, Minnesota range maps based on the DNR NHIS's biotics database indicates that there is no record of the northern long-eared bat in Olmsted County.¹⁶
- One or more calcareous fens have been documented in the vicinity of the Project.
- No state-listed endangered or threatened species have been documented in the vicinity of the Project.
- Bell's Vireo (*Vireo bellii*, bird) and Black Redhorse (*moxostoma duquesnei*, fish) have both been identified as state-listed species of special concern that have been documented in the vicinity of the Project.
- The Project Site overlaps with a U.S. Fish and Wildlife Service (USFWS) Rusty Patched Bumble Bee high potential zone. However, because the Project Site is actively farmed and pesticides are used, the presence of rusty patched bumble bees is unlikely.

The USFWS Information for Planning and Consultation (IPaC) was similarly queried. The IPaC tool indicates that the rusty patched bumble bee may be affected by the Project.

- c. Discuss how the identified fish, wildlife, plant communities, rare features and ecosystems may be affected by the project including how current Minnesota climate trends and anticipated climate change in the general location of the project may influence the effects. 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.

The fish, wildlife, plant communities, rare features and ecosystems that have potential of being impacted by the Project are identified above. The potential impacts are as follows:

- Tree removal can negatively impact bats by destroying roosting habitat, especially during the pup rearing season when females are forming maternity roosting colonies and pups cannot yet fly.
- Because of the dependence on groundwater hydrology, calcareous fens can be affected by nearby activities or even those several miles away.
- There is no strong evidence that habitat is a limiting factor for the presence of Bell's Vireo bird since apparently suitable habitat is unoccupied.
- Further habitat assessments would be needed in the Zumbro system to identify negative impacts of development on the Black Redhorse fish, and subsequently, appropriate mitigation measures.

¹⁵ "Natural Communities and Rare Species of Olmsted County, Minnesota," Minnesota Biological Survey, 1997, <https://files.dnr.state.mn.us/eco/mcbs/maps/olmsted.pdf>

¹⁶ "Rare Species Guide – Northern Long-eared Bat," DNR, accessed September 30, 2025, <https://www.dnr.state.mn.us/rsg/profile.html?action=elementDetail&selectedElement=AMACC01150>

- The rusty patched bumble bee may be impacted by a variety of land management activities including prescribed fire, tree removal, haying, grazing, herbicide use, pesticide use, land-clearing, soil disturbance, or compaction, or use of non-native bees.

Current Minnesota climate trends indicate that this century will experience warmer winters, a continued increase in the frequency and magnitude of extreme rainfall events, and an increase in the severity and duration of heat waves, all of which may also influence effects on the species identified above.

Construction contractors will be directed to properly manage on-site equipment to ensure development does not spread noxious weeds through construction vehicle traffic. If any invasive species are encountered during the grading/site grubbing process, they will be removed, and proper mitigation will be implemented to remove them from the Project Site.

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

The Minnesota DNR provides specific guidance regarding the avoidance, minimization, or mitigation of impacts to species identified above during construction and site development activities. The Project Proposer shall comply with the following mitigation plan:

- As noted above, the presence of bats on the Project Site is unlikely. To minimize impacts if any bats are discovered during site preparation, the DNR recommends that any tree removal be avoided from June 1 to August 15.
- To minimize stormwater impacts that may affect calcareous fens, the contractor must follow guidance from the SWPPP and NPDES Construction Permit.
- As noted above, there are no known Bell's Vireo sites on the Project Site. However, if discovered during site preparation, grassland and shrub habitats in areas where Bell's Vireo is known to occur should be maintained. Invasive species that may compromise the bird's habitat, including reed canary grass, hybrid/narrow-leaved cattail, purple loosestrife, and buckthorn should be controlled. At known Bell's Vireo sites, provision must be made for maintaining shrub patches in native prairies otherwise managed to control or eliminate woody cover. Shrubby ecotones between forests and open grasslands/wetlands need to be maintained or enhanced.
- As noted above, the presence of rusty patched bumble bees on the Project Site is unlikely due to the present use of pesticides. To minimize impacts should rusty patched bumble bees be encountered during site preparation, the DNR recommends reseeding disturbed soils with native species of grasses and forbs using BWSR seed mixes or MnDOT seed mixes which should be included in stormwater management plans and considered for other open space areas. Avoiding pesticides and planting native flowering plants to provide food for bees is also recommended.

As identified in the project description, the Project includes open space and stormwater treatment areas to minimize the effects of the redevelopment on native species.

The Project's Concept Plan (Figure 3) protects the existing wetlands and surrounding buffer areas. This will provide long-term protection of any sensitive ecological resources that may exist proximate to the existing wetlands. In addition, stands of existing trees will remain, areas of open space and stormwater treatment will provide space for wildlife habitat, and slopes will be revegetated with native species.

15. Historic properties

Describe any historic structures, archeological sites, and/or traditional cultural properties on or proximate 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.

The Minnesota Statewide Historic Inventory Portal¹⁷ was queried, and there are no identified historic or architectural properties documented within the Project Site. SHPO was contacted for a project review and a letter was provided (see Appendix B). Based on the History Center of Olmsted County, there are no known historical sites within the Project Site. The City of Rochester does not know of any structures of significance on the Project Site. The project to realign Cascade Creek will be a separate project and will likely require review for potential archaeological impacts associated with excavation.

Within one mile of the Project Site, there are sixteen historic properties, listed in Table 19. The Project will not directly impact any of the properties listed in Table 18.

The Office of the State Archaeologist's (OSA) public viewer¹⁸ was queried and, no archaeological sites are known to exist within the Project Site. Near the Project Site to the east of the former Meadow Lakes Golf Club, there is potentially one archaeological site.

Table 18. Historic Properties within 1 mile of Project Site

Historic Inventory #	Property Type	Address	National Register Listed or Eligible
OL-CAS-00037	House	331 Lowry Court NW	Unevaluated
OL-CAS-00036	House	311 Lowry Court NW	No
OL-CAS-00033	House	5930 Lowry Dr NW	Unevaluated
OL-CAS-00028	Farmstead	60 th Ave SW, ¼ mile S of TH 14	No
OL-CAS-00003	St. Mary's Hospital Dairy Farmstead	Off CR 104	Listed
OL-CAS-00041	House	5145 St. Mary Drive NW	No
OL-CAS-00039	House	5100 St. Mary Drive NW	No
OL-KAL-00024	Farmstead	6203 Country Club Rd	No
OL-CAS-00038	House	5244 St. Mary Drive NW	No
OL-CAS-00040	House	5320 St. Mary Drive NW	No
OL-ROT-00025	House	5971 Partridge Drive SW	No
OL-ROT-00027	House	5963 Partridge Drive SW	No
OL-ROT-00026	House	5944 Partridge Drive SW	No
OL-ROT-00029	House	5816 Country Club Rd SW	No
OL-SLM-00009	Farmstead	143 60 th Ave NW	No
OL-ROT-00028	House	5980 Partridge Drive SW	No

Source: Minnesota Statewide Historic Inventory, SHPO, <https://mnship.gisdata.mn.gov/public-map>

¹⁷ "Minnesota Statewide Historic Inventory," MN SHPO, accessed July 15, 2025, <https://mnship.gisdata.mn.gov/public-map>

¹⁸ "Office of the State Archaeologist Portal – Public Map," Minnesota Department of Administration, State Archaeologist, accessed July 15, 2025, <https://osaportal.gisdata.mn.gov/public-map>

16. 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 transition of the Project Site from agricultural uses to a residential development will impact the visual appearance of the site. The Project is consistent with the City of Rochester's Comprehensive Plan that guides the Project Site as an Urban Reserve Area, planned for increased intensity and urbanization. While the development will change the views of the site, it is planned for and anticipated as part of the City's vision for the future. There are no known scenic views or vistas on or near the Project Site.

During the construction process, appropriate screening of truck entrances, garbage enclosures, and other development features that may adversely impact adjacent residential areas will be required. Post construction, any proposed exterior/site lighting associated with the Project will be required to be downcast and must meet footcandle requirements at the property lines.

17. 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. 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 Project will not generate stationary source emissions exceeding the mandatory EAW thresholds specified in Minnesota Rules Part 4410.4300, Subp. 15, nor will it require an air permit from the Minnesota Pollution Control Agency (MPCA). Per Item 18, greenhouse gas (GHG) emissions from this Project are not expected to have significant environmental effects. The Project's air emissions will be typical of those of residential developments, potentially including sources like natural gas and oil-powered appliances and equipment, fertilizer use, and heating and cooling systems. These emissions generally fall under Conditionally Insignificant Activities and Conditionally Exempt Stationary Sources according to Minnesota Rules Part 7007.1300.

- 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 develop the site for residential uses. Motor vehicle emissions will be generated from vehicles traveling to and from the development site, and from construction equipment to perform the construction activities. Following full project site development, vehicle related emissions including carbon monoxide levels are anticipated to rise slightly due to the increase in the number of trips to and from the site. During construction and post-construction, trucks and equipment are not permitted to idle while not in use or if parked on site.

- 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 17a). 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 anticipated to produce significant dust or odors during construction, material export, or operation. Any minor odors generated during construction will be typical of those associated with residential development, such as exhaust from diesel or gasoline-powered equipment.

Grading, construction, and material export activities will temporarily generate dust. To mitigate this, BMPs such as dust control by using watering trucks or other methods as agreed to with the City to protect the adjacent neighborhoods will be implemented. The nearby existing residential neighborhoods will be the nearest receptors of dust and odors, which should be monitored throughout the construction process by the Proposer. Odors generated during construction will be mitigated by proper maintenance of the equipment according to the manufacturer's specifications.

18. Greenhouse Gas (GHG) Emissions/Carbon Footprint

- a. **GHG Quantification:** For all proposed projects, provide quantification and discussion of project GHG emissions. Include additional rows in the tables as necessary to provide project-specific emission sources. Describe the methods used to quantify emissions. If calculation methods are not readily available to quantify GHG emissions for a source, describe the process used to come to that conclusion and any GHG emission sources not included in the total calculation.

The projected greenhouse gas (GHG) emissions are provided on an average annual basis using the CO₂ equivalent (CO₂e) and include a best estimate of average annual emissions over the life of the proposed Project. Emissions were estimated using the US Environmental Protection Agency's Simplified GHG Emissions Calculator (SGEC)¹⁹, the EIE's Energy Consumption Survey Dashboards²⁰, the EPS's Advancing Sustainable Materials Fact Sheet²¹, and the Minnesota Pollution Control Agency's (MPCA) annually published Select Committee on Recycling and the Environment (SCORE) report²². Estimates are summarized in Tables 19 and 20 by project phase and source type. Direct emissions refer to those under the ownership or control of the reporting company, classified as Scope 1. Indirect emissions stem from sources controlled by other entities but are influenced by the reporting company, like off-site electricity generation. These are classified as Scope 2 or Scope 3.

¹⁹ "Simplified GHG Emissions Calculator," United States Environmental Protection Agency, <https://www.epa.gov/climateleadership/simplified-ghg-emissions-calculator>

²⁰ "Residential Energy Consumption Survey (RECS) Dashboard – Site electricity consumption per household," US Energy Information Administration, [https://experience.arcgis.com/experience/cbf6875974554a74823232f84f563253?src=%E2%80%B9%20Consumption%20%20%20%20%20Residential%20Energy%20Consumption%20Survey%20\(RECS\)-b1](https://experience.arcgis.com/experience/cbf6875974554a74823232f84f563253?src=%E2%80%B9%20Consumption%20%20%20%20%20Residential%20Energy%20Consumption%20Survey%20(RECS)-b1)

²¹ "Advancing Sustainable Materials Management: 2018 Fact Sheet," Environmental Protection Agency (EPA), https://www.epa.gov/sites/default/files/2021-01/documents/2018_ff_fact_sheet_dec_2020_fnl_508.pdf

²² "2022 SCORE Report," Minnesota Pollution Control Agency, <https://public.tableau.com/app/profile/mpca.data.services/viz/2022SCOREReport/2022SCOREReport>

Table 19. Construction Emissions

Category	Scope	Type of Emission	Emission Sub-type	Emission	Project-related CO ₂ eEmissions (tons/year)
Direct	1	Combustion - Diesel	Mobile Construction Equipment	N ₂ O, CH ₄	2,869
Direct	1	Combustion - Diesel	Passenger Cars	N ₂ O, CH ₄	13,402
TOTAL					16,271

Table 20. Operational Emissions

Category	Scope	Type of Emission	Emission Sub-type	Emission	Project-related CO ₂ eEmissions (tons/year)
Indirect	2	Off-Site Electricity Production	Grid-Based	CO ₂ , N ₂ O, CH ₄	1,371.1
Indirect	3	Off-Site Waste Management	Area	CO ₂ , CH ₄	200
TOTAL					1,571.1

The emissions in Tables 19 and 20 are reported in CO₂ short tons (English units), per EQB guidance. Worksheets for each source using the SGEC are provided in Appendix H. Scope 1 emissions calculations reflect an estimate of emissions generated over one year of Phases I and II. Approximately 10 pieces of mobile diesel equipment will be on-site and operate at 144 gallons each per day. Scope 1 emissions also assume that there will be approximately 10 workers who commute an average of 20 miles to the site. Scope 2 and 3 emission calculations assume that the Project Site will feature approximately 317 residential units that utilize off-site electricity production and waste management at levels that are comparable to other residential developments within the State of Minnesota. The Project will utilize energy within the MROW (West) eGRID subregion, which generates energy with 35% coal, 38% wind, 8% nuclear, 13% gas, 4% hydro, and about 1% solar sources.

b. GHG Assessment

i. Describe any mitigation considered to reduce the project's GHG emissions.

The following are potential design strategies and sustainability measures that are under consideration for the proposed development to reduce emissions:

- Use energy efficient appliances, equipment, and lighting
- Energy efficient and electricity-reliant HVAC systems
- Energy efficient and low embodied carbon (LEC) building materials
- Implement waste best management practices (BPMs) and to recycle and compost appropriate material when applicable
- On-site landscaping will absorb water
- Additional native landscaping will be planted to improve local air quality, absorb greenhouse gas emissions, and reduce local urban heat island effect
- Buildings will be constructed with rooftop-ready infrastructure for solar power generation
- Provide electric vehicle ready charging infrastructure

Implementation of the above strategies will be evaluated on a case-by-case basis based on code requirements, feasibility, availability of materials, schedule, and tenant considerations.

- ii. Describe and quantify reductions from selected mitigation, if proposed to reduce the project's GHG emissions. Explain why the selected mitigation was preferred.

The potential mitigation listed in Item 18.b.i. was selected to comply with best management practices for new construction and reduce GHG emissions where practicable during operations.

- iii. Quantify the proposed projects predicted net lifetime GHG emissions (total tons/# of years) and how those predicted emissions may affect achievement of the Minnesota Next Generation Energy Act goals and/or other more stringent state or local GHG reduction goals.

The project does not have an estimated lifetime. It is estimated that the project will emit a total of 104,526 CO₂e metric tons over the next 50 years. The proposer will evaluate implementing the sustainability measures listed in Item 18.b.i. to reduce operational emissions to the extent practicable. The proposed project will be built in compliance with state regulations and city building codes.

Construction Emissions * Years of Construction + Operational Emissions * 50 Years =

Estimated Cumulative 50 Year Emissions

$$16,270 * 1.5 + 1,571 * 50 = 104,526$$

19. 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.

The Project will be developed in phases with the portion of the site north of Cascade Creek being developed first. Both phases of development will commence with mass site grading. A temporary increase in noise level will occur during this phase and the noise level intensity will vary based on the type of construction equipment used. Typical noise levels associated with different types of equipment are provided in Table 21. To minimize the potential effects of noise pollution, construction volumes and work hours will be limited to those established by the City of Rochester's ordinances, which will be identified during the land use permitting process. Construction hours will be limited to daytime hours, with additional restrictions to comply with all local and state rules and ordinances. During construction of the Project, there will be additional noise generated beyond existing conditions.

Post-construction, the site will likely generate an increase in noise over existing conditions and will be roughly equivalent to the levels generated by the residential developments to the west, east, and south of the Project Site. However, the site is guided for urban development, so this increase is anticipated. The Minnesota Pollution Control Agency (MPCA) enforces noise standards (Minnesota Rules Chapter 7030). Table 22 is a summary of the statutory noise limit standards for residential (NAC1) areas.

Table 21. Statutory Noise Limit Standards

Use	Daytime (7 am – 10 pm)		Nighttime (10 pm – 7 am)	
	L ₁₀ *	L ₅₀ **	L ₁₀	L ₅₀
Residential (NAC1)	65 dBA	60 dBA	55 dBA	50 dBA

Source: Minnesota Pollution Control Agency (2015). A Guide to Noise Control in Minnesota.

<https://www.pca.state.mn.us/sites/default/files/p-gen6-01.pdf>

*L₁₀ calculation is the noise level that is exceeded for 10% of an hour.

**L₅₀ calculation is the noise level exceeded for 50% of an hour.

The Project is required to operate in compliance with Minnesota Noise Standards. If noise impacts are determined to be above the state standards, potential contributions will be assessed to pinpoint primary sources and determine optimal methods for noise reduction.

20. 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.

The Project Site is located south of CSAH 34/Country Club Rd SW, west of 45th Ave SW, north of 8th St SW, and east of CSAH 44/60th Ave SW. The existing land use is agricultural.

The proposed development consists of 317 single-family dwelling units for senior adults, each with off-street parking. An additional approximately 60 parking stalls will be provided near the Amenity Center for resident and guest parking.

A Traffic Impact Study was completed for the Proposed Project by Alliant Engineering, dated August 8, 2025, and the full memo is provided in Appendix I. Table 22: Trip Generation Summary provides the estimated total average daily traffic generated by the Project. The analysis was completed using the Institute of Transportation Engineers (ITE) Trip Generation Manual, 11th Edition. The applicable land use was determined to be 251: Senior Adult Housing – Single-Family.

Table 22: Trip Generation Summary

ITE Code	Land Use	Dwelling Units	Daily Trips	Trips Generated	
				AM Peak	PM Peak
251	Single-Family Senior Adult Housing	317	1,366	76	95

The estimates above do not include internal capture or bypass trip reductions. The maximum peak hour traffic for the development is 95 trips, which would occur during a single hour between 4:00 and 6:00 p.m.

Local bus route 408 passes through the neighborhood north of Country Club Road to the west of W Circle Drive, passing through the intersection of W Circle Drive & Country Club Road. As the area continues to develop there may be opportunities to expand bus routes, but none are planned for near the development at this time.

Existing sidewalks are present along both sides of 45th Avenue SW north of

Country Club Road, but not to the south along the development boundary. Sidewalk is also present along both sides of 8th Street SW, but only one-third of a mile east of the 45th Avenue SW & 8th Street SW intersection. There will be sidewalks on both sides of streets within the development.

- 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

Based on the traffic operations analysis of existing year 2025, forecast year 2027, and forecast year 2037, all study intersections operate adequately under existing AM and PM peak hours. The signalized intersection of W Circle Drive NW & Country Club Road SW operates at overall intersection level of service (LOS) C or better. All other intersections operate acceptably with overall intersection LOS A and minimal side-street delay (LOS A) except for W Circle Drive NW & Berkshire Road SW / Fairway Ridge Lane SW which operates with a side-street delay of LOS C.

Overall, the proposed development is expected to have a minimal impact on the existing transportation system. All unsignalized intersections, including the proposed access locations, are expected to continue operating at LOS A with minimal side-street delay after construction of the Project. The signalized intersection of W Circle Drive NW & Country Club Road SW is expected to continue operating at overall intersection LOS C or better.

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

Given that the existing transportation network is expected to operate acceptably with the new development trips, no mitigation is needed to address or minimize project related transportation effects. The following are offered for consideration:

Country Club Road SW & 45th Avenue SW

- A westbound left-turn lane is not present at the Country Club Road SW & 45th Avenue SW intersection, and based on the traffic operations analysis is not needed for the intersection to operate at overall LOS A. However, the increased number of westbound left-turns may warrant consideration of a dedicated left-turn lane to maintain safe operations.

45th Avenue SW & 8th Street SW

- Eastbound and westbound 8th Street SW approaches are currently controlled by a stop sign (through/stop traffic control). Despite increased volumes, the northbound and southbound crossing movements remain higher, and 8th Street SW should remain stop controlled.

21. 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.

Any environmental impacts must comply with all Federal, State, and local rules and regulations and appropriate permits must be obtained. Required mitigation measures and permit conditions must be followed. Potential impacts outside the permitting process have been properly evaluated as part of this EAW. Therefore, there are no cumulative impacts from the Proposed Project anticipated provided proper mitigation is followed.

- 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 Project Site is surrounded by a mix of agricultural and residential uses, which are guided as Urban Reserve for expected growth beyond 2050. There are no other known immediate development plans, but future development in the area is likely.

- 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.

Development of the Proposed Project is not anticipated to cause adjacent development activities. The surrounding area is planned for near term urban expansion and continued large lot development uses. Urban expansion may trigger the need for additional environmental review processes in the future. Given the information contained within this EAW analysis, there are no known impacts that are not addressed through recommended mitigation within this review.

22. 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 additional environmental effects have been identified.

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

11/3/25

Title

PLANNER

A faint, light gray topographic map with contour lines is visible in the background of the top half of the page.

APPENDICES

Appendix A: Figures

Appendix B: Agency Correspondence

Appendix C: Geotechnical Evaluation Report

Appendix D: Desktop and Field Verification Decorah Edge Study

Appendix E: Wetland Delineation Report

Appendix F: Phase I Environmental Site Assessment

Appendix G: Phase II Environmental Site Assessment

Appendix H: Greenhouse Gas (GHG) Calculator Analysis

Appendix I: Traffic Impact Study

APPENDIX A

Figures

Figure 1. Project Location

Figure 2. USGS Topo Map

Figure 3. Concept Plan

Figure 4. Average Annual Temperature

Figure 5. Projected Average Annual Temperature

Figure 6. Average Annual Precipitation

Figure 7. Projected Average Annual Precipitation

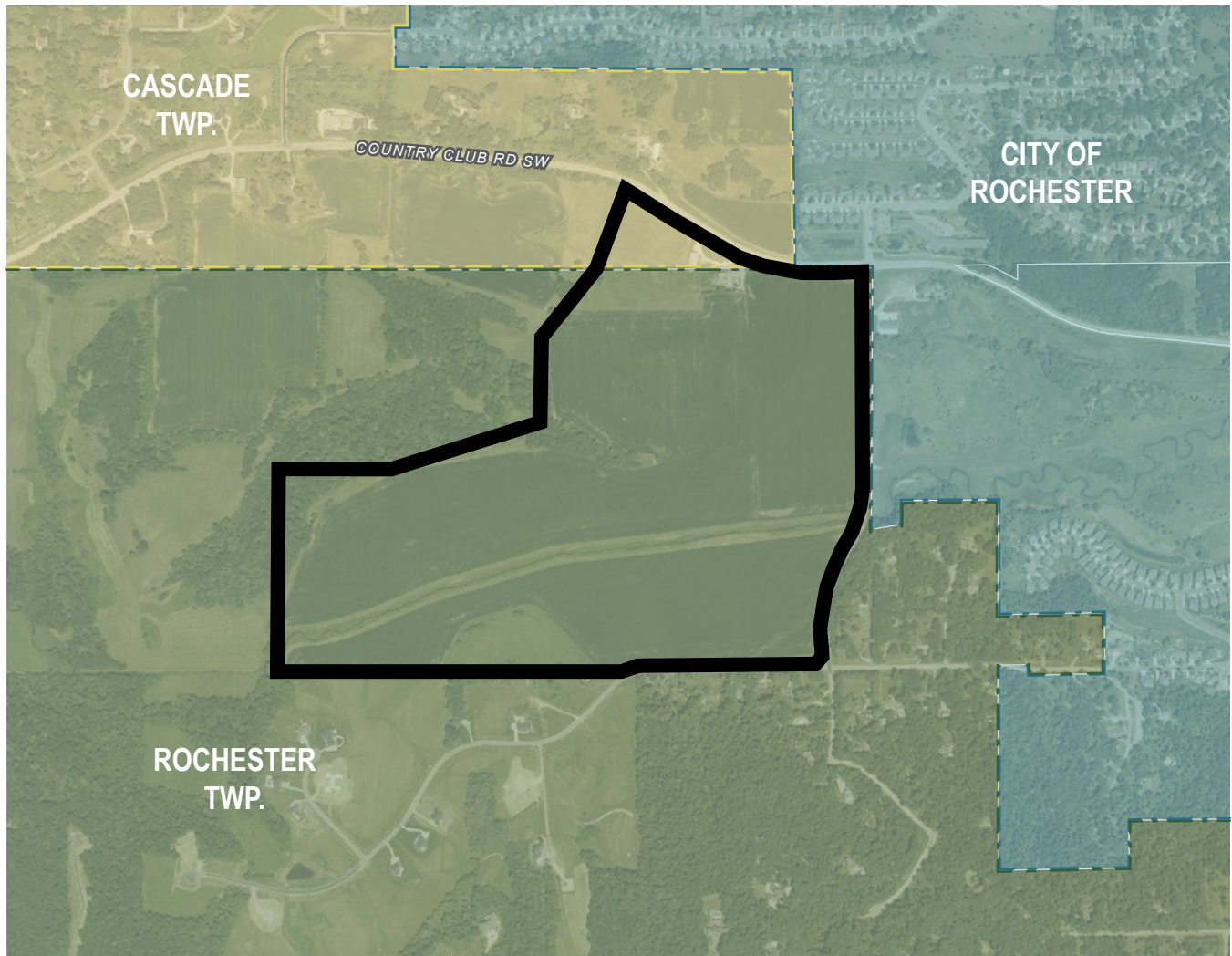
Figure 8. Land Use Designation

Figure 9. Urban Area Growth Map

Figure 10. NRCS Soil Classifications

Figure 11. MLCCS

FIGURE 1. PROJECT LOCATION



0 250 500 1,000 Feet

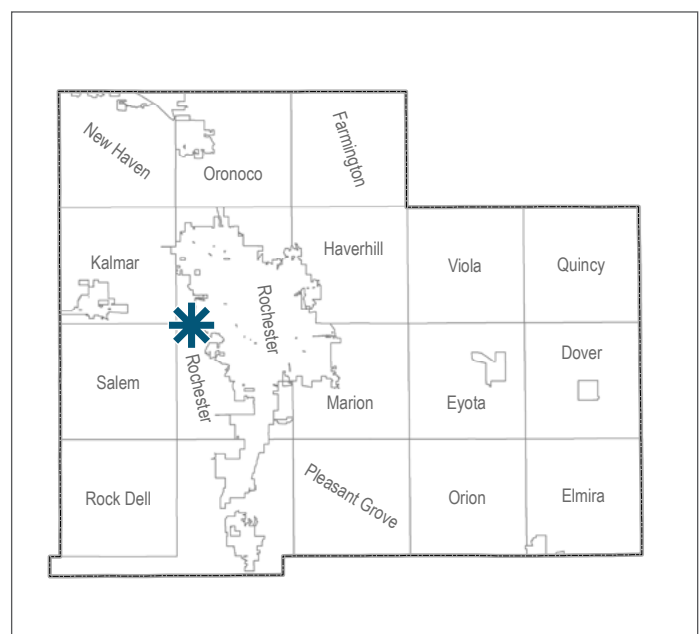
COUNTY: OLMSTED

TOWNSHIPS:

- » CASCADE TWP
- » ROCHESTER TWP
(TO BE ANNEXED TO CITY OF ROCHESTER)

PIDs:

- » 640522041608
- » 640611084153 (PARTIAL)
- » 743233081149 (PARTIAL)



Sources: USGS National Map, Olmstead County GIS

NIGON DEVELOPMENT EAW
ROCHESTER, MN



FIGURE 3. CONCEPT PLAN

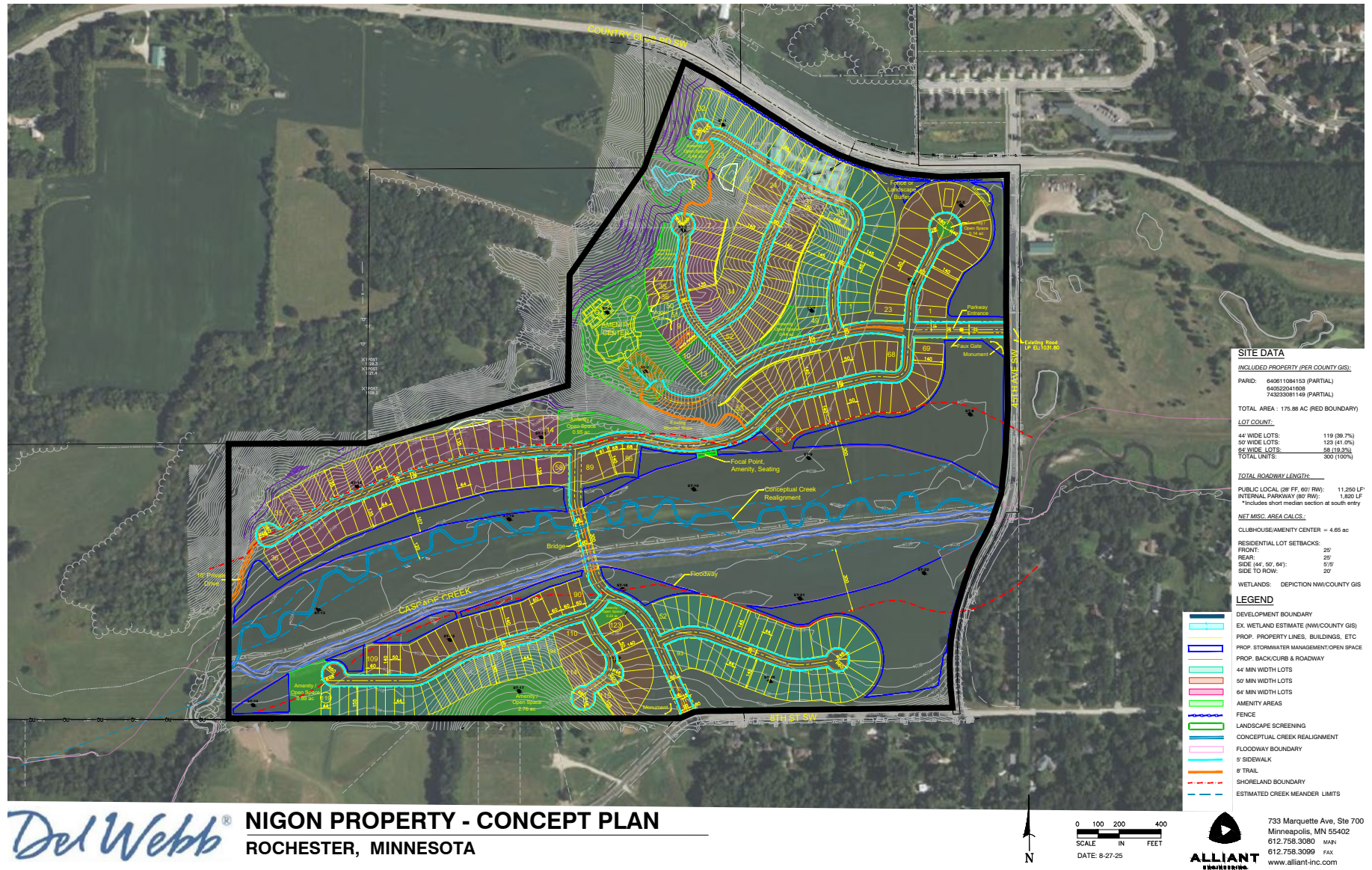


FIGURE 4. AVERAGE ANNUAL TEMPERATURE

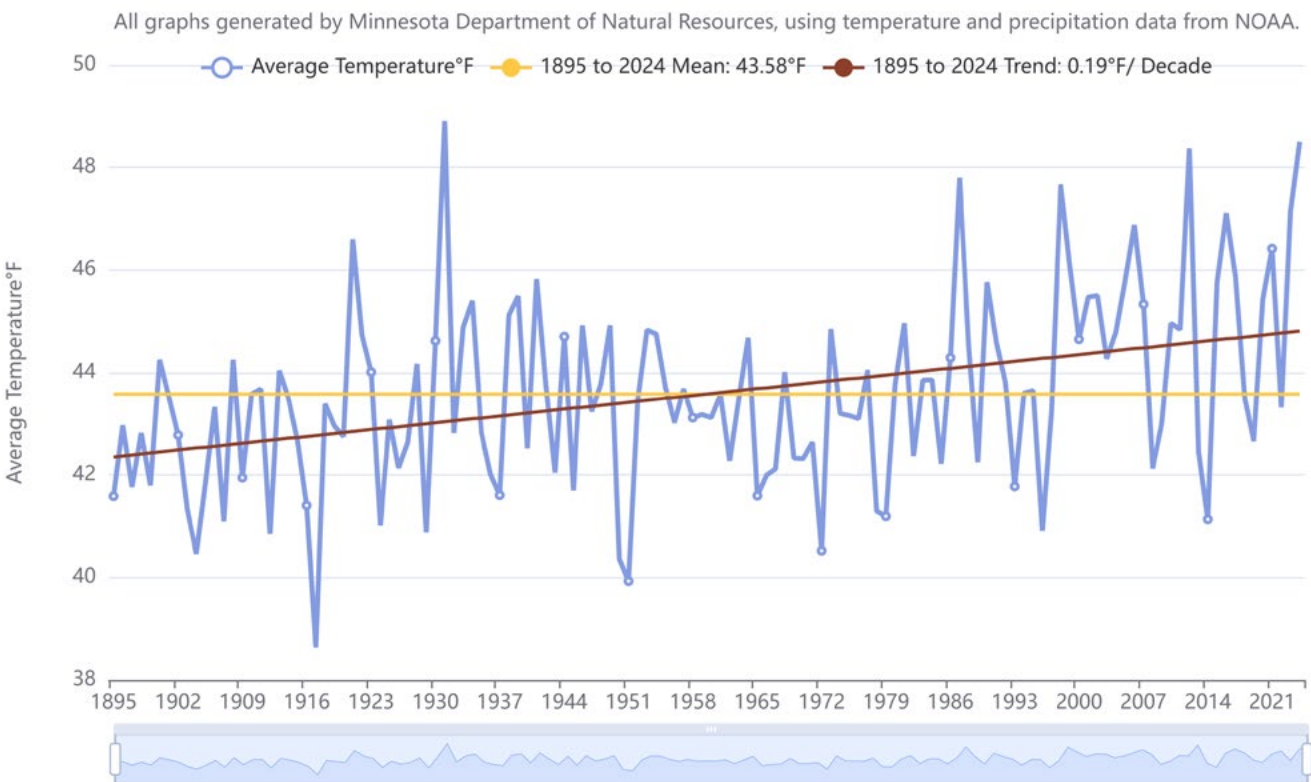
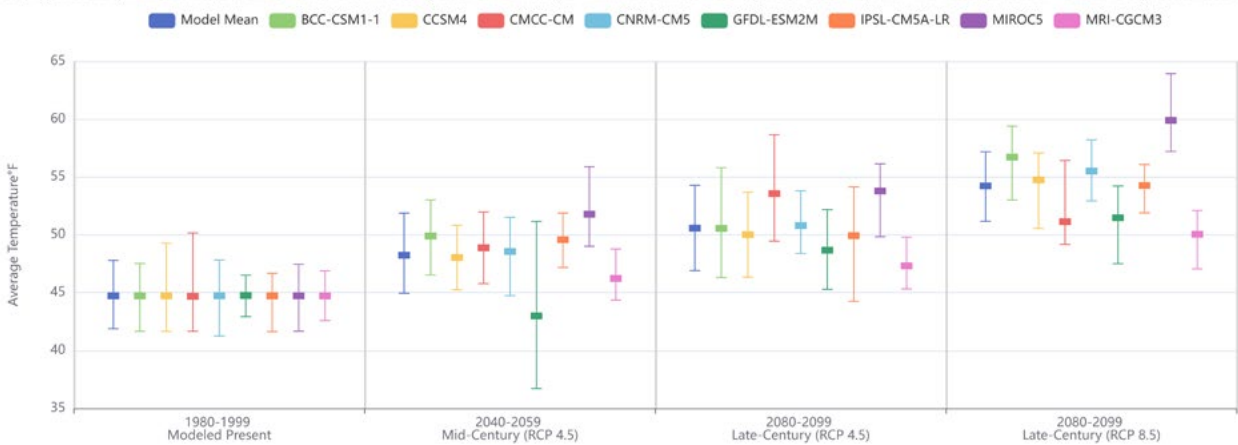


FIGURE 5. PROJECTED AVERAGE ANNUAL TEMPERATURE

Graph generated by Minnesota Department of Natural Resources using data from University of Minnesota climate modeling. These values may differ from those published in national and global climate assessments.



Source: MNDNR Minnesota Climate Explorer Tool, available at <https://arcgis.dnr.state.mn.us/climateexplorer/>

FIGURE 6. AVERAGE ANNUAL PRECIPITATION

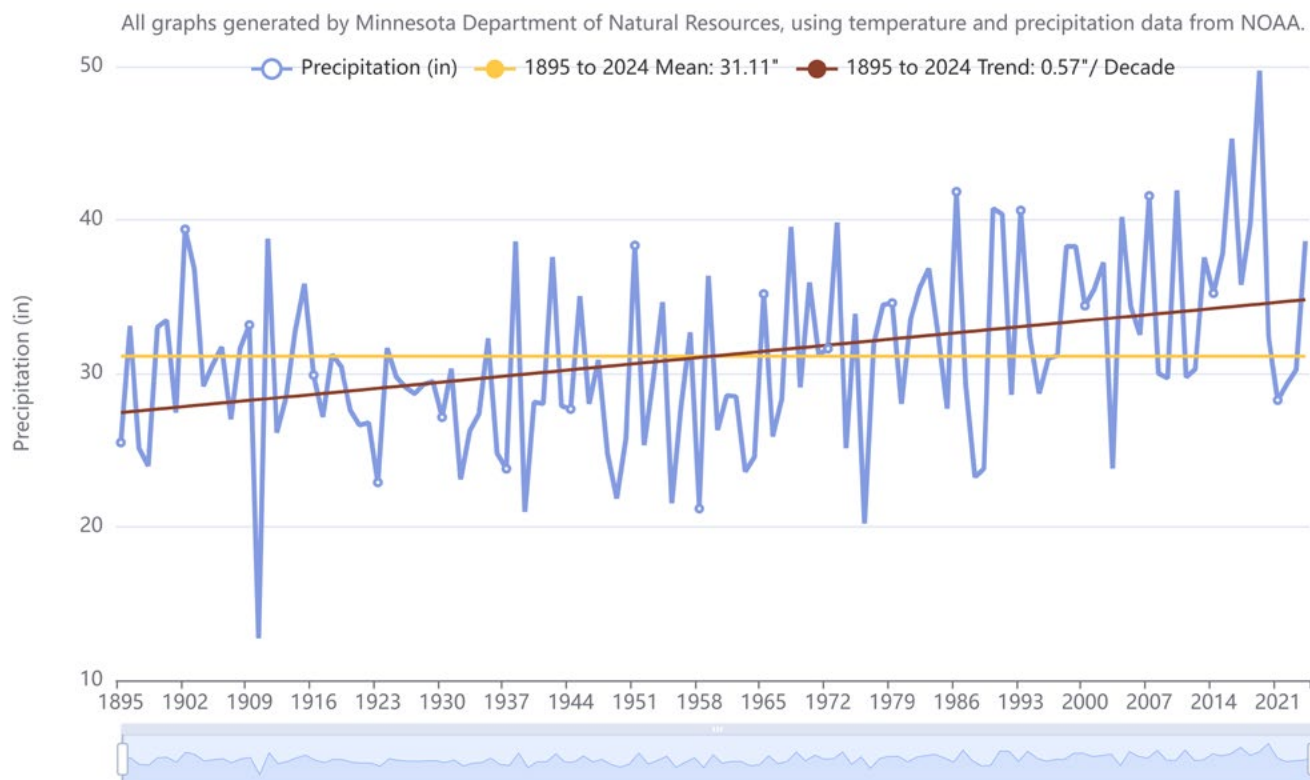
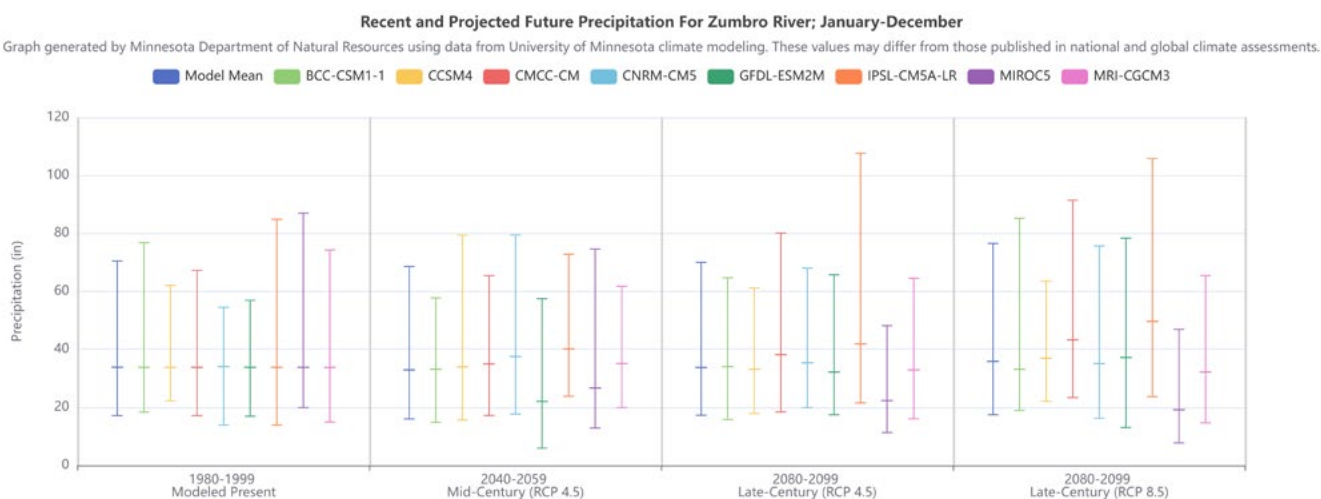
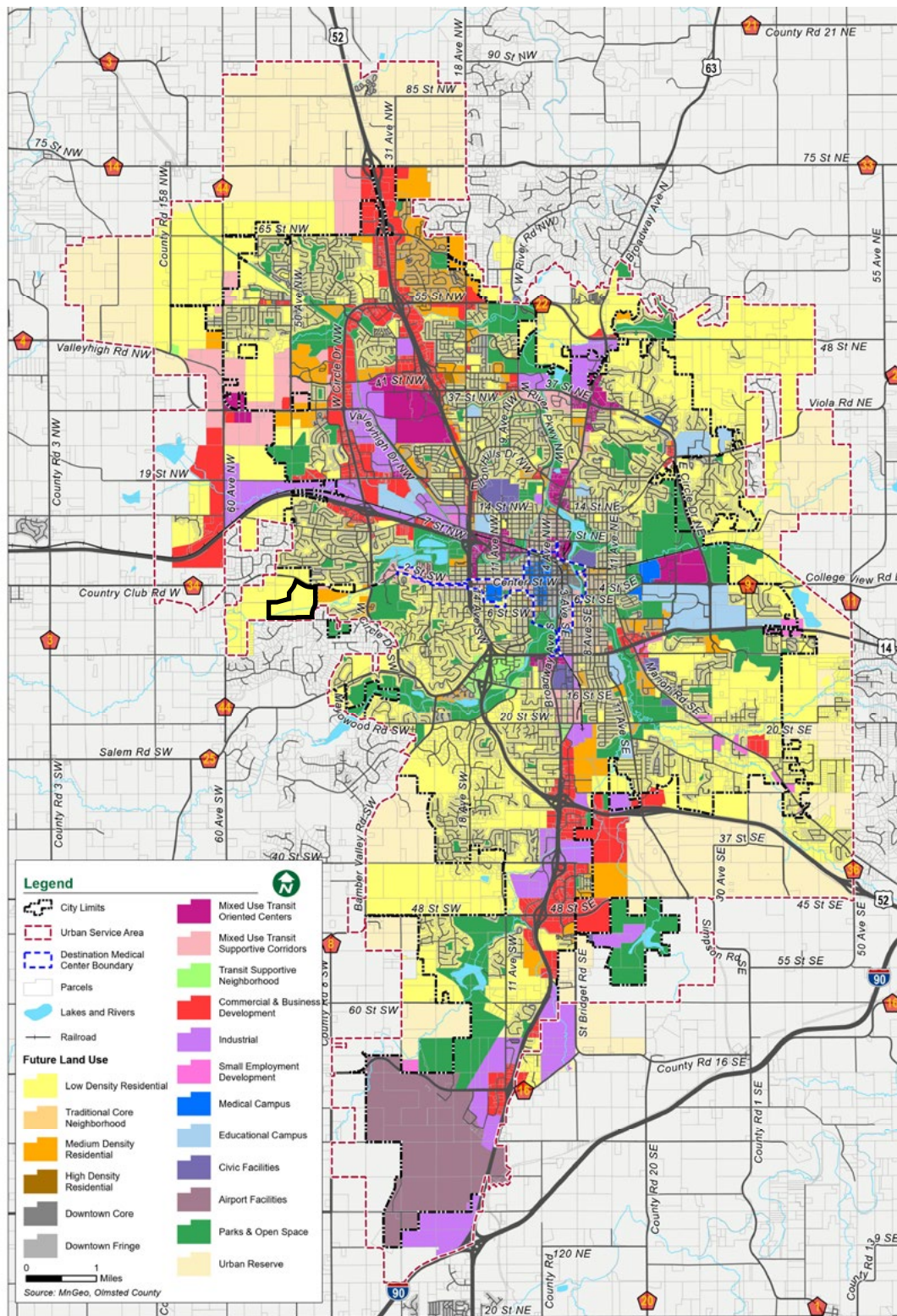


FIGURE 7. PROJECTED AVERAGE ANNUAL PRECIPITATION



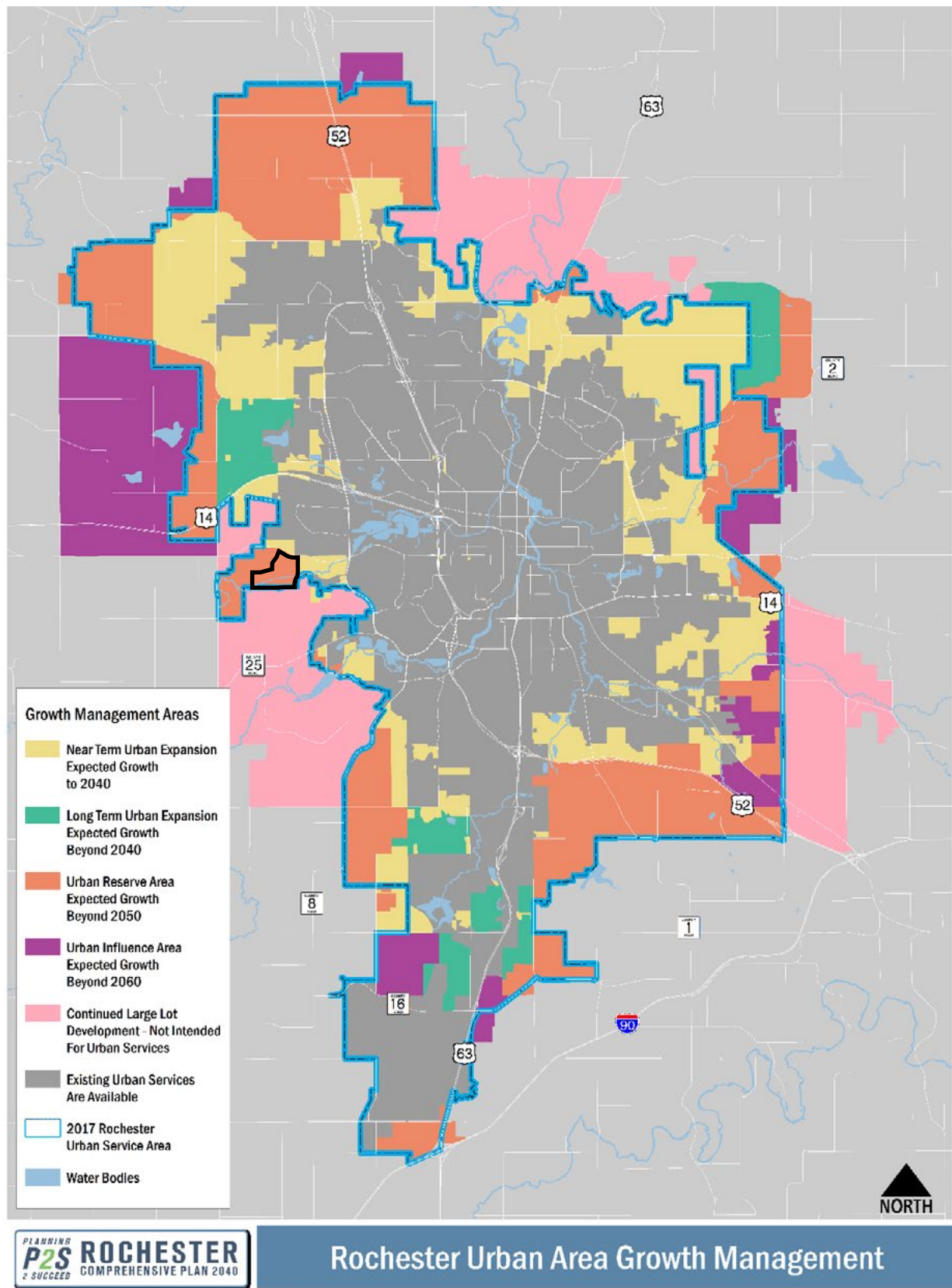
Source: MNDNR Minnesota Climate Explorer Tool, available at <https://arcgis.dnr.state.mn.us/climateexplorer/>

FIGURE 8. LAND USE DESIGNINATION



Source: City of Rochester Comprehensive Plan

FIGURE 9. URBAN AREA GROWTH MAP



Source: Rochester Comprehensive Plan 2040

FIGURE 10. NRCS SOIL CLASSIFICATIONS

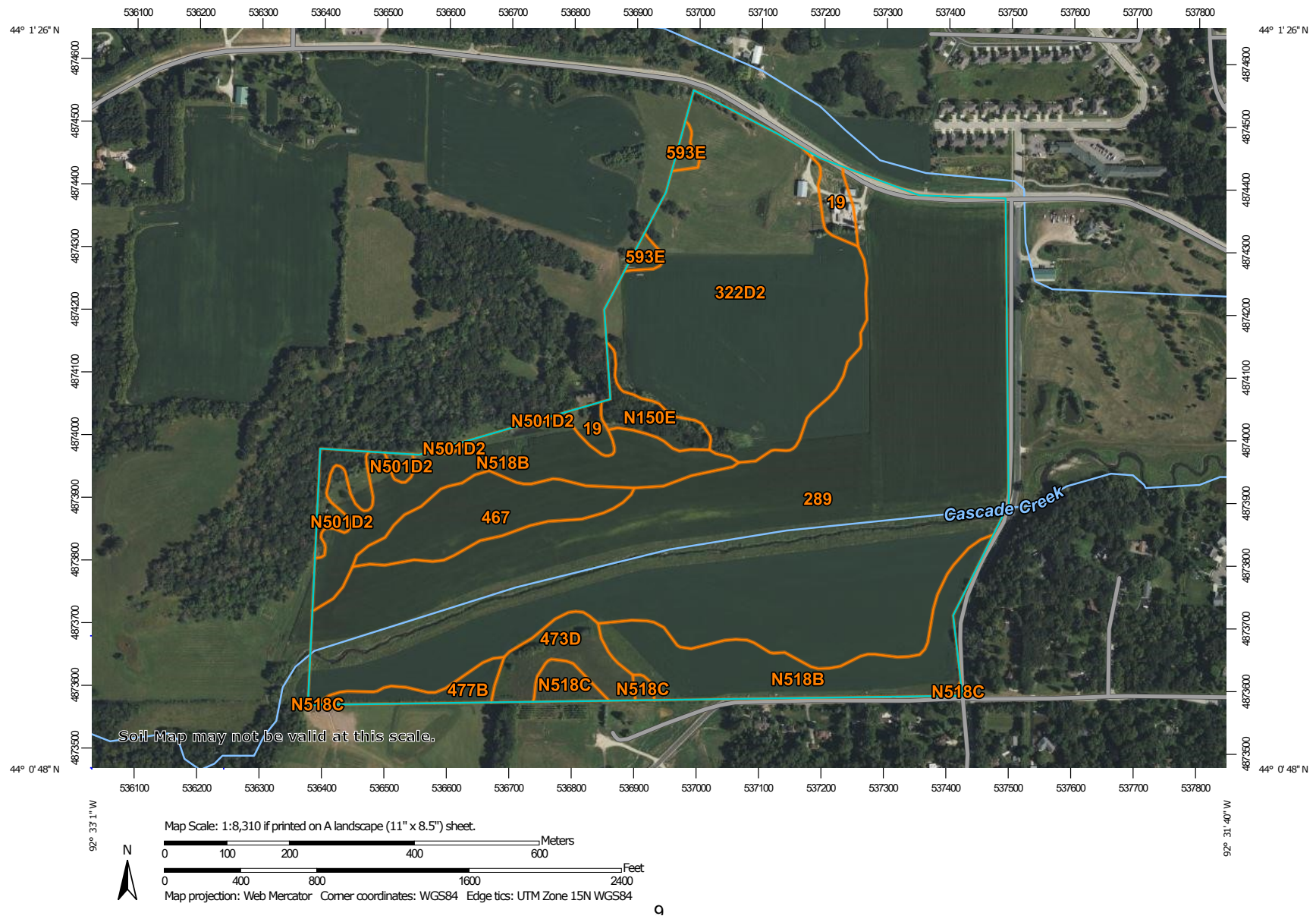


FIGURE 10. NRCS SOIL CLASSIFICATIONS (CONT.)

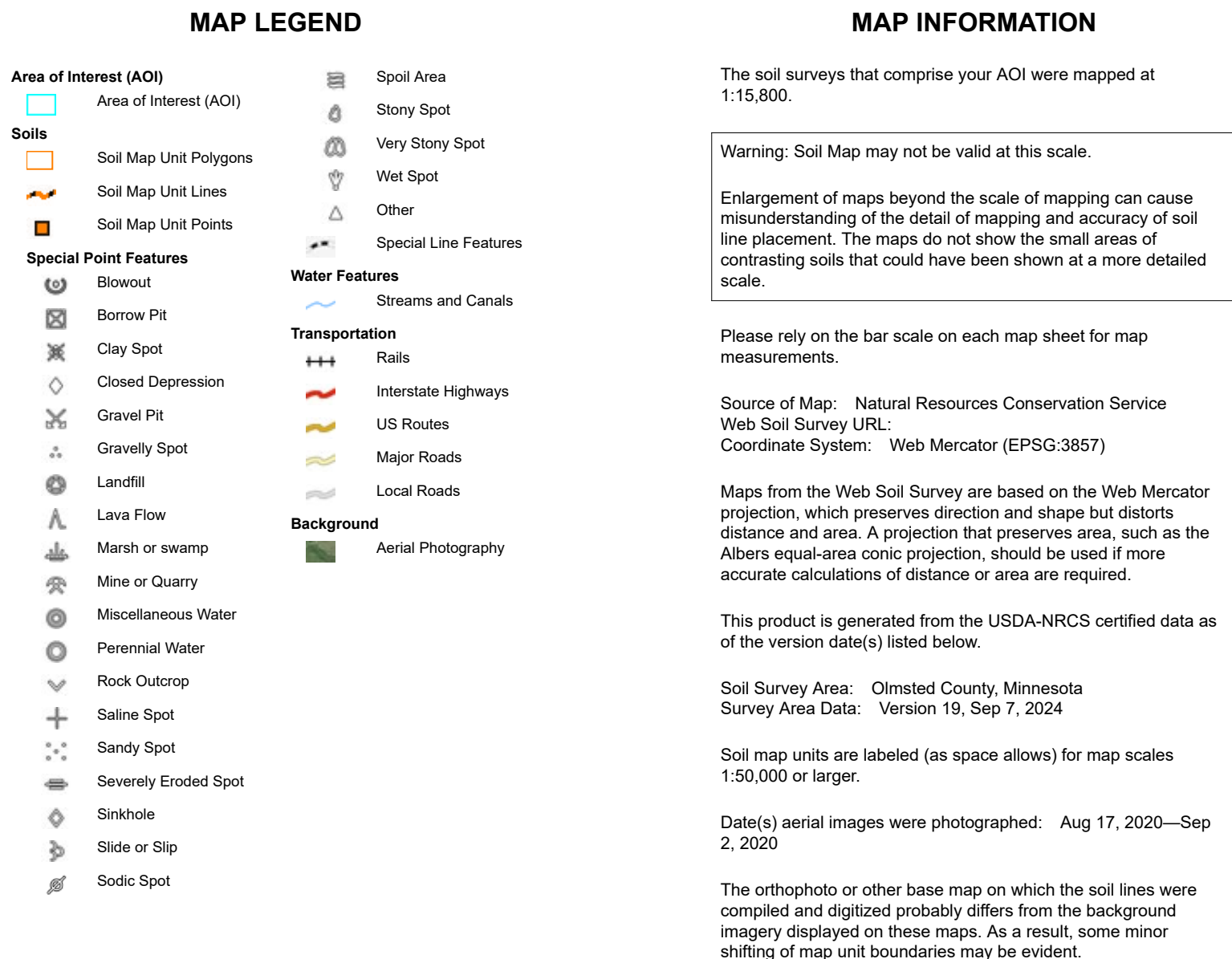
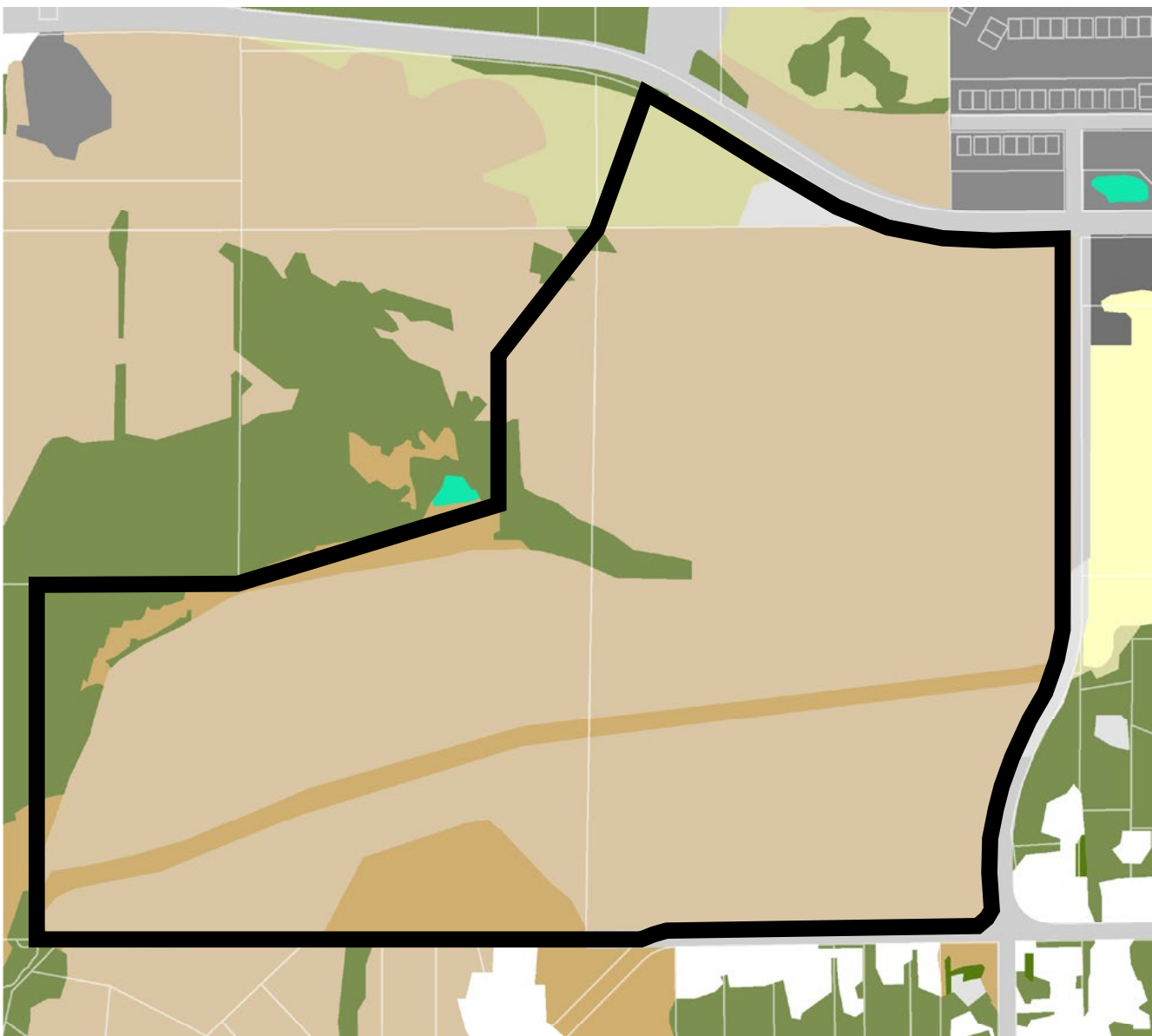


FIGURE 10. NRCS SOIL CLASSIFICATIONS (CONT.)

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
19	Chaseburg silt loam, moderately well drained, 0 to 2 percent slopes	2.4	1.3%
289	Radford silt loam	90.6	50.8%
322D2	Timula silt loam, 12 to 20 percent slopes, moderately eroded	38.8	21.7%
467	Sawmill silty clay loam	7.7	4.3%
473D	Dorerton loam, 12 to 25 percent slopes	4.2	2.4%
477B	Littleton silt loam, 1 to 4 percent slopes	2.1	1.2%
593E	Elbaville silt loam, 18 to 30 percent slopes	1.0	0.5%
N150E	Brodale channery loam, deep, 20 to 30 percent slopes	2.4	1.4%
N501D2	Downs silt loam, 12 to 18 percent slopes, moderately eroded	2.5	1.4%
N518B	Lindstrom silt loam, 2 to 6 percent slopes	25.2	14.1%
N518C	Lindstrom silt loam, 6 to 12 percent slopes	1.7	0.9%
Totals for Area of Interest		178.5	100.0%

FIGURE 11. MLCCS



LEGEND

Project Boundary	76-100% Impervious	Short Grasses
11-25% Impervious	Agricultural Land	Tall Grasses
26-50% Impervious	Tree Plantation	Dry Tall Grasses
51-75% Impervious	Forest	Wetland Open Water

Source: MNDNR, Olmstead County GIS



APPENDIX B

Agency Correspondence



Formal Natural Heritage Review - Cover Page

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

Project Name: Nigon Property

Project Proposer: Pulte Group

Project Type: Development, Residential

Project Type Activities: Tree Removal;Structure Removal or Bridge Removal;Waterbody or watercourse impacts (e.g., dewatering, discharge, excavation, fill, runoff, sedimentation, changes in hydrology));Wetland impacts (e.g., dewatering, tiling, drainage, discharge, excavation, fill, runoff, sedimentation, changes in hydrology)

TRS: T106 R14 S5, T106 R14 S6, T107 R14 S32

County(s): Olmsted

DNR Admin Region(s): Central

Reason Requested: Federal Environmental Assessment/Environmental Impact Assessment

Project Description: Pulte Group is proposing to develop approximately 175.91-acres into 323 single-family residential lots. The site was previously utilized for agricultural ...

Existing Land Uses: The majority of the site was used for agricultural production with some vacant/open space areas.

Landcover / Habitat Impacted: The site will be fully developed with single-family residential uses with some amenity and gathering spaces. The project will include protection of the ...

Waterbodies Affected: Cascade Creek runs diagonally through the southern portion of the site. There is also one identified wetland on the site. The proposed development plan ...

Groundwater Resources Affected: No groundwater resource impacts are anticipated at this time.

Previous Natural Heritage Review: No

Previous Habitat Assessments / Surveys: No

SUMMARY OF AUTOMATED RESULTS

Category	Results	Response By Category
Project Details	Comments	Tree Removal - Recommendations
Ecologically Significant Area	Comments	Protected Wetlands: Calcareous Fens
State-Listed Endangered or Threatened Species	No Comments	No Further Review Required
State-Listed Species of Special Concern	Comments	Recommendations

Category	Results	Response By Category
Federally Listed Species	Comments	Visit IPaC for Federal Review RPBB High Potential Zone



United States Department of the Interior

FISH AND WILDLIFE SERVICE
Minnesota-Wisconsin Ecological Services Field Office
3815 American Blvd East
Bloomington, MN 55425-1659
Phone: (952) 858-0793



In Reply Refer To:
Project code: 2025-0109502
Project Name: Nigon Rochester

06/16/2025 14:37:13 UTC

Federal Nexus: no

Federal Action Agency (if applicable):

Subject: Technical Assistance letter for 'Nigon Rochester' for rusty patched bumble bee that may occur in your proposed project location consistent with the Rusty Patched Bumble Bee Range Wide Determination Key (RPBB DKey).

Dear Kimberly Zlimen:

This letter records your determination using the RPBB DKey within the Information for Planning and Consultation (IPaC) system provided to the U.S. Fish and Wildlife Service (USFWS) on **June 16, 2025**, for 'Nigon Rochester' (here forward, Project). This project has been assigned Project Code '2025-0109502' and all future correspondence should clearly reference this number. **Please carefully review this letter. Your Endangered Species Act (Act) requirements are not complete.**

Ensuring Accurate Determinations When Using IPaC Determination Keys

The USFWS developed the IPaC system and associated species' determination keys in accordance with the Endangered Species Act of 1973 (ESA; 87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.). All information submitted by the Project proponent into the IPaC must accurately represent the full scope and details of the Project. **Failure to accurately represent or implement the Project as detailed in IPaC or the RPBB DKey, invalidates this letter.**

Determination for the Rusty Patched Bumble Bee

Based on your answers and the assistance of the USFWS' RPBB DKey, you made the following effect determination for the proposed Action:

Species	Listing Status	Determination
Rusty Patched Bumble Bee (<i>Bombus affinis</i>)	Endangered	May affect

Coordination with the USFWS is not complete. Further coordination with the USFWS is recommended for the rusty patched bumble bee. Please email the local USFWS Ecological Services Field Office and attach a copy of this letter, so we can discuss methods to avoid or minimize potential adverse impacts.

Other Species and Critical Habitat that May be Present in the Action Area

The IPaC-assisted determination key for the rusty patched bumble bee **does not** apply to the following ESA-protected species and/or critical habitat that also may occur in your Action area:

- Monarch Butterfly *Danaus plexippus* Proposed Threatened
- Northern Long-eared Bat *Myotis septentrionalis* Endangered
- Prairie Bush-clover *Lespedeza leptostachya* Threatened
- Tricolored Bat *Perimyotis subflavus* Proposed Endangered
- Western Regal Fritillary *Argynnis idalia occidentalis* Proposed Threatened
- Whooping Crane *Grus americana* Experimental Population, Non-Essential

Critical Habitats:

- Rusty Patched Bumble Bee *Bombus affinis* Endangered

Coordination with the USFWS is advised for any species and/or critical habitat listed above.

You should coordinate with our Office to determine whether the Action may affect the species and/or critical habitat listed above and if further consultation is required. Note that reinitiation of consultation would be necessary if a new species is listed or critical habitat designated that may be affected by the identified action before it is complete.

If you have any questions regarding this letter or need further assistance, please contact the local Ecological Services Field Office and reference Project Code '2025-0109502' associated with this Project. See the top of this letter for the Project Code.

Additional Information

Sufficient project details: Please provide sufficient project details on your project homepage in IPaC (Define Project, Project Description) to support your conclusions. Failure to disclose important aspects of your project that would influence the outcome of your effects determinations may negate your determinations and invalidate this letter. If you have site-specific information that leads you to believe a different determination is more appropriate for your project than what the Dkey concludes, you can and should proceed based on the best available information.

Future project changes: The Service recommends that you contact the local Ecological Services Field Office or re-evaluate the project in IPaC if: 1) the scope or location of the proposed Action is changed; 2) new information reveals that the action may affect rusty patched bumble bee in a manner or to an extent not previously considered; 3) the Action is modified in a manner that

causes effects to rusty patched bumble bee; or 4) or critical habitat is designated. If any of the above conditions occur, additional consultation with the Service should take place before project changes are final or resources are committed.

Species-specific information

Bald and Golden Eagles: Bald eagles, golden eagles, and their nests are protected under the Bald and Golden Eagle Protection Act (54 Stat. 250, as amended, 16 U.S.C. 668a-d) (Eagle Act). The Eagle Act prohibits, except when authorized by an Eagle Act permit, the “taking” of bald and golden eagles and defines “take” as “pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb.” The Eagle Act’s implementing regulations define disturb as “... to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, (1) injury to an eagle, (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior.”

If you observe a bald eagle nest in the vicinity of your proposed project, you should follow the National Bald Eagle Management Guidelines (May 2007). For more information on eagles and conducting activities in the vicinity of an eagle nest, please visit our regional eagle website or contact the local Ecological Services Field Office. If the Action may affect bald or golden eagles, additional coordination with the Service under the Eagle Act may be required.

Action Description

You provided to IPaC the following name and description for the subject Action.

1. Name

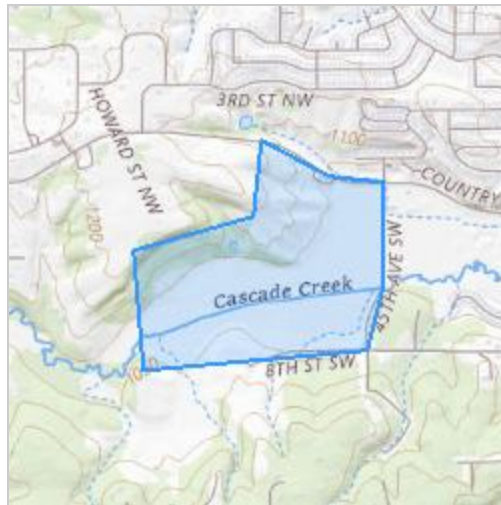
Nigon Rochester

2. Description

The following description was provided for the project 'Nigon Rochester':

Redevelopment of 176 acres of agricultural land for development of 323 single-family residential units in 2026/2027 in Rochester, Minnesota.

The approximate location of the project can be viewed in Google Maps: <https://www.google.com/maps/@44.018007850000004,-92.53936595762345,14z>



QUALIFICATION INTERVIEW

1. Is the action authorized, funded, or being carried out by a Federal agency?

No

2. Does the action area overlap with a rusty patched bumble bee high potential zone?

Automatically answered

Yes

3. Does the action include - or is it reasonably certain to cause - intentional take of rusty patched bumble bee (rusty patched bumble bee) that is not covered under a scientific recovery permit under section 10(A)1(a) of the Endangered Species Act or under a cooperative agreement with a state agency?

Note: This could include, for example, surveys or studies that include handling or capture of the species. Whether "Project Review" surveys using USFWS protocols were conducted as part of the action is addressed later in this key.

No

4. Does the action include – or is it reasonably certain to result in – construction of one or more new roads or rail lines that will increase vehicle traffic in a rusty patched bumble bee HPZ?

Yes

IPAC USER CONTACT INFORMATION

Agency: Private Entity
Name: Kimberly Zlimen
Address: 550 Vandalia Street
Address Line 2: Suite 205
City: St. Paul
State: MN
Zip: 55114
Email: kzlimer@swansonhaskamp.com
Phone: 6123967618



Minnesota Department of Natural Resources
Division of Ecological & Water Resources
500 Lafayette Road, Box 25
St. Paul, MN 55155-4025

February 17, 2025

Project ID: MCE #2025-00152

Jennifer Haskamp
Swanson Haskamp Consulting, LLC
246 S Albert Street
Saint Paul, MN 55105

RE: Automated Natural Heritage Review of the proposed Nigon Property
See Cover Page for location and project details.

Dear Jennifer Haskamp,

As requested, the above project has been reviewed for potential effects to rare features. Based on this review, the following rare features may be adversely affected by the proposed project:

Project Type and/or Project Type Activity Comments

- The Natural Heritage Information System (NHIS) tracks bat roost trees and hibernacula plus some acoustic data, but this information is not exhaustive. Even if there are no bat records listed below, all of Minnesota's bats, including the federally endangered northern long-eared bat ([Myotis septentrionalis](#)), can be found throughout Minnesota. During the active season (approximately April-November) bats roost underneath bark, in cavities, or in crevices of both live and dead trees. Tree removal can negatively impact bats by destroying roosting habitat, especially during the pup rearing season when females are forming maternity roosting colonies and the pups cannot yet fly. To minimize these impacts, the DNR recommends that tree removal be avoided from June 1 through August 15.

Ecologically Significant Area

- One or more calcareous fens have been documented in the vicinity of the proposed project. A calcareous fen is a rare and distinctive peat-accumulating wetland that is legally protected in Minnesota. Many of the unique characteristics of calcareous fens result from the upwelling of groundwater through calcareous substrates. Because of this dependence on groundwater hydrology, calcareous fens can be affected by nearby activities or even those several miles away. Calcareous fens are fragile and may be impacted by activities within the fen, activities that affect surface water flows (e.g., stormwater flow/runoff, erosion), or activities that affect groundwater hydrology (e.g., groundwater pumping, contamination, or discharge). For more information regarding calcareous fens, please see the [Calcareous Fen Fact Sheet](#). To minimize stormwater impacts, please refer to the Minnesota Pollution Control Agency's [General Principles for Erosion Prevention and Sediment Control](#) in the Minnesota Stormwater Manual. Please note that calcareous fens are "Special Waters"

and a [buffer zone](#) may be required.

Depending on the distance to the calcareous fen(s), additional guidance may be provided below if you indicated that potential project activities include wetland impacts or groundwater impacts. **If you did not correctly identify wetland or groundwater impacts as part of your project, this impact analysis may be incorrect.**

State-Listed Endangered or Threatened Species

No state-listed endangered or threatened species have been documented in the vicinity of the project.

State-Listed Species of Special Concern

Taxonomic Group	Common Name	Scientific Name	Water Regime	Habitat	Federal Status
Vertebrate Animal	Bell's Vireo	Vireo bellii		Upland Prairie, Wet Meadow/Carr, Lowland Prairie	
Vertebrate Animal	Black Redhorse	Moxostoma duquesnei		Small Rivers and Streams, Medium Rivers and Streams	

- The above table identifies state-listed species of special concern that have been documented in the vicinity of your project. If suitable habitat for any of these species occurs within your project footprint or activity impact area, the project may negatively impact those species. To avoid impacting state-listed species of special concern, the DNR recommends modifying the location of project activities to avoid suitable habitat or modifying the timing of project activities to avoid the presence of the species. Please visit the [DNR Rare Species Guide](#) for more information on the habitat use of these species and recommended measures to avoid or minimize impacts. Species-specific comments, if any, appear below.

Federally Listed Species

- One or more federally listed species may be impacted by the proposed project. To ensure compliance with federal law, the DNR recommends that you conduct a federal regulatory review using the U.S. Fish & Wildlife Service [online IPaC tool](#).
- The area of interest overlaps with a U.S Fish and Wildlife Service (USFWS) Rusty Patched Bumble Bee [High Potential Zone](#). The [rusty patched bumble bee](#) (*Bombus affinis*) is federally listed as endangered and is likely to be present in suitable habitat within High Potential Zones. From April through October this species uses underground nests in upland grasslands, shrublands, and forest edges, and forages where nectar and pollen are available. From October through April the species overwinters under tree litter in upland forests and woodlands. The rusty patched bumble bee may be impacted by a variety of land management activities including, but not limited to, prescribed fire, tree-removal, haying, grazing, herbicide use, pesticide use, land-clearing, soil disturbance or compaction, or use of non-native bees. If applicable, the DNR recommends reseeding disturbed soils with native species of grasses and forbs using [BWSR Seed Mixes](#) or [MnDOT Seed Mixes](#). To ensure compliance with federal law, please conduct a federal regulatory review using the U.S. Fish and Wildlife Service's online [Information for Planning and Consultation \(IPaC\) tool](#). Please note that all projects, regardless of whether there is a federal nexus, are subject to federal take prohibitions. The IPaC review will determine if prohibited take is likely to occur and, if not, will generate an automated letter. The [USFWS RPB guidance](#) provides guidance on avoiding impacts to rusty patched bumble

bee and a key for determining if actions are likely to affect the species; the determination key can be found in the appendix.

The Natural Heritage Information System (NHIS), a collection of databases that contains information about Minnesota's rare natural features, is maintained by the Division of Ecological and Water Resources, Department of Natural Resources. The NHIS is continually updated as new information becomes available, and is the most complete source of data on Minnesota's rare or otherwise significant species, native plant communities, and other natural features. However, the NHIS is not an exhaustive inventory and thus does not represent all of the occurrences of rare features within the state. Therefore, ecologically significant features for which we have no records may exist within the project area. If additional information becomes available regarding rare features in the vicinity of the project, further review may be necessary.

For environmental review purposes, the results of this Natural Heritage Review are valid for one year; the results are only valid for the project location and the project description provided on the cover page. If project details change or construction has not occurred within one year, please resubmit the project for review before initiating project activities.

The Natural Heritage Review does not constitute project approval by the Department of Natural Resources. Instead, it identifies issues regarding known occurrences of rare features and potential impacts to these rare features. For information on the environmental review process or other natural resource concerns, you may contact your [DNR Regional Environmental Assessment Ecologist](#).

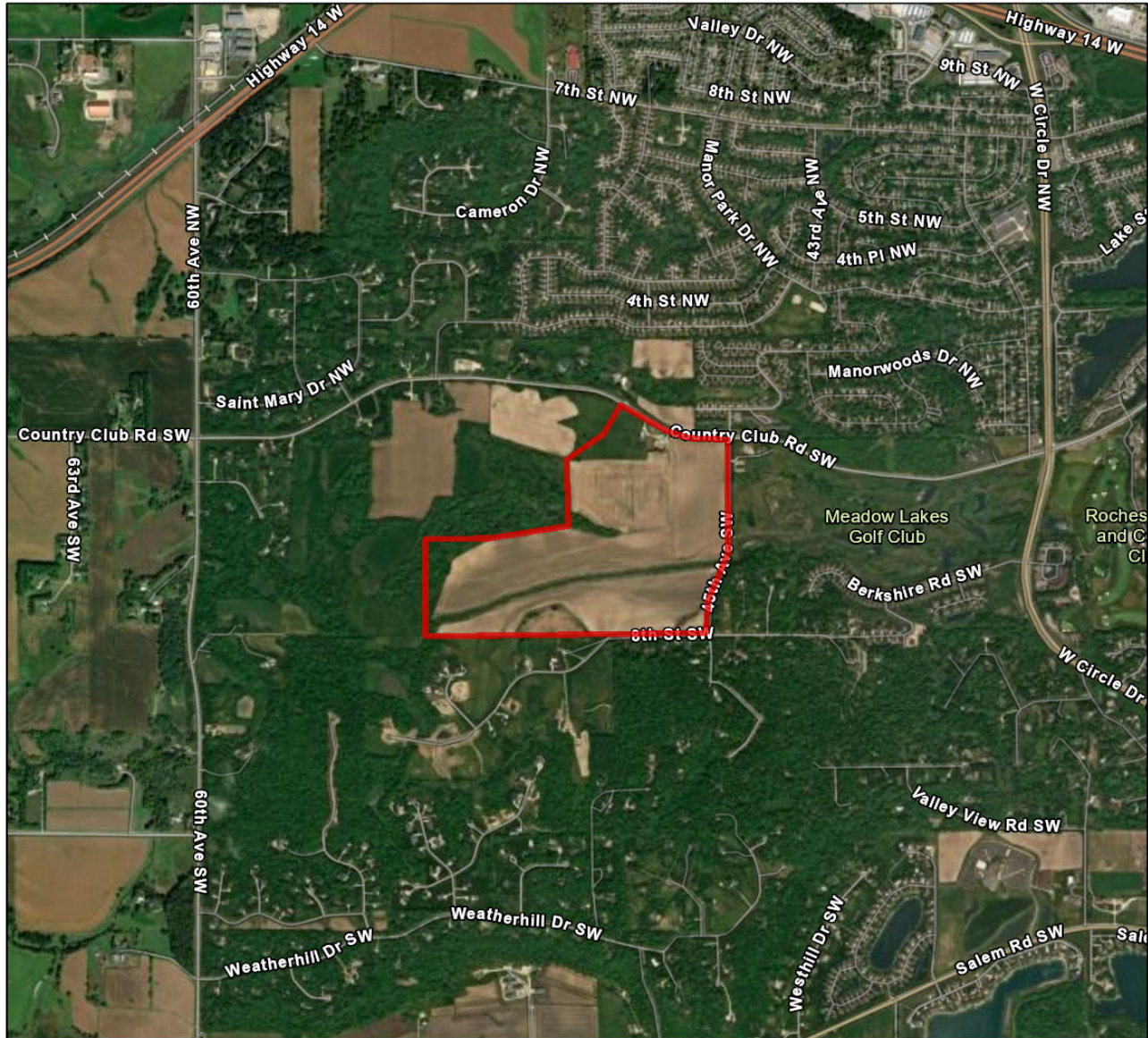
Thank you for consulting us on this matter, and for your interest in preserving Minnesota's rare natural resources.

Sincerely, *The Natural Heritage Review Team* [Natural Heritage Review Program](#)
Review.NHIS@state.mn.us

Links: USFWS Information for Planning and Consultation (IPaC) tool
[Information for Planning and Consultation \(IPaC\) tool](#)
DNR Regional Environmental Assessment Ecologist Contact Info
https://www.dnr.state.mn.us/eco/ereview/erp_regioncontacts.html

Nigon Property

Aerial Imagery With Locator Map



0 0.15 0.3 0.6 0.9 1.2 Miles

 Project Boundary

Project Type: Development, Residential

Project Size (acres): 179.02

County(s): Olmsted

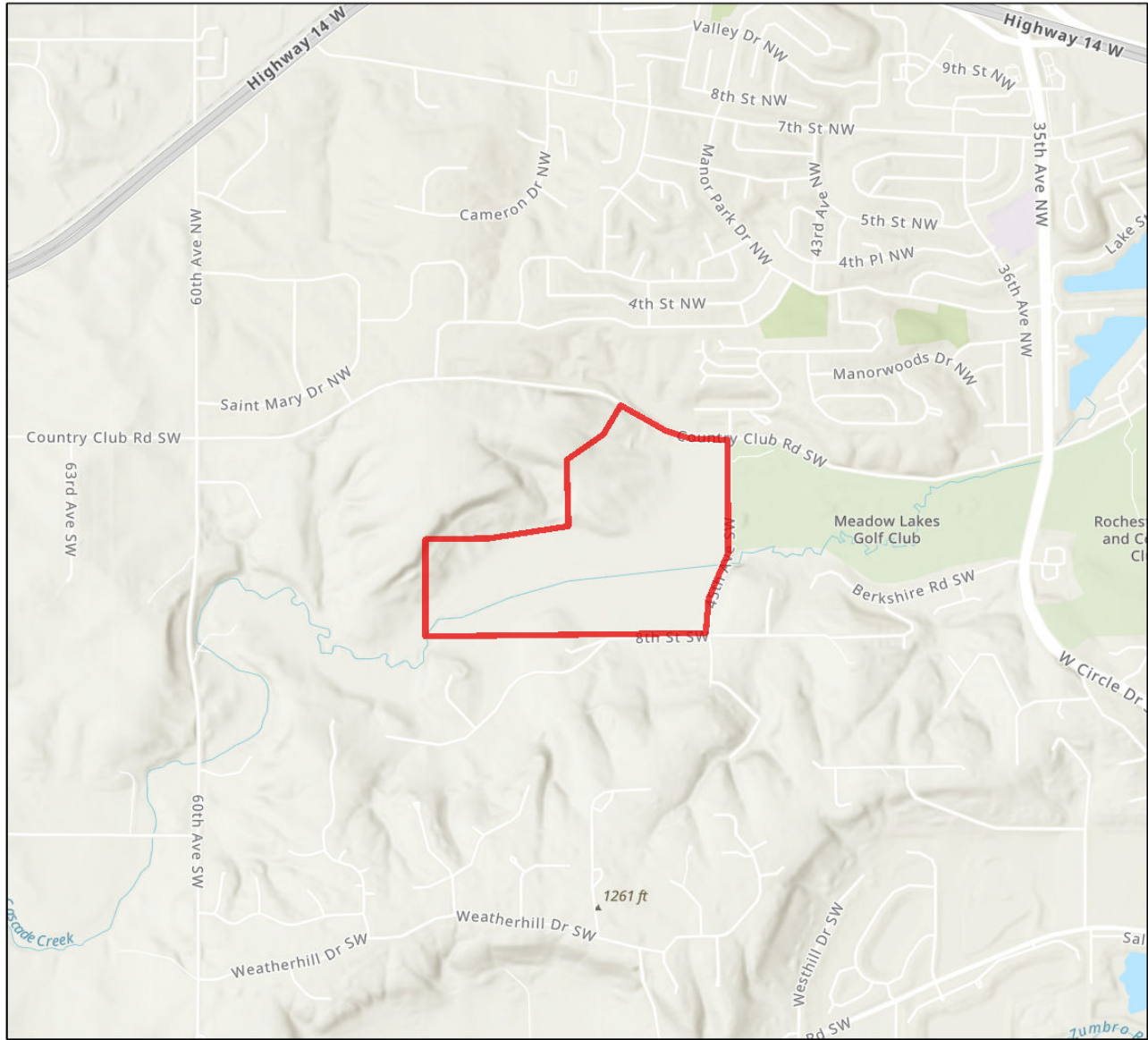
TRS: T106 R14 S5, T106 R14 S6, T107 R14 S32

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



Nigon Property

USA Topo Basemap With Locator Map



0 0.15 0.3 0.6 0.9 1.2 Miles

 Project Boundary

Project Type: Development, Residential

Project Size (acres): 179.02

County(s): Olmsted

TRS: T106 R14 S5, T106 R14 S6, T107 R14 S32

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



July 30, 2025

Kimberly Zlimen
Senior Engineer/Planner
Swanson Haskamp Consulting
kzlimen@swansonhaskamp.com

RE: Nigon Development
Proposed 176-acre development project; 323 single-family residential lots
T106 R14 S5-6; T107 R14 S32, Olmsted County
SHPO Number: 2025-1351

Dear Kimberly Zlimen:

Thank you for contacting our office during the preparation of an Environmental Assessment Worksheet for the above-referenced project.

Due to the nature and location of the proposed project, we recommend that an archaeological survey be completed. The survey must meet the requirements of the Secretary of the Interior's Standards for Identification and Evaluation and should include an evaluation of National Register eligibility for any properties that are identified. For a list of consultants who have expressed an interest in undertaking such surveys, please visit the website preservationdirectory.mnhs.org, and select "Archaeologists" in the "Specialties" box.

We will reconsider the need for survey if the project area can be documented as previously surveyed or disturbed. Any previous survey work must meet contemporary standards. **Note:** plowed areas and right-of-way are not automatically considered disturbed. Archaeological sites can remain intact beneath the plow zone and in undisturbed portions of the right-of-way.

Please note that this comment letter does not address the requirements of Section 106 of the National Historic Preservation Act of 1966 and 36 CFR § 800. If this project is considered for federal financial assistance, or requires a federal permit or license, then review and consultation with our office will need to be initiated by the lead federal agency. Be advised that comments and recommendations provided by our office for this state-level review may differ from findings and determinations made by the federal agency as part of review and consultation under Section 106.

If you have any questions regarding our review of this project, please contact me at kelly.graggjohnson@state.mn.us.

Sincerely,

Kelly Gragg-Johnson

Kelly Gragg-Johnson
Environmental Review Specialist

A faint, light gray topographic map with contour lines is visible in the background of the top half of the page.

APPENDIX C

Geotechnical Evaluation Report

Geotechnical Evaluation Report

Nigon Property
4700 Country Club Road
Rochester, Minnesota

Prepared for

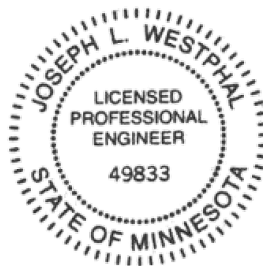
PulteGroup, Inc.

Professional Certification:

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly licensed Professional Engineer under the laws of the State of Minnesota.



Joseph L. Westphal, PE
Director, Senior Engineer
License Number: 49833
October 1, 2025



Project B2500826

Braun Intertec Corporation

October 1, 2025

Project B2500826

Haley Daily-Sievers
PulteGroup, Inc.
1650 West 82nd Street, Suite 300
Bloomington, MN 55431

Re: Geotechnical Evaluation
Nigon Property
4700 Country Club Road
Rochester, Minnesota

Dear Ms. Daily-Sievers:

We are pleased to present this Geotechnical Evaluation Report for the proposed residential development at the Nigon property in Rochester, Minnesota. The following report provides the results of our evaluation and should be read in its entirety.

Thank you for making Braun Intertec Corporation (Braun Intertec) your geotechnical consultant for this project. Please contact Joe Westphal at 952.995.2238 (jwestphal@braunintertec.com) if you have questions about this report, or if there are other services that we can provide in support of our work to date.

Sincerely,

BRAUN INTERTEC CORPORATION



Dan Leffler, PE
Project Engineer



Joseph L. Westphal, PE
Director, Senior Engineer

c: Dean Lotter; PulteGroup, Inc.
Chad Onsgard; PulteGroup, Inc.
Mark Rausch, PE; Alliant Engineering, Inc.

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Appendix

Soil Boring Location Sketch

Log of Boring Sheets ST-1 to ST-25

Log of Test Pit Sheets TP-1 to TP-12

Descriptive Terminology of Soil

A. Introduction

A.1. Project Description

PulteGroup, Inc. is planning to develop a mixed single-family and multi-family housing community on the Nigon property, located at 4700 Country Club Road in Rochester, Minnesota. The site encompasses approximately 176 gross acres. The proposed development includes approximately 331 residential lots, to support single-family homes. The project scope involves grading building pads and streets, as well as the construction of underground utilities, roadways, and stormwater management ponds. Figure 1 below shows an illustration of the proposed site layout

Figure 1. Preliminary Site Layout

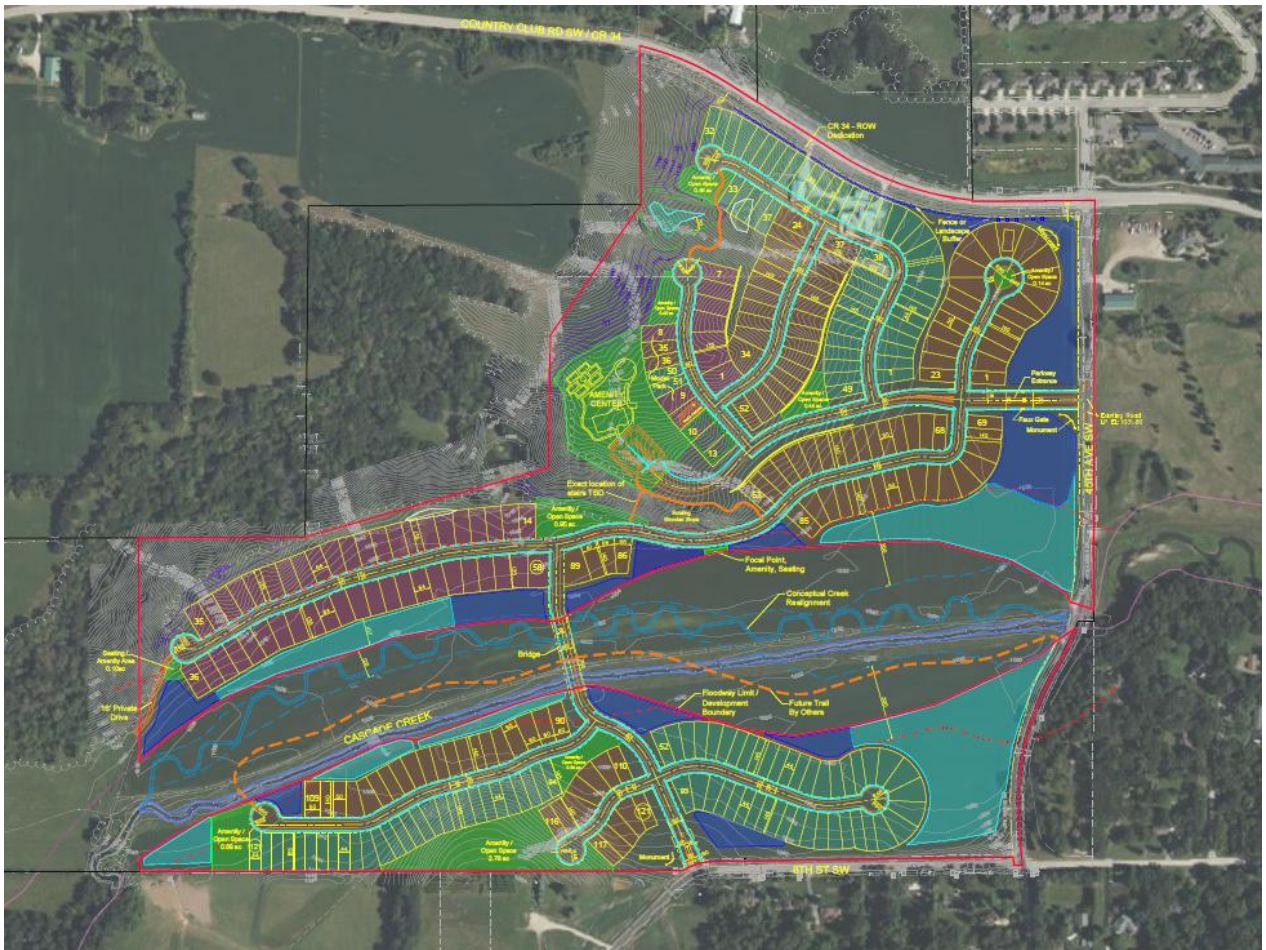


Figure provided by Alliant Engineering, dated September 23, 2025.

A.1.a. Structural Loads

We understand the construction will consist of one-to-two story wood-framed buildings with pitched roofs and full or partial basements on poured concrete foundations. Some of the buildings may also be constructed as slab-on-grade construction, that is, without basements. Based on the proposed residential construction, we have based our analysis and recommendations on the assumption that footing pressures will not exceed 2,000 pounds per square foot (psf). Please contact us if this information is not correct.

A.1.b. Pavement Traffic Loads

We have assumed that bituminous pavements, typical of residential neighborhoods, will be subjected to normal traffic conditions over a design life of 20 years.

A.2. Site Conditions and History

The proposed site at 4700 Country Club Road SW in Rochester, Minnesota, primarily consists of an open agricultural field with a few residential houses and farmstead structures to the north. It is bordered by Country Club Road SW to the north, 45th Avenue W to the east, and 8th Street SW to the south, with adjacent farmland and wooded areas to the west. Cascade Creek flows east-west through the southern portion of the site.

The site's terrain is generally gentle to slightly undulating in the east and south, with elevations ranging from approximately 1030 to 1040 feet Mean Sea Level (MSL). However, the topography rises more steeply in the northwest portion of the site, near Borings ST-1, ST-3, ST-5, ST-6, and ST-7, where elevations increase from approximately 1040 to 1170 feet MSL. Additionally, there is a mound in the southern portion of the site near Boring ST-17, where elevations rise from approximately 1040 to 1080 feet MSL. Refer to the soil boring location sketch in the appendix for approximate boring locations.

Historically, the site has been used for agricultural purposes, with no significant structures except for a few houses/farmstead structures in the northern portion. A review of Google Earth aerial imagery from 1991 to the present and a 1940 historical photograph from the John R. Borchert Map Library indicates that the site has remained largely unchanged during this period. Aerial photographs from 1940 to 2024 (Photographs 1 through 2) illustrate the site's historical conditions, with red lines delineating the approximate project location. Additional Aerial Photographs of the site can be found in the Phase I Environmental Site Assessment (provided under separate cover).

Photograph 1. Aerial Photograph of the Site in 1940



Photograph provided by University of Minnesota, John R. Borchert Map Library Online.

Photograph 2. Aerial Photograph of the Site in 2024



Photograph obtained from Google Earth.

A.3. Purpose

The purpose of our geotechnical evaluation will be to characterize subsurface geologic conditions at selected boring locations, evaluate their impact on the project, and provide geotechnical recommendations for the design and construction of the proposed residential development.

A.4. Background Information and Reference Documents

We reviewed the following information:

- Historical aerial photographs from Google Earth™ showing the site between 1991 and current day and Minnesota historic photographs online dated 1940 from John R. Borchert Map Library. This information was used to determine potential surficial changes that occurred to this area over time.
- University of Minnesota Geologic Survey Map, County Atlas Series, Atlas C-49, Part A, Plates 2, 3, and 6, showing the surficial and bedrock geology in the area.
- Nigon Property Concept Plan, prepared by Alliant Engineering, dated September 23, 2025.
- Topographic Information available through the Minnesota Department of Natural Resources (MnTOPO) website.

We have described our understanding of the proposed construction and site to the extent others reported it to us. Depending on the extent of available information, we may have made assumptions based on our experience with similar projects. If we have not correctly recorded or interpreted the project details, the project team should notify us. New or changed information could require additional evaluation, analyses and/or recommendations.

A.5. Scope of Services

We performed our scope of services for the project in accordance with our Proposal QTB208527 to PulteGroup, Inc., dated January 6, 2025. The following list describes the geotechnical tasks completed in accordance with our authorized scope of services.

- Reviewing the background information and reference documents previously cited.

- Staking and coordinating clearing of the exploration location of underground utilities. Representatives of PulteGroup, Inc. selected, and we staked the new exploration locations. We acquired the surface elevations and locations with GPS technology using the State of Minnesota's permanent GPS base station network. The Soil Boring Location Sketch included in the Appendix shows the approximate locations of the borings.
- Performing 19 standard penetration test (SPT) borings, denoted as ST-1 to ST-19, to nominal depths of 15 to 20 feet below grade across the site. Auger and sampler refusal were encountered in Borings ST-7 and ST-17 on apparent bedrock material at depths of about 19 1/2 and 8 feet, respectively, below the existing grade.
- Performing laboratory testing on select samples to aid in soil classification and engineering analysis.
- Preparing this report containing a boring location sketch, logs of soil borings, a summary of the soils encountered, results of laboratory tests, and recommendations for structure and pavement subgrade preparation and the design of foundations, floor slabs, exterior slabs, utilities, stormwater improvements and pavements.
- Following a Draft Geotechnical report in May, more exploration was requested. In July 2025, we mobilized back onsite to perform 6 additional borings, denoted as ST-20 through ST-25. We also observed 12 test pits across the site, denoted at TP-1 through TP-12.

We performed this geotechnical evaluation concurrently with a Phase I Environmental Assessment (ESA) and Phase II ESA, which we submitted under separate cover. The project team should review the Environmental reports in conjunction with this geotechnical evaluation report to understand both the geotechnical and environmental aspects of the site and how they may impact one another.

B. Results

B.1. Geologic Overview

As part of our assessment, we reviewed the geologic maps for the general site area. Based on the geologic maps for Olmstead County dated 2020, the geology of the site generally consists of loess deposited silts and clays over glacially deposited clays and gravel. We also reviewed bedrock geology and depth to bedrock maps for Olmstead County dated 2020. The depth to bedrock ranges from less than

25 feet to about 75 feet below existing grades, but the majority of the site was in the less than 25 feet range. The Bedrock generally consists of St. Peter Sandstone and Shakopee Formation Dolostone and Sandstone, but the maps also suggest there could be pockets of the Decorah shale within the site limits.

In addition, we based the geologic origins used in this report on the soil types, laboratory testing, and available common knowledge of the geological history of the site. Because of the complex depositional history, geologic origins can be difficult to ascertain.

B.2. Boring Results

Table 1 provides a summary of the soil boring and test pit results, in the general order we encountered the strata. Please refer to the Log of Boring sheets in the Appendix for additional details. The Descriptive Terminology sheet in the Appendix includes definitions of abbreviations used in Table 1.

Table 1. Subsurface Profile Summary*

Strata	Soil Type - ASTM Classification	Range of Penetration Resistances	Commentary and Details
Topsoil/ Slope wash	CL, SM, OL	3 to 19* blows per foot (BPF)	- Encountered in all borings at the surface. - Thicknesses at the boring locations varied from about 1/2 to 7 feet. - Some of the deeper topsoil observed in Borings ST-9, ST-10, ST-11, ST-14, ST-16, and ST-24 along with the test pits is likely attributed to slope wash deposits. - Predominantly consisted of lean clay, with some silty sand organic clay. - Dark brown to black in color. - Moisture condition was generally moist.
Loess	CL, ML, CL-ML, SM	3 to 50 blows over 5 inches of penetration	- Encountered in most borings beneath the topsoil <u>except</u> in Borings ST-8, ST-9, ST-10, ST-14, ST-16, and ST-17 along with test pits TP-9 through TP-12, and extended to depths ranging from 4 to 21 feet below existing grade. - Generally underlain by alluvial soils, except in Borings ST-6, ST-7, and ST-12, which were terminated within loess soils. - Predominantly clays and silts with intermixed seams and lenses of each other. - Silts were encountered in a very loose to medium dense condition. - Excluding frost affected soils, clays were encountered in a soft to stiff condition but were typically in a soft to medium condition. - Practical auger and sample refusal was encountered within loess soils in Boring ST-7 at approximately 19 1/2 feet, likely due to underlying bedrock. - Generally light brown to brown in color. - Moisture condition was generally moist.

Strata	Soil Type - ASTM Classification	Range of Penetration Resistances	Commentary and Details
Alluvial	SP, SP-SM, SM, CL, SC	6 to 50 blows for 4 inches of penetration	- Generally encountered beneath the loess soils in all borings, <u>except</u> in Borings ST-6, ST-7, and ST-12, along with test pits TP-1 through TP-10, and extended to the termination depths of the borings. - Predominantly sandy; Sands were generally more prevalent in the southern portion of the site. - Practical auger and sample refusal was encountered within alluvial soil in Boring ST-17 at approximately 19 1/2 feet. Additionally, limestone fragments were observed in Borings ST-1, ST-3, and ST-11 near termination depths. - Alluvial sands were encountered in a loose to very dense condition but were typically in loose to medium dense condition. - Generally light brown to brown in color. - Variable amounts of gravel. - Moisture condition was generally moist to wet.

*Blow counts likely influenced by the frost.

B.3. Groundwater

Table 2 summarizes the depths where we observed groundwater; the attached Log of Boring sheets in the Appendix also include this information and additional details. In these soil borings, water was observed at elevations between 1019 1/2 to 1037 1/2 feet Mean Sea Level (MSL). Groundwater may take days or longer to reach equilibrium in the boreholes and we immediately backfilled the boreholes, in accordance with our scope of work. If the project team identifies a need for more accurate determination of groundwater depth, we can install piezometers.

Table 2. Groundwater Summary

Location	Measured Surface Elevation (ft)	Measured Depth to Groundwater (ft)	Corresponding Groundwater Elevation* (ft)
ST-2	1030.1	10	1020
ST-4	1030.6	11	1019 1/2
ST-5	1047.3	10	1037 1/2
ST-8	1030.2	7 1/2	1022 1/2
ST-9	1031.9	10	1022
ST-10	1033.4	7 1/2	1026
ST-13	1037.2	8	1029

Location	Measured Surface Elevation (ft)	Measured Depth to Groundwater (ft)	Corresponding Groundwater Elevation* (ft)
ST-14	1039.5	11	1028 1/2
ST-15	1036.7	8	1028 1/2
ST-16	1034.4	7 1/2	1027
ST-18	1033.3	8	1025 1/2
ST-20	1035.0	12	1023
ST-21	1031.4	6	1025 1/2
ST-24	1111.5	6	1105 1/2
ST-25	1079.0	15	1064
TP-2	1114.0	5	1009
TP-6	1102.1	8	1094
TP-7	1106.8	7	1100
TP-8	1111.0	6 1/2	1104 1/2
TP-11	1032.8	3	1030
TP-12	1033.3	4	1029 1/2

*The groundwater elevations have been rounded to the nearest half foot.

Groundwater was conservatively observed between elevations 1020 and 1030 feet. A review of the topographic map indicates that the surface water elevation at Cascade Creek within the project site is approximately 1030 feet. Therefore, groundwater above 1030 feet is likely perched within the Loess soils.

In addition, Perched groundwater should be anticipated when fine grained clay or silt laden soils are encountered in excavations. This is shown in Boring ST-5, ST-23, and ST-24 along with test pits TP-2, TP-6, and TP-7 as a perched condition. Project planning should anticipate seasonal and annual fluctuations of groundwater.

B.4. Laboratory Test Results

The boring logs show the results of laboratory testing we performed, next to the tested sample depth. The laboratory tests were all completed in general conformance with the applicable ASTM standards. The Log of Boring sheets are in the Appendix of this report.

The moisture content (ASTM D 2216) of the selected topsoil/slopewash soils ranged from approximately 8 to 31 percent. Most topsoil and slopewash soils were near or slightly above their estimated optimum moisture content (OMC), although some could be dry of optimum. The moisture content of native silt soils tested ranged from approximately 16 to 26 percent, and clay soils ranged from 20 to 28 percent, indicating these materials were generally near or above their OMC. The moisture content of tested native sandy soils ranged from 6 to 16 percent, suggesting they should be readily compactable but may require moisture conditioning, including both wetting and drying.

Select soil samples were washed through a #200 sieve (ASTM C117) to assist in soil classification. The results indicated 6 to 23 percent by weight passing the #200 sieve. These samples were classified as poorly graded sand with silt and silty sand.

Organic content (ASTM D 2974) tests on selected samples showed organic contents ranging from 2 to 6 percent by weight, indicating the soils were slightly organic to organic.

Atterberg Limit (ASTM D4318) tests were performed on select native soil samples. Liquid limits ranged from 25 to 62 percent, plastic limits from 18 to 26 percent, and the plasticity index from 4 to 36 percent. The tested soils were classified as silt, silty clay, lean clay, and shale.

C. Recommendations

C.1. Design and Construction Discussion

The site generally appears suitable for the proposed development; however, soil corrections will be required to address soft Loess soils and any significant grade changes. Key discussion points for the project are provided below.

C.1.a. Building Subgrade Preparation

Based on the results of our subsurface exploration and evaluation, spread footing foundations bearing on engineered fill and/or native soils can support the proposed houses after performing typical subgrade preparation. Typical subgrade preparation includes removing existing vegetation, topsoil or slope wash soils, along with areas of soft clays or very loose silts. In areas where loess soils are present beneath proposed building footings, sub-cutting and reengineering approximately 3 feet of soil below the footings is recommended to promote uniformity and to help control settlement.

The soil profile at this site is highly variable. Based on the size of the development we recommend additional soil borings and/or test pits prior to the start of construction.

C.1.b. Potential Construction Delay

Due to the rolling terrain and the need for deeper soil corrections, some house pads may require more than 10 feet of compacted fill. The placement of significant fill volumes will result in varying degrees of long-term consolidation, depending on the fill thickness and the compressibility of the underlying soils.

Our analysis indicates that construction delays of approximately 3 months could be expected in areas where engineered fill ranges from 5 to 15 feet, and around 6 to 12 months where fill exceeds 15 feet. To mitigate or shorten these delays, several alternatives could be considered, including using granular soils (less than 12 percent passing on the #200 sieve) to accelerate consolidation within the engineered fill zone, installing wick drains to enhance drainage in native fine-grained soils, or implementing surcharge embankments. These alternatives can be value-engineered to determine the most cost-effective approach while meeting the project's construction schedule.

C.1.c. Reuse of On-Site Soils

Based on the soil boring results, the near-surface onsite soils primarily consist of topsoil/slopewash underlain by clayey, silty or sandy native soils. The non-organic clayey soils are generally suitable for reuse as engineered fill; however, they may require moisture conditioning before placement and compaction. Additionally, sandy soils which were generally encountered in the southern portion of the project beneath the topsoil are suitable for reuse after moisture conditioning. The silt soils on this site present a challenge, as discussed below. Proper drying of these soils would require space, time and favorable weather to dry the material for reuse.

Silty soils (ML) encountered on-site are expected to be highly moisture-sensitive, making them challenging to reuse and compact. If possible, these soils should not be used as compacted fill. If their use is unavoidable, extensive drying will likely be required to achieve the recommended compaction levels.

We do not recommend using the silts encountered on the site for structural fill due to their moisture sensitivity, narrow band of optimum moisture and susceptibility to disturbance. The concern is primarily soils with high silt content are difficult for reuse and compaction. We understand it is likely not feasible to disregard all of these soils, therefore provision should be made for the reuse silt soils, when elected.

Should on-site silt (ML) and sandy silt (ML-S) soils need to be used as structural fill or to balance the site, contingency for extra moisture conditioning and grading time should be anticipated. Based on our experience, some of the sandy silt soils may become disturbed and unusable during placement. Similarly, we do not recommend using silt soils within the upper 3 feet of roadway (Subgrade) fill, as they are easily disturbed and may make it difficult to achieve a passing roll test, and to limit excessive frost heave.

We recommend that moisture conditioning be performed during the summer months. If project constraints do not allow the time, or ideal weather conditions, the overly wet soil may need to be replaced with suitable material. Any materials to be used as engineered fill should be tested and approved by the geotechnical engineer prior to placement.

C.1.d. Bedrock Excavation

During soil boring exploration bedrock was encountered and caused auger refusal and boring terminations. The amount of bedrock encountered was less than expected based on the bedrock atlas.

Soil borings ST-7 and ST-17 each encountered auger refusal at depths of 19 feet and 8 feet below the apparent bedrock surface, respectively. Based on the auger refusal and samples retrieves, these locations appear to be Limestone or Dolostone bedrock. We anticipate that large hydraulic excavators with ripper toothed buckets will be able to remove limestone bedrock at similar depths as those encountered during exploration. For bedrock removal deeper than refusal depths, we anticipate that techniques such as a hydraulic hammer, ripper, or explosives may be required.

While performing test pits and the additional soils borings, shale soils were encountered and we anticipate that shale will be readily excavatable by typical excavation equipment. The shales encountered at the exploration locations were readily penetrated and will act similarly to a hard clay soil.

If excavations extend into the underlying sandstone, we anticipate that this can be excavated with large hydraulic excavators equipped with ripper toothed buckets. We anticipate that these excavations will take more time and effort than typical soil excavation, however, we do not anticipate that the sandstone will require explosives or other, non-typical excavation techniques.

Each house pad will require easily excavatable soil (not bedrock) a minimum of 4 feet below the proposed low floor grade, or as directed by the project Civil Engineer. This 4-foot soil buffer zone will allow the installation of water and sanitary sewer services, foundations (spread footings and poured foundation walls) as well as interior plumbing (including drain tile and sump baskets) below the lowest floor, as required.

C.1.e. Reuse of Limestone

Removed limestone is typically not reused as engineered fill. Often, the pieces of removed limestone exceed 4 inches in diameter and are too large to reuse as engineered fill. If reuse of some limestone is permitted, limestone fragments under 6 inches in size may be blended with soil, but we recommend no more than one part limestone fragments to three parts engineered soil (approximately 25 percent by volume, or less). If there are large quantities of limestone, it may be possible to crush the material to 2 inches or less whereby it could be used in deeper excavations (up to 4 feet below proposed basement grades) prior to using on-site sand or clay to complete the building pads.

C.1.e.1. Reuse of Shale

Glenwood Shale was encountered in many exploration locations. In our experience, this shale consists of primarily fat clays (CH) and is considered expansive when used as fill. Given this, **we do not recommend that shale be reused for support of structures or pavements**. We also do not recommend relying on shale soils immediately below foundation elements. We recommend a minimum of 4-foot buffer zones between shale soils and foundation elements. The final location of any shale during the mass grading phase should be reviewed and approved by the Civil Engineer, Geotechnical Engineer, and the owner, prior to placement.

C.1.e.2. Reuse of Sandstone

Where encountered, the Saint Peter Sandstone was at relatively lower elevations throughout the site. Given this, it is unlikely that this formation will be encountered in excavations other than for deep utility trenches. Where encountered, sandstone may be reused for fill within utility trenches or other site features, provided that it meets the project compaction requirements.

C.1.f. Groundwater

Groundwater will be encountered when excavating for building pad corrections and utility trench work below elevations of 1030 feet. Most of the soil layers are fine-grained such as clays and silts, which can be confining and are known to create a perched groundwater condition. Therefore, excavations above elevation 1030 feet will likely encounter groundwater. The site also contains a large change in grades, which increases the likelihood of the proposed construction intercepting groundwater. Based on the soil profile, a perched groundwater condition from precipitation, if water drains to the site, or leaching groundwater should be anticipated.

We recommend the contractor removes any water that collects in work area (specifically excavations) before performing further work. Most excavations are anticipated to be in clayey/silty soils therefore sumps and pumps could be used to manage the groundwater conditions, Where granular soils are encountered, along Cascade Creek, well points for dewatering may be necessary.

C.1.g. Construction Disturbance

The contractor should note that some of the on-site silty and clayey soils are highly susceptible to disturbance, due to repeated construction traffic. Disturbance of these soils may cause areas that were previously prepared, or that were suitable for pavement or structure support, can be destabilized and require additional moisture conditioning and compacting. Subcutting and replacing the disturbed material with crushed, coarse gravel, free of fines is also an alternative. The contractor should use means and methods to limit disturbance of the soils.

C.2. Site Grading and Subgrade Preparation

C.2.a. Building Subgrade Excavations

We recommend removing unsuitable materials from beneath the house pads and street subgrades and oversize areas. We define unsuitable materials as existing fill soils, frozen materials, organic soils, existing structures, existing utilities, vegetation, and soft/loose soils.

Table 3 shows the anticipated excavation depths and bottom of soil correction excavation elevations at each of the current soil boring locations assuming that structures, utilities, or roads will be built at each location. Excavation depths could be reduced in areas that will not support future structures, utilities, or roads. As final plans are not available at this time and the site layout may change, we have included all borings, even those currently in stormwater management areas.

Table 3. Building Excavation Depths

Location	Measured Surface Elevation (ft)	Anticipated Excavation Depth (ft)	Anticipated Bottom Elevation (ft)
ST-1	1106.4	1 to 4**	1105 to 1102
ST-2	1030.1	9*	1021
ST-3	1121.6	2**	1119 1/2
ST-4	1030.6	4**	1026 1/2
ST-5	1047.3	2 to 6*	1045 to 1041
ST-6	1121.1	2**	1119
ST-7	1098.1	6**	1092
ST-8	1030.2	4	1026
ST-9	1031.9	7	1025
ST-10	1033.4	7	1026 1/2
ST-11	1042.6	7*	1035 1/2
ST-12	1044.8	4*	1040 1/2
ST-13	1037.2	4**	1033
ST-14	1039.5	6	1033 1/2
ST-15	1036.7	1 1/2**	1035
ST-16	1034.4	7	1027 1/2
ST-17	1077.5	1 1/2	1076
ST-18	1033.3	2 to 7*	1031 to 1026
ST-19	1038.4	1 1/2**	1037
ST-20	1035.0	2**	1033
ST-21	1031.4	6	1025 1/2
ST-22	1112.8	1 1/2**	1111
ST-23	1111.5	8***	1103 1/2

Location	Measured Surface Elevation (ft)	Anticipated Excavation Depth (ft)	Anticipated Bottom Elevation (ft)
ST-24	1079.0	1 1/2	1077 1/2
ST-25	1031.4	9	1022 1/2
TP-1	1120.0	3+	<1117
TP-2	1114.0	2+	<1112
TP-3	1106.8	3 1/2+	<1103
TP-4	1098.8	4+	<1094 1/2
TP-5	1098.2	2+	<1096
TP-6	1102.1	3 1/2+	<1098 1/2
TP-7	1106.8	5+	<1101 1/2
TP-8	1111.0	1+	<1110
TP-9	1122.4	5+	<1117
TP-10	1118.2	6 1/2+	<1111 1/2
TP-11	1032.8	2	1030 1/2
TP-12	1033.3	4	1029

*Excavation depth to be verified on field.

** Amount of loess removal below building grades will be determined during grading, based heavily on the final grading plan.

In general, assume a 3 foot subcut of the loess soils below footing grade for uniformity and to help control settlement.

*** Shale soils should be subcut a minimum of 4 feet below bottom of foundation elements.

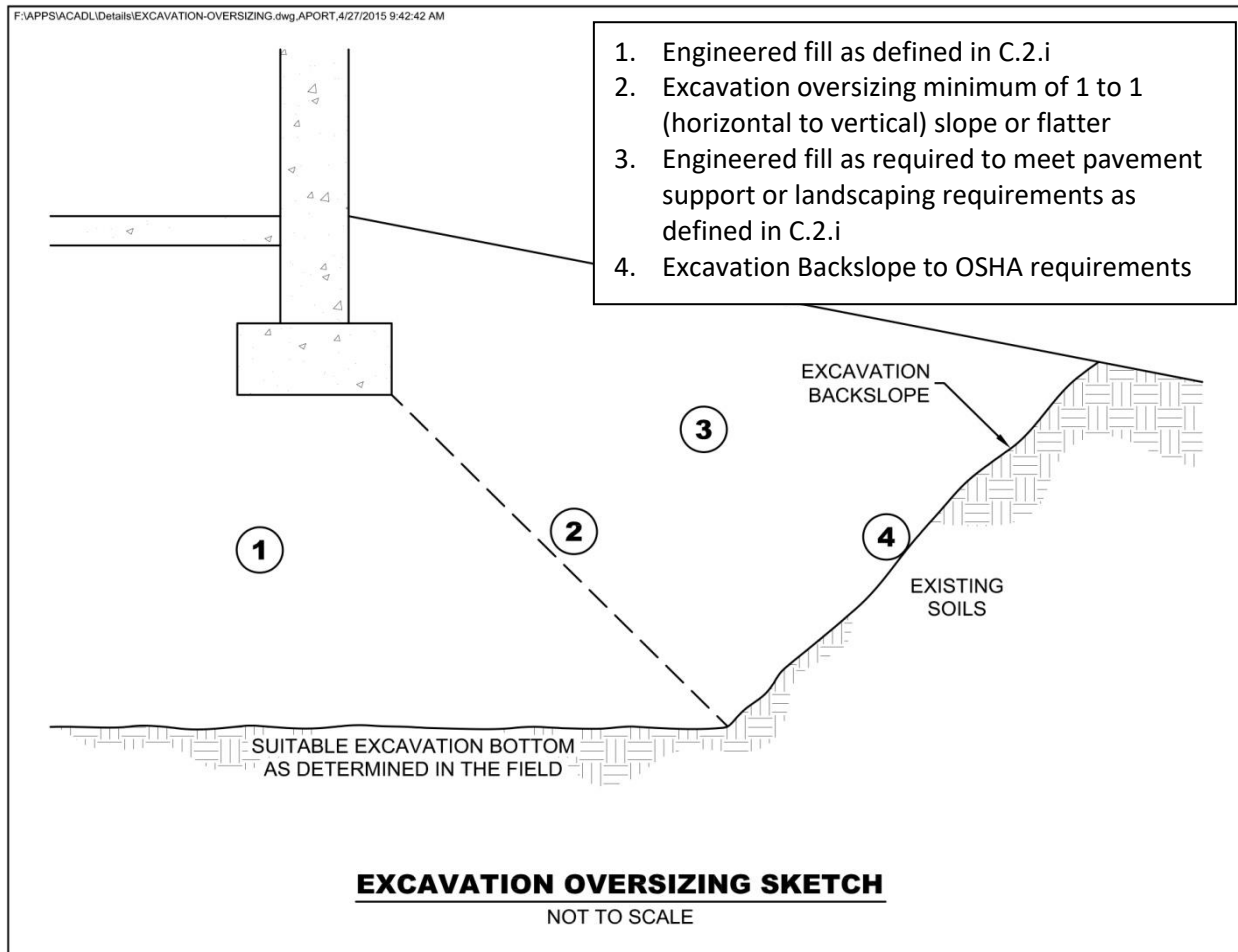
Due to variability in soil conditions, at some of the soil boring locations we have given a range of expected soil correction excavation depths. Excavation depths will vary between the borings. Portions of the excavations may also extend deeper than indicated by the borings. A geotechnical representative should observe the excavations to make the necessary field judgments regarding the suitability of the exposed soils.

The contractor should use equipment and techniques to minimize soil disturbance. If soils become disturbed or are wet, we recommend excavation and replacement of the disturbed or unstable soils. Provided the existing soils do not become disturbed, surface compaction will likely not be necessary prior to construction of the footings.

C.2.b. Excavation Oversizing

When removing unsuitable materials below structures or pavements, we recommend the excavation extend outward and downward at a slope of 1H:1V (horizontal:vertical) or flatter. See Figure 1 for an illustration of excavation oversizing.

Figure 1. Generalized Illustration of Oversizing



C.2.c. Excavated Slopes

Based on the borings, we anticipate the on-site soils in excavations will consist mostly of clayey and silty soils and some sandy soils on southern portion of the site. The clay soils are typically considered Type B Soil under OSHA (Occupational Safety and Health Administration) guidelines. OSHA guidelines indicate unsupported excavations in Type B soils should have a gradient no steeper than 1H:1V. The sandy or silty soils are typically considered Type C Soil under OSHA (Occupational Safety and Health Administration) guidelines. OSHA guidelines indicate unsupported excavations in Type C soils should have a gradient no steeper than 1 1/2H:1V. Slopes constructed in this manner may still exhibit surface sloughing. OSHA requires an engineer to evaluate slopes or excavations over 20 feet in depth.

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.

C.2.d. Filling on Slopes

Where existing or excavated grades are steeper than 4H:1V, we recommend placing fill from low to high elevations on horizontal benches cut into the native soils so that successive lifts are spread and compacted on level surfaces, and a potential failure surface is not created along the fill's lower boundary. Depending on fill requirements, the contractor can construct benches by cutting into existing grades while placing fill (the compaction of the exposed soils thus being in compliance with fill specifications), or by cutting the benches in advance of filling (to prevent mixing with soils not in compliance with fill specifications). The height of a given bench may vary but the width should consistently be great enough to accommodate large, self-propelled compaction equipment.

C.2.e. Excavation Dewatering

We recommend removing groundwater from the excavations. Project planning should include temporary sumps and pumps for excavations in low-permeability soils, such as the onsite loess soils. Dewatering of high-permeability soils (e.g., sands) from within the excavation with conventional pumps has the potential to loosen the soils, due to upward flow. Excavation in granular soils below elevation 1030 may require well points for dewatering. A well contractor should develop a dewatering plan; the design team should review this plan.

C.2.f. Selecting Excavation Backfill and Additional Required Fill

On-site soils free of organic soil and debris can be considered for reuse as backfill and fill. However, the topsoil and the organic fill soils should not be re-used as engineered fill under house pads or below streets. Although clays can be used as fill if properly moisture conditioned and compacted, for ease of construction, if possible, the higher moisture content clay should not be used as engineered fill below house pads and streets. We also do not recommend reusing silty or shale soils as reuse within structural fill areas. Silt and shale soils may remain in place if determined that those soils are stable and capable of supporting proposed design loads. Please note, shale soils should be subcut a minimum of 4-feet below bottom of any foundation elements.

Unless a drainage composite is placed against the backs of the exterior perimeter basement walls, we recommend that backfill placed within 2 horizontal feet of those walls consist of sand having less than 50 percent of the particles, by weight, passing a #40 sieve and less than 5 percent of the particles, by weight, passing a #200 sieve. Sand meeting this gradation may need to be imported to the site. We recommend that the balance of the backfill placed against exterior perimeter walls also consist of sand; although it is our opinion that the sand may contain up to 20 percent of the particles, by weight, passing a #200 sieve.

C.2.g. Pavement and Exterior Slab Subgrade Preparation

We recommend the following steps for pavement and exterior slab subgrade preparation. Note that project planning may need to require additional subcuts to limit frost heave. Silt soils, if within the frost zone, can lead to a very high risk of damaging frost heave.

1. Strip unsuitable soils consisting of topsoil, organic soils, vegetation, existing structures and pavements down to native soils and place structural fill to reattain pavement subgrade.
2. Have a geotechnical representative observe the excavated subgrade to evaluate if additional subgrade improvements are necessary.
3. Slope subgrade soils to areas of sand or drain tile to allow the removal of accumulating water.
4. Scarify, moisture condition and surface compact with at least three passes of a large roller with a minimum drum diameter of 3 1/2 feet.
5. Place pavement engineered fill to grade and compact in accordance with Section C.2.i to bottom of pavement and exterior slab section. See Section C.6 for additional considerations related to frost heave.
6. Proofroll the pavement or exterior slab subgrade as described in Section C.2.h.

Due to susceptibility of loess soils to excessive frost heaving, we strongly suggest incorporating 18 inches of clean sand subbase to the pavement section. The sand will provide some uniformity to the subgrade and help reduce frost heave. We also recommend sloping subgrade soils to promote drainage and removal of accumulated water.

C.2.h. Pavement Subgrade Proofroll

After preparing the subgrade as described above and prior to the placement of the aggregate base, we recommend proofrolling the subgrade soils with a fully loaded tandem-axle truck. We also recommend having a geotechnical representative observe the proofroll. Areas that fail the proofroll likely indicate soft or weak areas that will require additional soil correction work to support pavements.

The contractor should correct areas that display excessive yielding or rutting during the proofroll, as determined by the geotechnical representative. Possible options for subgrade correction include moisture conditioning and recompaction, subcutting and replacement with soil or crushed aggregate, chemical stabilization and/or geotextiles. We recommend performing a second proofroll after the aggregate base material is in place, and prior to placing bituminous or concrete pavement.

C.2.i. Engineered Fill Materials and Compaction

Table 4 below contains our recommendations for engineered fill materials.

Table 4. Engineered Fill Materials*

Locations To Be Used	Engineered Fill Classification	Possible Soil Type Descriptions	Gradation	Additional Requirements
- Below foundations - Below interior slabs	Structural fill* Building Pad Fill	SP, SP-SM, SM, SC, CL, CL-ML, ML**	100% passing 2-inch sieve	< 2% Organic Content (OC) Plasticity Index (PI) < 20%
- Drainage layer - Non-frost-susceptible	- Free-draining - Non-frost-susceptible fill	GP, GW, SP, SW	100% passing 1-inch sieve < 50% passing #40 sieve < 5% passing #200 sieve	< 2% OC
Behind below-grade walls, beyond drainage layer	Retained fill	SP, SW, SP-SM, SW-SM, SM	100% passing 3-inch sieve < 20% passing #200 sieve	< 2% OC Plasticity Index (PI) < 4%
Pavements	Pavement fill	SP, SM, SC, CL, SP-SM, CL-ML,	100% passing 3-inch sieve	< 2% OC PI < 20%
Below landscaped surfaces, where subsidence is not a concern	Non-structural fill	CH, CL, SC, ML, SM, SP-SM, SP	100% passing 6-inch sieve	< 10% OC

* More select soils comprised of coarse sands with < 5% passing #200 sieve may be needed to accommodate work occurring in periods of wet or freezing weather.

** *contingency for extra moisture conditioning and grading time should be anticipated, if ML is used.*

Project grading plans were not available at the time of this report, so it is unknown if there will be any deep fill areas. If only clayey fill soil is used to fill house pads where more than 10 feet of fill is needed, a construction delay of at least 3 to 12 months may be needed, depending on the final depths of clay fill used. As an alternative, on lots where deep fills are needed, deep sand fill (less than 12 percent passing the #200 sieve) could be used to initially fill the excavations below these house pads. The deep sand fill should be placed in thin compacted lifts, up to an elevation of 10 feet or less from the finished basement floor grades. On-site clayey soil can then be used to complete construction of the building pads. If the alternative method of filling the house pads partially with deep sand fill is used, a construction delay would not be needed. Deep sand fill will likely need to be imported to the site.

We recommend spreading engineered fill in loose lifts of approximately 8 to 12 inches thick. We recommend compacting each lift of engineered fill with a full-size vibrating or sheepfoot compactor, in accordance with the criteria presented below in Table 5. The project documents should specify relative compaction of engineered fill, based on the structure located above the engineered fill, and vertical proximity to that structure.

Table 5. Compaction Recommendations Summary

Reference	Relative Compaction, percent (ASTM D698 – Standard Proctor)	Moisture Content Variance from Optimum, percentage points	
		< 12% Passing #200 Sieve (typically SP, SP-SM)	> 12% Passing #200 Sieve (typically CL, SC, ML, SM)
Below building pads, less than 10 feet of fill	95	*---	-1 to +3
Below building pads, greater than 10 feet of fill	98	*---	-1 to +2
Within 3 feet of pavement subgrade	100	*---	-2 to +1
More than 3 feet below pavement subgrade	95	*---	-1 to +3
Below landscaped surfaces	90	*---	-1 to +5

* The minimum moisture content should be no less than 5 percent and no more than 3 percentage points over optimum.

The project documents should not allow the contractor to use frozen material as engineered fill or to place engineered fill on frozen material. Frost should not penetrate under foundations during construction.

We recommend performing density tests in engineered fill to evaluate if the contractors are effectively compacting the soil and meeting project requirements.

C.3. Spread Footings

C.3.a. Embedment Depth

For frost protection, we recommend embedding perimeter footings of the proposed houses, including attached garages, a minimum of 42 inches below the lowest exterior grade. Interior footings may be placed directly below floor slabs unless they will be subjected to freezing. We recommend embedding building footings not heated during winter construction, and other unheated footings associated with decks, porches, stoops, or sidewalks 60 inches below the lowest exterior grade.

C.3.b. Subgrade Improvement

If a small amount of groundwater is present within the footing excavation, or if the footing subgrade soils become disturbed prior to placing forms or reinforcement, we recommend subcutting any soft or wet soil and placing a 6- to 12-inch layer of clear rock. The clear rock will provide a stable working surface and will allow for the flow of water to a drain tile or sump pump. Based on the sensitivity of the soils on this site, the builder should be prepared to complete this lot-by-lot-correction on some of the building pads during construction.

We recommend subcutting any shale soils a minimum of 4 feet below any foundation elements.

C.3.c. Net Allowable Bearing Pressure

We recommend sizing spread footings to exert a net allowable bearing pressure of up to 2,000 pounds per square foot (psf). This value includes a safety factor of at least 3.0 with regard to bearing capacity failure.

C.3.d. Settlement

We estimate that total and differential settlements among the footings will amount to less than 1 and 1/2 inch, respectively, under the assumed loads. If there are areas where more than 10 feet of fill is required, higher settlements could occur, unless the deeper fill areas are only filled with poorly graded sand (SP) or poorly graded sand with silt (SP-SM) fill.

If deep fill areas are completed using clay or loess soils, a construction delay may also be needed to allow the fill soils to consolidate under its own weight and the consolidation of loess/soft soils at depth. Construction delays could range from 3 to 12 months, depending on the type of fill used, the compaction level obtained in the fill and the thickness of the fill. The construction delays should be evaluated after grading is completed by using settlement plates to monitor the consolidation of the fill.

C.4. Basement Walls

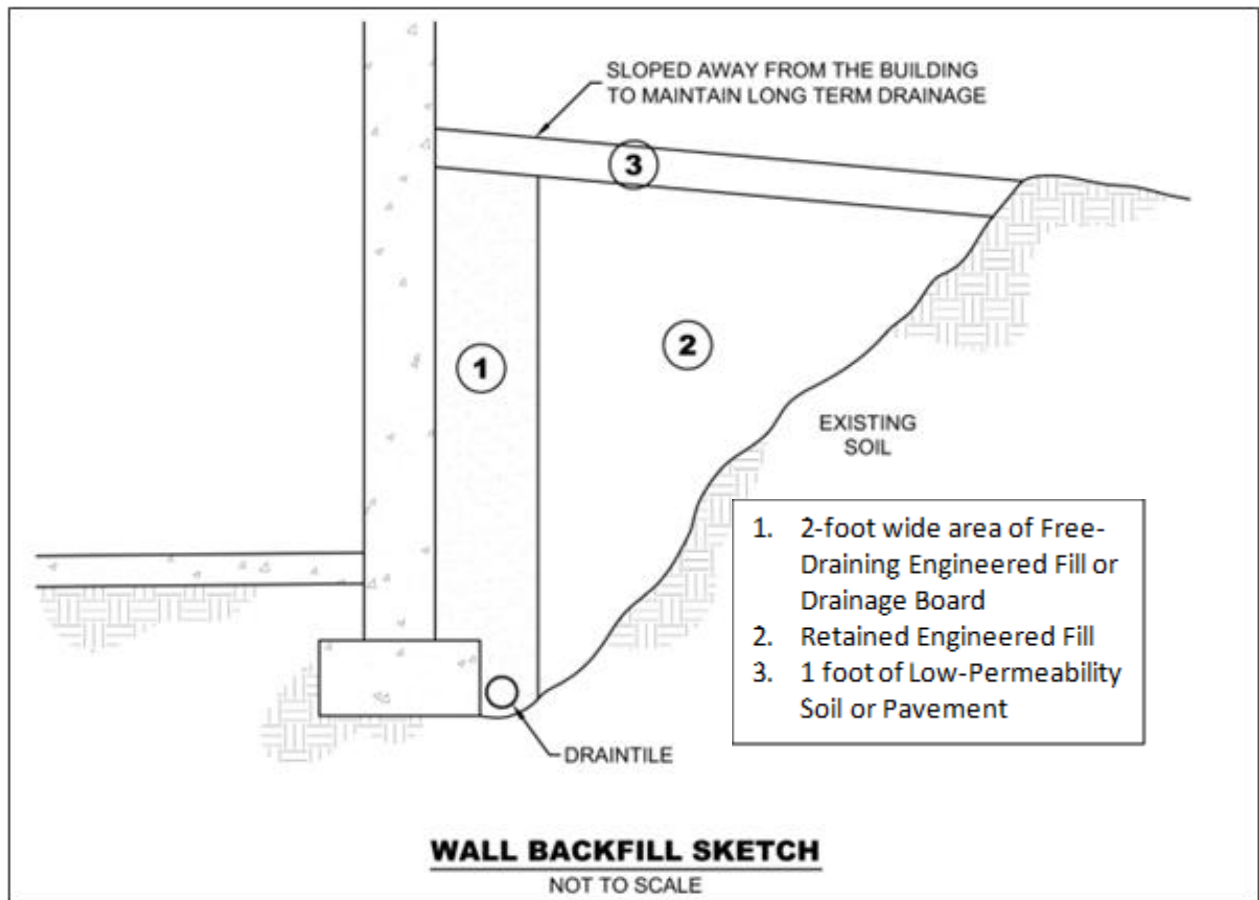
The following sections address soil parameters for basement wall design. However, the following recommendations can also be used for preliminary retaining wall design. Additional soil analysis, including additional soil borings, may be needed for final retaining wall design.

C.4.a. Drainage Control

We recommend installing drain tile to remove water behind the below-grade walls, at the location shown in Figure 2. The below-grade wall drainage system should also incorporate free-draining, engineered fill or a drainage board placed against the wall and connected to the drain tile.

Even with the use of free-draining, engineered fill, we recommend general waterproofing of below-grade walls that surround occupied or potentially occupied areas because of the potential cost impacts related to seepage after construction is complete.

Figure 2. Generalized Illustration of Wall Engineered Fill



The materials listed in the sketch should meet the definitions in Section C.2.i. The low-permeability material should be capable of directing water away from the wall, like clay, topsoil or pavement. The project documents should indicate if the contractor should brace the walls prior to filling and allowable unbalanced fill heights.

C.4.b. Configuring and Resisting Lateral Loads

Below-grade wall design can use active earth pressure conditions, if the walls can rotate slightly. If the wall design cannot tolerate rotation, then design should use at-rest earth pressure conditions. Rotation up to 0.002 times the wall height is generally required for walls supporting sand. Rotation up to 0.02 times the wall height is required when wall supports clay.

Table 6 presents our recommended equivalent fluid pressures for wall design of active, at-rest and passive earth pressure conditions. The table also provides recommended wet unit weights and internal friction angles. Designs should also consider the slope of any engineered fill and dead or live loads placed behind the walls within a horizontal distance that is equal to the height of the walls. Our recommended values assume the wall design provides drainage so water cannot accumulate behind the walls. The construction documents should clearly identify what soils the contractor should use for engineered fill of walls.

Table 6. Recommended Below-Grade Wall Design Parameters – Drained Conditions

Retained Soil	Wet Unit Weight (pcf)	Friction Angle (degrees)	Equivalent Active Fluid Pressure (pcf)	Equivalent At-Rest Fluid Pressure (pcf)	Equivalent Passive Fluid Pressure* (pcf)
On site or Imported Sand (SP, SP-SM)	120	33	35	55	N/A
Onsite Loess Soils (CL-ML, ML, CL)	125	26	49	70	320

*Based on Rankine model for soils in a region behind the wall extending at least 2 horizontal feet beyond the bottom outer edges of the wall footings and then rising up and away from the wall at an angle no steeper than 60 degrees from horizontal.

Sliding resistance between the bottom of the footing and the soil can also resist lateral pressures. We recommend assuming a sliding coefficient equal to 0.30 between the concrete and the loess/clayey soils and 0.40 between the concrete and sandy soils.

The values presented in this section are un-factored.

C.5. Interior Slabs

C.5.a. Moisture Vapor Protection

Excess transmission of water vapor could cause floor dampness, certain types of floor bonding agents to separate, or mold to form under floor coverings. If project planning includes using floor coverings or coatings, we recommend placing a vapor retarder or vapor barrier immediately beneath the slab. We also recommend consulting with floor covering manufacturers regarding the appropriate type, use and installation of the vapor retarder or barrier to preserve warranty assurances.

C.5.b. Radon

We recommend installing radon resistant construction components for the proposed building, including appropriate sub-slab material and vent piping, if required by applicable local building codes. Our radon mitigation professionals can assist with evaluation of site-specific radon resistant construction requirements and/or design of a system, at your request.

C.6. Frost Protection

C.6.a. General

Most native soils on the site were generally lean clays and silts. We consider these soils to be moderately to highly frost susceptible. Soils of this type can retain moisture and heave upon freezing. In general, this characteristic is not an issue unless these soils become saturated, due to surface runoff or infiltration, or are excessively wet in situ. Once frozen, unfavorable amounts of general and isolated heaving of the soils and the surface structures supported on them could develop. This type of heaving could affect design drainage patterns and the performance of exterior slabs and pavements, as well as any isolated exterior footings and piers.

Note that general runoff and infiltration from precipitation are not the only sources of water that can saturate subgrade soils and contribute to frost heave. Roof drainage and irrigation of landscaped areas in close proximity to exterior slabs, pavements, and isolated footings and piers, contribute as well.

C.6.b. Frost Heave Mitigation

To address most of the heave related issues, we recommend setting general site grades and grades for exterior surface features to direct surface drainage away from buildings, across large paved areas and away from walkways. Such grading will limit the potential for saturation of the subgrade and subsequent heaving. General grades should also have enough “slope” to tolerate potential larger areas of heave, which may not fully settle after thawing.

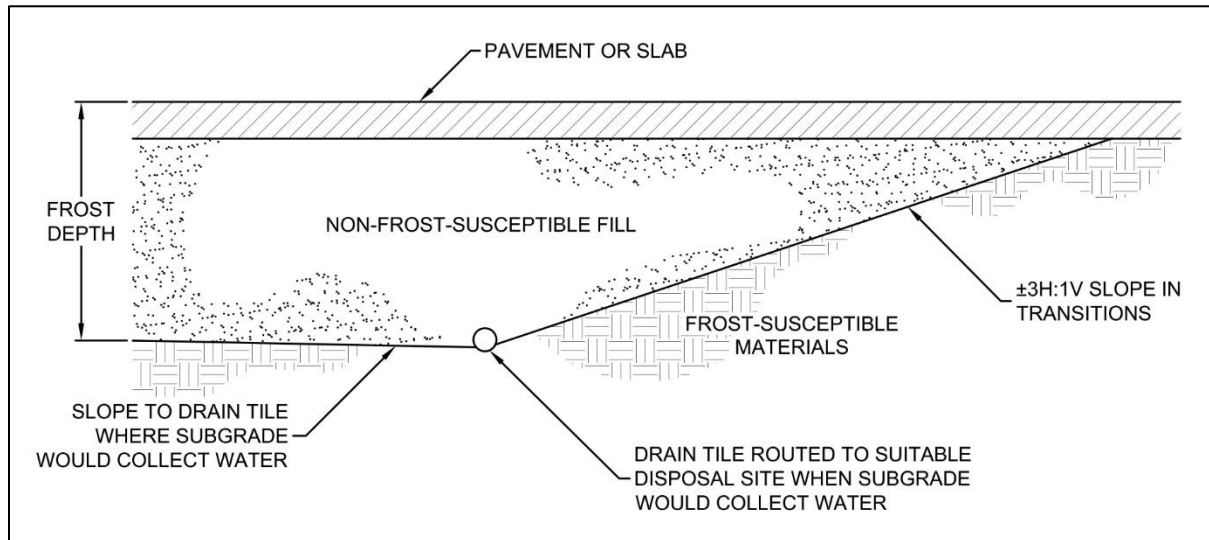
Even small amounts of frost-related differential movement at walkway joints or cracks can create tripping hazards. Project planning can explore several subgrade improvement options to address this condition.

One of the more conservative subgrade improvement options to mitigate potential heave is removing any frost-susceptible soils present below the exterior slab areas down to a minimum depth of 3 feet below subgrade elevations. We recommend filling the resulting excavation with non-frost-susceptible fill. We also recommend sloping the bottom of the excavation toward one or more collection points to remove any water entering the engineered fill. This approach will not be effective in controlling frost heave without removing the water.

An important geometric aspect of the excavation and replacement approach described above is sloping the banks of the excavations to create a more gradual transition between the unexcavated soils considered frost susceptible and the engineered fill in the excavated area, which is not frost susceptible. The slope allows attenuation of differential movement that may occur along the excavation boundary. We recommend slopes that are 3H:1V, or flatter, along transitions between frost-susceptible and non-frost-susceptible soils.

Figure 3 shows an illustration summarizing some of the recommendations.

Figure 3. Frost Protection Geometry Illustration



Another option is to limit frost heave in critical areas, such as doorways and entrances, via frost-depth footings or localized excavations with sloped transitions between frost-susceptible and non-frost-susceptible soils, as described above.

Over the life of slabs and pavements, cracks will develop and joints will open up, which will expose the subgrade and allow water to enter from the surface and either saturate or perch atop the subgrade soils. This water intrusion increases the potential for frost heave or moisture-related distress near the crack or joint. Therefore, we recommend implementing a detailed maintenance program to seal and/or fill any cracks and joints. The maintenance program should give special attention to areas where dissimilar materials abut one another, where construction joints occur and where shrinkage cracks develop.

C.7. Pavements

C.7.a. Design Sections

Our scope of services for this project did not include laboratory tests on subgrade soils to determine an R-value for pavement design. Based on our experience with similar loess soils anticipated at the pavement subgrade elevation, we recommend pavement design assume an R-value of 12. Note the contractor may need to perform limited removal of unsuitable or less suitable soils to achieve this value. The pavements can be design using the city's standard templates.

We assume the pavement section will be designed in accordance with the City of Rochester Standard Plates, including layer thickness and material specifications.

In the event there are areas of the site in which City standards are not required, we recommend the following. We have assumed that pavements for residential development will be subject to a maximum of 150,000 ESALs over a 20-year design life. Based upon the traffic volume and an R-value estimate of 12, we recommend a bituminous pavement section that includes a minimum of 4 inches of bituminous pavement (a 12-inch wear course over a 2-inch base course) over 8 inches of aggregate base material over a minimum of 18 inches of select granular borrow. Additional select granular borrow maybe required during construction will help to support the roadways in areas of wet or unstable moisture sensitive clay and silt soils.

C.7.b. Subgrade Drainage

We recommend installing perforated drainpipes throughout pavement areas at low points, around catch basins, and behind curb in landscaped areas. We also recommend installing drainpipes along pavement and exterior slab edges where exterior grades promote drainage toward those edge areas. The contractor should place drainpipes in small trenches, at the base of the granular subbase layer, or in shallow trenches just below the aggregate base material where no subbase is present.

C.7.c. Performance and Maintenance

Many conditions affect the overall performance of the exterior slabs and pavements. Some of these conditions include the environment, loading conditions and the level of ongoing maintenance. With bituminous pavements, it is common to have thermal cracking develop within the first few years of placement, and continue throughout the life of the pavement. We recommend developing a regular maintenance plan for filling cracks in exterior slabs and pavements to lessen the potential impacts for cold weather distress due to frost heave or warm weather distress due to wetting and softening of the subgrade.

C.8. Utilities

C.8.a. Subgrade Stabilization

Earthwork activities associated with utility installations located inside the building area should adhere to the recommendations in Section C.2. Dewatering may be needed for utility installations that extends below elevation of 1030 feet (MSL).

For exterior utilities, we anticipate the soils at typical invert elevations will be suitable for utility support. However, if construction encounters unfavorable conditions such as soft clay, organic soils or perched water at invert grades, the unsuitable soils may require some additional subcutting and replacement with sand or crushed rock to prepare a proper subgrade for pipe support. Project design and construction should not place utilities within the 1H:1V oversizing of foundations.

C.8.b. Selection, Placement, and Compaction of Backfill

We recommend selecting, placing and compacting utility backfill in accordance with the recommendations provided above in Section C.2.i.

C.8.c. Corrosion Potential

Based on our experience, the soils encountered by the borings are moderately corrosive to metallic conduits, but only marginally corrosive to concrete. We recommend specifying non-corrosive materials or providing corrosion protection, unless project planning chooses to perform additional tests to demonstrate the soils are not corrosive.

C.9. Stormwater

We estimated infiltration rates for some of the soils we encountered in our soil borings, as listed in Table 7. These infiltration rates represent the long-term infiltration capacity of a practice and not the capacity of the soils in their natural state. Field testing, such as with a double-ring infiltrometer (ASTM D3385), may justify the use of higher infiltration rates. However, we recommend adjusting field test rates by the appropriate correction factor, as provided for in the Minnesota Stormwater Manual or as allowed by the local watershed. We recommend consulting the Minnesota Stormwater Manual for stormwater design.

Table 7. Estimated Design Infiltration Rates Based on Soil Classification

Soil Type	Infiltration Rate * (inches/hour)
Sands with less than 12% fines, poorly graded or well graded sands	0.8
Silts, very fine sands, silty or clayey fine sands	0.2
Clayey sands and clays	Not Recommended

* From Minnesota Stormwater Manual. Rates may differ at individual sites.

Fine-grained soils (silts and clays), topsoil or organic matter that mixes into or washes onto the soil will lower the permeability. The contractor should maintain and protect infiltration areas during construction. Furthermore, organic matter and silt washed into the system after construction can fill the soil pores and reduce permeability over time. Proper maintenance is important for long-term performance of infiltration systems.

This geotechnical evaluation does not constitute a review of site suitability for stormwater infiltration or evaluate the potential impacts, if any, from infiltration of large amounts of stormwater.

D. Procedures

D.1. Penetration Test Borings

We drilled the penetration test borings with an off-road-mounted core and auger drill equipped with hollow-stem auger. We performed the borings in general accordance with ASTM D6151 taking penetration test samples at 2 1/2- or 5-foot intervals in general accordance with ASTM D1586. The boring logs show the actual sample intervals and corresponding depths.

We sealed penetration test boreholes meeting the Minnesota Department of Health (MDH) Environmental Borehole criteria with an MDH-approved grout, and sealing records submitted, as required.

D.2. Exploration Logs

D.2.a. Log of Boring Sheets

The Appendix includes Log of Boring sheets for our penetration test borings. The logs identify and describe the penetrated geologic materials and present the results of penetration resistance tests performed. The logs also present the results of laboratory tests performed on penetration test samples, and groundwater measurements.

We inferred strata boundaries from changes in the penetration test samples and the auger cuttings. Because we did not perform continuous sampling, the strata boundary depths are only approximate. The boundary depths likely vary away from the boring locations, and the boundaries themselves may occur as gradual rather than abrupt transitions.

D.2.b. Geologic Origins

We assigned geologic origins to the materials shown on the logs and referenced within this report, based on: (1) a review of the background information and reference documents cited above, (2) visual classification of the various geologic material samples retrieved during the course of our subsurface exploration, (3) penetration resistance testing performed for the project, (4) laboratory test results, and (5) available common knowledge of the geologic processes and environments that have impacted the site and surrounding area in the past.

D.3. Material Classification and Testing

D.3.a. Visual and Manual Classification

We visually and manually classified the geologic materials encountered based on ASTM D2488. When we performed laboratory classification tests, we used the results to classify the geologic materials in accordance with ASTM D2487. The Appendix includes a chart explaining the classification system we used.

D.3.b. Laboratory Testing

The exploration logs in the Appendix note the results of the laboratory tests performed on geologic material samples. We performed the tests in general accordance with ASTM procedures.

D.4. Groundwater Measurements

The drillers checked for groundwater while advancing the penetration test borings, and again after auger withdrawal. We then filled the boreholes, as noted on the boring logs.

E. Qualifications

E.1. Variations in Subsurface Conditions

E.1.a. Material Strata

We developed our evaluation, analyses and recommendations from a limited amount of site and subsurface information. It is not standard engineering practice to retrieve material samples from exploration locations continuously with depth. Therefore, we must infer strata boundaries and thicknesses to some extent. Strata boundaries may also be gradual transitions, and project planning should expect the strata to vary in depth, elevation and thickness, away from the exploration locations.

Variations in subsurface conditions present between exploration locations may not be revealed until performing additional exploration work, or starting construction. If future activity for this project reveals any such variations, you should notify us so that we may reevaluate our recommendations. Such variations could increase construction costs, and we recommend including a contingency to accommodate them.

E.1.b. Groundwater Levels

We made groundwater measurements under the conditions reported herein and shown on the exploration logs, and interpreted in the text of this report. Note that the observation periods were relatively short, and project planning can expect groundwater levels to fluctuate in response to rainfall, flooding, irrigation, seasonal freezing and thawing, surface drainage modifications and other seasonal and annual factors.

E.2. Continuity of Professional Responsibility

E.2.a. Plan Review

We based this report on a limited amount of information, and we made some assumptions to help us develop our recommendations. We should be retained to review the geotechnical aspects of the designs and specifications. This review will allow us to evaluate whether we anticipated the design correctly, if any design changes affect the validity of our recommendations, and if the design and specifications correctly interpret and implement our recommendations.

E.2.b. Construction Observations and Testing

We recommend retaining Braun Intertec to perform the required observations and testing during construction as part of the ongoing geotechnical evaluation. This will allow us to correlate the subsurface conditions exposed during construction with those encountered by the borings and provide professional continuity from the design phase to the construction phase. If we do not perform observations and testing during construction, it becomes the responsibility of others to validate the assumption made during the preparation of this report and to accept the construction-related geotechnical engineer-of-record responsibilities.

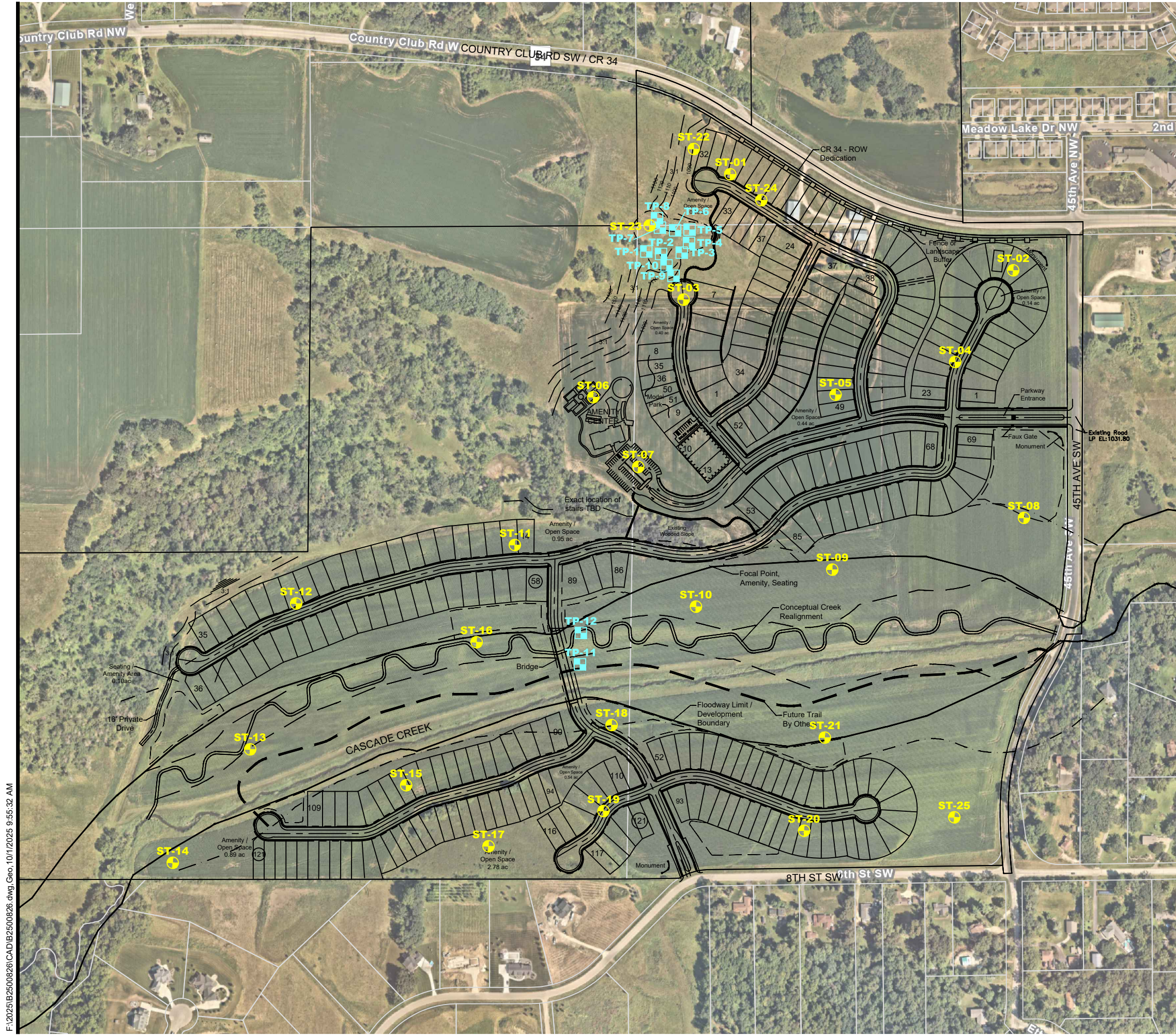
E.3. Use of Report

This report is for the exclusive use of the addressed parties. Without written approval, we assume no responsibility to other parties regarding this report. Our evaluation, analyses and recommendations may not be appropriate for other parties or projects.

E.4. Standard of Care

In performing its services, Braun Intertec used that degree of care and skill ordinarily exercised under similar circumstances by reputable members of its profession currently practicing in the same locality. No warranty, express or implied, is made.

Appendix



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Drawing Information

Project No:	B2500826
Drawing No:	B2500826
Drawn By:	BJB
Date Drawn:	2/19/25
Checked By:	SN
Last Modified:	10/1/25

Project Information

Nigon Property

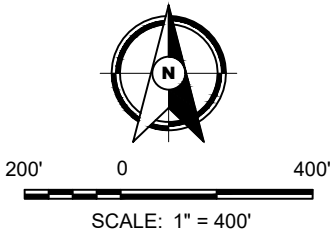
4700 Country Club Road

Rochester, Minnesota

Soil Boring
Location Sketch

 **DENOTES APPROXIMATE LOCATION OF
STANDARD PENETRATION TEST BORING**

 **DENOTES APPROXIMATE LOCATION OF
TEST PIT**



A light gray topographic map with contour lines is visible in the background of the top half of the page.

APPENDIX D

Desktop and Field Verification Decorah Edge Study

September 11, 2025

Mr. Mark Rausch, PE
Alliant Engineering, Inc.
7333 Marquette Avenue, Suite 700
Minneapolis, Minnesota 55402

Re: **Desktop and Field Verification Decorah Edge Study**
Rochester-Nigon Property
4700 Country Club Road
Rochester, Minnesota
Bay West Project Number: J250490

Dear Mr. Rausch:

Bay West LLC (Bay West) is pleased to provide this Desktop and Field Verification Decorah Edge Study associated with the assessment of the potential presence of the Decorah Shale on the subject property (the Site) based on published data and field verified. The Site location is depicted on Figure 1.

1.0 BACKGROUND

Bay West was contacted pertaining to a review of a 179-acre property located at the southwest corner of the intersection of Country Club Drive SW and 45th Avenue SW for potential Decorah Edge geologic features associated with a delineated wetland on the property. The wetland was delineated by Kjolhaug Environmental Services (Kjolhaug) and documented in their Wetland Delineation Report dated June 10, 2025, and as revised per TEP review and comments. Bay West has georeferenced the wetland location on to our figures used in this document.

The “Decorah Edge” is defined in the Olmsted County Wetland Conservation ordinance as:

- The Decorah, Platteville, or Glenwood formation is the first encountered bedrock according to “C-49 Geologic Atlas of Olmsted County, Minnesota” produced by the Minnesota Geological Survey, University of Minnesota, 2020 “specifically Plate 2 Bedrock Geology;
- Areas where the depth to bedrock of less than twenty-five feet according to the according to “C-49 Geologic Atlas of Olmsted County, Minnesota” Specifically Plate 6 Bedrock Topography as modified by field investigation, reliable well logs, or more precise mapping; and,
- Along with contiguous adjacent areas with the Cummingsville or higher formations as the first encountered bedrock according to “C-49 Geologic Atlas of Olmsted County, Minnesota” produced by the Minnesota Geological Survey, University of Minnesota, 2020 specifically Plate 2 Bedrock Geology.

City of Rochester Decorah Edge Feature Map Review

The City of Rochester Decorah Edge Feature Map (Map) was prepared by the Rochester-Olmsted Planning Department Long Range Division on October 24, 2006 (Figure 2). The Map denotes the potential areas

where the Decorah Shale or higher formations or the presence of buffer features and hydric soil are present.

The Map defines the occurrence of the Decorah Edge features where the Decorah, Platteville, or Glenwood is the first encountered bedrock, AND depth to bedrock is less than 25 feet, AND where the Decorah abuts the Cummingsville formation. Areas where the Decorah Shale is isolated from the Cummingsville are not subject to the Decorah Edge regulations.

The Map was derived from the "Bedrock Geology: Steele, Dodge, Olmsted, and Winona Counties" and "Depth to Bedrock: Steele, Dodge, Olmsted, and Winona Counties" produced by the Minnesota Geological Survey, University of Minnesota in 2004. It also relies on the Olmsted County Soil Survey published by the US Soil Conservation Service in 1978.

A review of the Map indicates that Potential Edge Soil is present on the subject property. The Map denotes the presents of the Decorah Edge feature along the northwest portion of the property along with an area denoted as 1000' ESA Buffer in Decorah Edge.

Each bedrock unit in the region is distinct and unique, and readily identifiable both in outcrop and well logs. The geologic units important to this Decorah Edge investigation, from youngest (top) to oldest (bottom) rocks are noted below:

Stewartville Formation — Yellowish-gray, dolomitic limestone and dolostone

Prosser Formation — Light tan to grayish-brown, very fine-grained, thin bedded limestone

Cummingsville Formation — Limestone interbedded with shale

Decorah Shale — Fossiliferous, green-gray shale with thin interbeds of blue-gray, densely fossiliferous limestone

Platteville and Glenwood Formations — Tan to gray limestone and dolostone

St. Peter Sandstone — Fine- to medium-grained, whitish-tan, quartzose sandstone

Shakopee Formation — Tan to gray dolostone, sandy dolostone, and sandstone

C-49 Geologic Atlas of Olmsted County Review

The subject property was reviewed for the presence of Decorah Shale using C-49 Geologic Atlas of Olmsted County Plate 2 Bedrock Geology and the depth to bedrock was reviewed based on Plate 6 Bedrock Topography.

Based on C-49 Geologic Atlas of Olmsted County Plate 2 (Figure 3) denotes the general bedrock observed at the subject property includes the Cummingsville Formation, Decorah Shale, Platteville and Glenwood Formations, St. Peter Sandstone and Prairie Du Chein Group. The Cummingsville Formation and Decorah Shale are limited to the topographic high in the northwest property area in the western portion of the subject property.

Based on C-49 Geologic Atlas of Olmsted County Plate 6 (Figure 4) the generalized underlying bedrock surface elevation was denoted entirely at an elevation from 951 to 1,150 feet above mean sea level (amsl). Figure 4 indicates the northwestern area hillside appears to have a potential bedrock elevation from 1051 to 1150 feet amsl and using the contours presented by Kjolhaug (Wetland Delineation Report Figure 2) the surface contours appear to be 1,180 at the top of the hillside. However, the elevation on Figure 2 indicated large changes and it appears that there is potential for bedrock to be located within 25 feet of the ground surface across the higher hillside areas.

A review of the available geological information indicates that the presence of the Decorah Shale is limited to the area as denoted along the northwest hillside of the subject property (Figure 4). This appears to support the previous conclusion that Decorah Edge conditions may be associated with the hillside wetland in the northwestern portion of the subject property.

Minnesota Department of Health Minnesota Well Index Review

The Minnesota Well Index (MWI) is a Minnesota Department of Health (MDH) database that provides basic information about wells and borings in Minnesota. The MWI is maintained by the Minnesota Geological Survey (MGS) in partnership with the MDH and the data are derived from well contractors' logs of geologic materials encountered during drilling and later interpreted by geologists at the MGS. The MWI information includes information such as: location, depth, geology, construction, and static water level. The following well logs were reviewed for the presence of Decorah Shale, or higher (younger) geologic units and their location is depicted on Figure 5:

Unique Well ID	First MGS Bedrock	MGS Aquifer	Direction/Distance from Site	Depth and Elevation of first bedrock unit*	Comments
101504	Opg	Ej	300 feet east of SE corner of property	0/1083	Decorah Shale not present
150349	Od	Pdc	4,400 feet west of west property line	5/1113	Decorah Shale elevation 1113
188856	Opg	Pdc	4,200 feet west of west property line	30/1077	Decorah Shale not present
227796	Ogc	Os/Pdc	1,800 feet west of west property line	22/1179	Decorah Shale elevation 1121
227797	Ogp	Multiple	2,400 feet west of west property line	10/1209	Decorah Shale elevation 1141
437194	Opg	Ej	500 feet east of SE corner of property	34/1065	Decorah Shale not present
787430	Ogc	Pdc	2,900 feet west of west property line	13/1193	Decorah Shale elevation 1129

*= Based on the MGS identified first bedrock unit associated with the well elevation.

Ogp – Prosser Formation

Ogc – Cummingsville Formation

Od – Decorah Shale

Opg – Platteville and Glenwood Formations

Os - St. Peter Sandstone

Pdc - Prairie Du Chien Group

Ej – Jordan Sandstone

The water well logs for wells to the west and northwest of the property present Decorah Shale in the associated well log descriptions with the exception of Well 188856 which had the first bedrock encountered as the Platteville and Glenwood Formations. The average elevation of the Decorah Shale was 1126 MSL. Well logs to the west and southwest of the southeast corner of the property had a first bedrock encountered of Platteville and Glenwood Formations and did not encounter the Decorah Shale or other Galena Group member bedrock units.

Well logs from the MDH MWI associated with the reference Unique Wells are presented in Attachment A and are spatially represented on Figure 5.

2.0 DESKTOP STUDY RESULTS

Based on the reference material outlined in the Olmsted County Wetland Conservation Ordinance for the site and the surrounding area, it appears that the Decorah Shale may be present in the higher elevations along the western property line. The bedrock elevation referenced in the MGS publication indicates that for the subject property area may have a depth to bedrock less than 25-feet in the northwestern portion of the property at higher elevations. Therefore, Bay West recommends additional field verification of the presence of bedrock within 25-feet of the surface and identify the initial bedrock unit in the upslope area of the hillside wetland identified by Kjolhaug (Wetland Delineation Report Figure 2). In addition, we recommend the field verification of the wetland boundaries and associated water table.

3.0 FIELD VERIFICATION STUDY

Based on the Desktop Study a field study was conducted on July 31, 2025, that included the advancement of one test boring at a location upslope from the delineated hillside wetland in the northwestern portion of the property along with the advancement of 10 test pits as step outs to the delineated boundary of the Decorah Shale related to the delineated wetland boundary. The test boring and test pit locations are denoted on Figure 6. The test boring and test pits were advanced to determine the presence of the Decorah Shale associated with the wetland and the influence associated with the wetland.

Test Pit Results

On July 31, 2025, Bay West and Kjolhaug observed the advancement of 10 test pits along the delineated wetland boundary to evaluate the presence of the Decorah Shale and the potential for a water table associated with the wetland feature. Appendix A presents the photos of the test pits. The table below summarizes the results:

Test Pit ID	Test Pit Depth	Presence of Water (depth)	Depth to Decorah (in feet below ground surface)
TP01	5 feet	No	3 feet
TP02	5 feet	Yes (2.5 feet)	2.5 feet
TP03	6 feet	No	3.5 feet
TP04	7 feet	No	3.5
TP05	8.5 feet	No	>8.5 feet
TP06	8.5 feet	Yes (8 feet)	Not present
TP07	8 feet	Yes (8 feet)	Not present
TP08	6.5 feet	No	3 feet

Test Pit ID	Test Pit Depth	Presence of Water (depth)	Depth to Decorah (in feet below ground surface)
TP09	6 feet	No	>6 feet
TP10	6.5 feet	No	6 feet

Based on the Test Pits it appears that TP02 encounters the Decorah Shale and has the presence of a water table less than 5 feet. A water table was also encountered in at TB06 and TB07 at a depth of 8 to 8.5 feet below the ground surface but did not encounter the Decorah Shale. A photolog of the test pits are presented in Attachment B.

Soil Boring Result

On July 31, 2025, Bay West observed the advancement of one soil boring by Braun Intertec (Braun) upslope from the delineated wetland to determine depth to bedrock. Results from this one boring indicated the presence of the Decorah Shale around 7-feet below ground surface and competent bedrock encountered at 20 feet below ground surface. The soil boring log can be found in Appendix B.

4.0 CONCLUSIONS

Based on the desktop and field study results it appears that the identified hillside wetland is influenced by the Decorah Shale with the Decorah Shale and water table denoted at TP-02. TP-06 and TP-07. The Decorah Shale was denoted as several other test pits but was not associated with a water table. The water table at TP-06 and TP-07 was denoted at approximately 8 feet below ground surface and the Decorah Shale was not present at that elevation. The Decorah Shale influence boundaries is outlined in Figure 6 along with the TEP revised delineated wetland boundary. Other Decorah Edge influenced wetlands are not observed on the property.

5.0 STANDARD OF CARE

Bay West appreciates the opportunity to complete this Desktop Decorah Edge Study for Alliant Engineering. If you have any questions or concerns regarding this project, please contact us using the information provided below.

Respectfully Submitted,



Bruce Johnson, PG (MN, TN, WI)
Senior Geologist/Senior Project Manager



Keith Rapp, PG (MN, MO, NE, NH)
Senior Hydrogeologist

FIGURES

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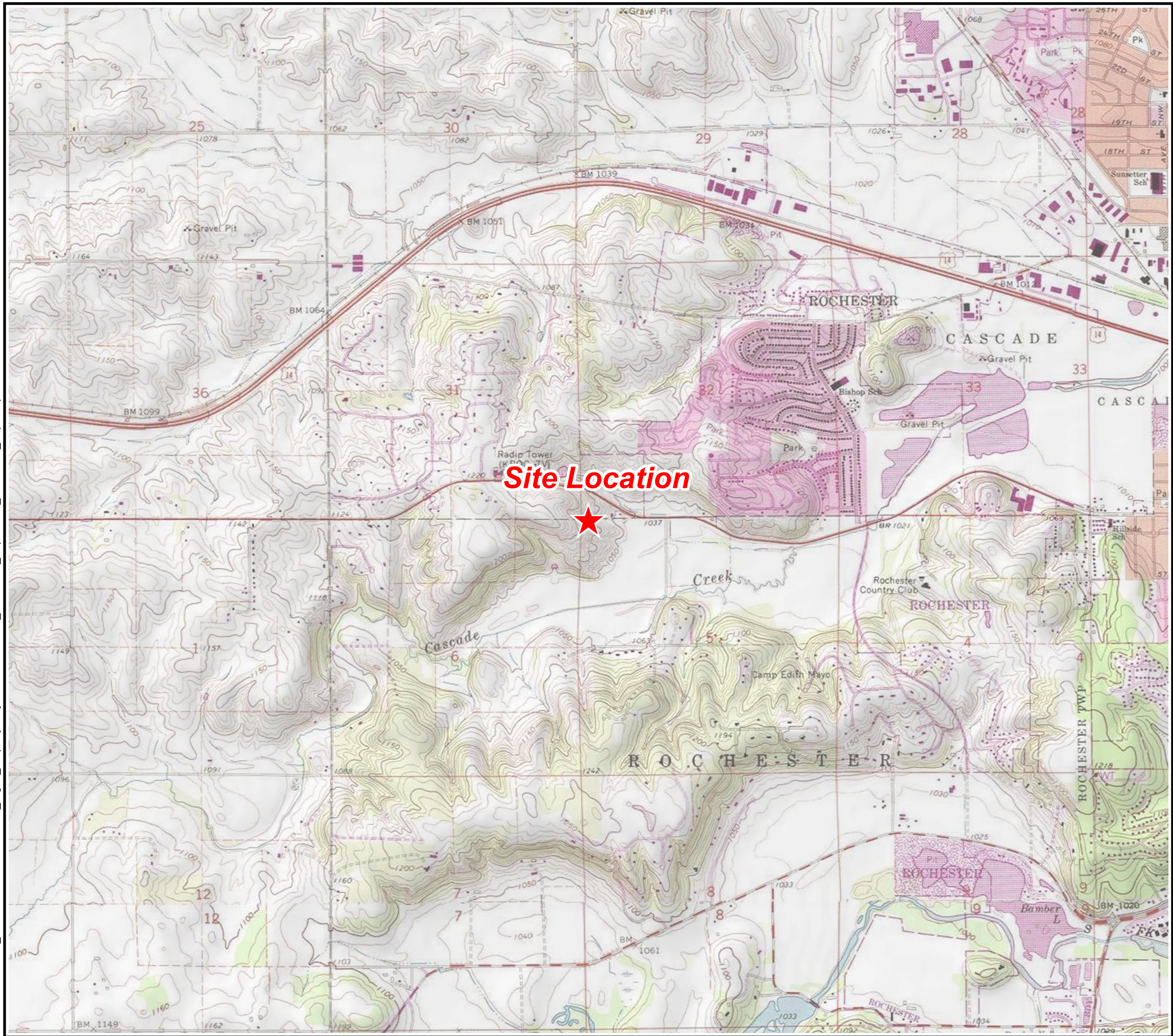


Figure 1

Site Location Map

Rochester-Nigon Property

4700 Country Club Rd W
Rochester, MN 55902



Map Projection: NAD 1983 UTM Zone 15 N, Meters
Basemap: ESRI USA Topo Maps WMS



Site Location



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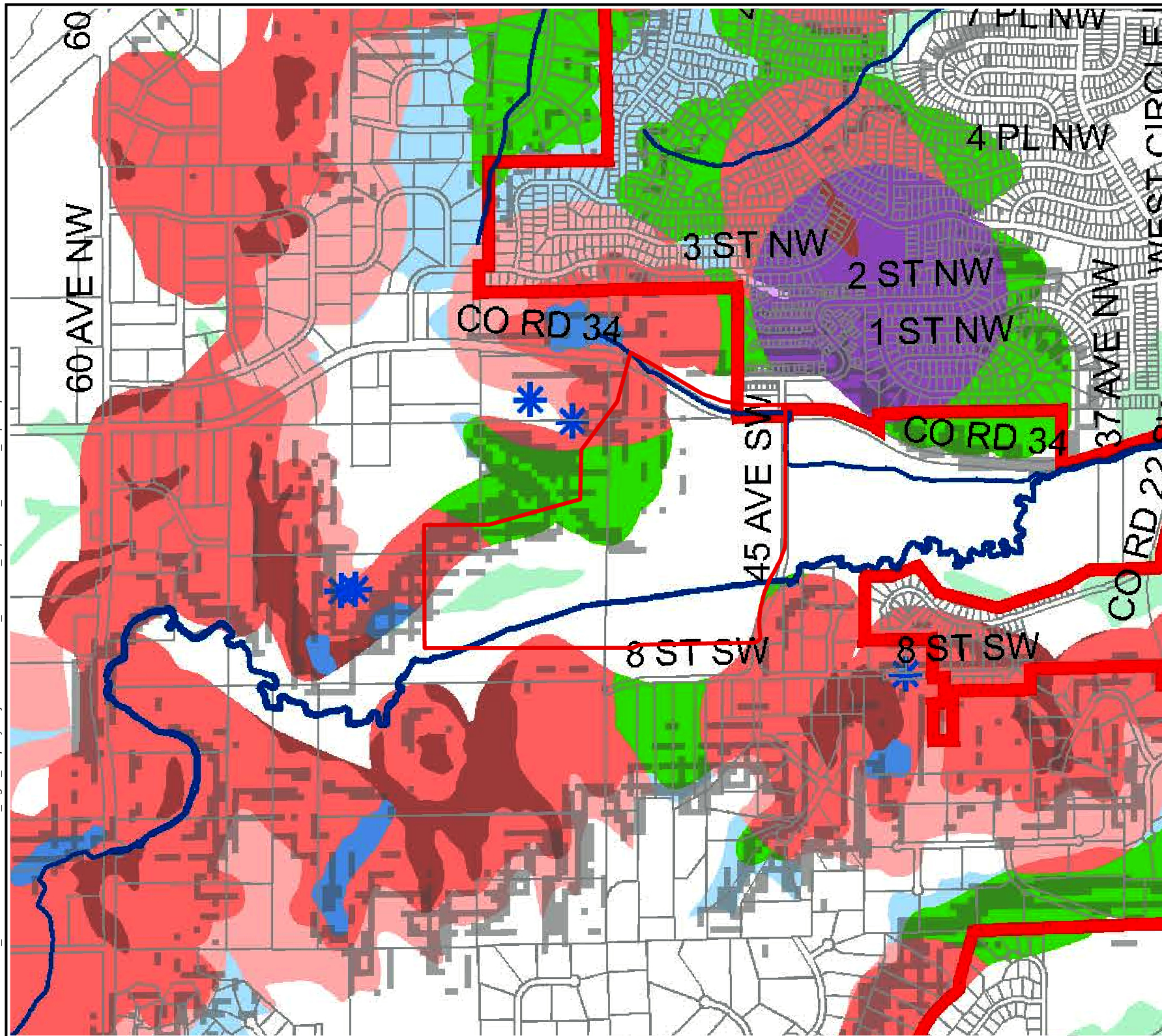
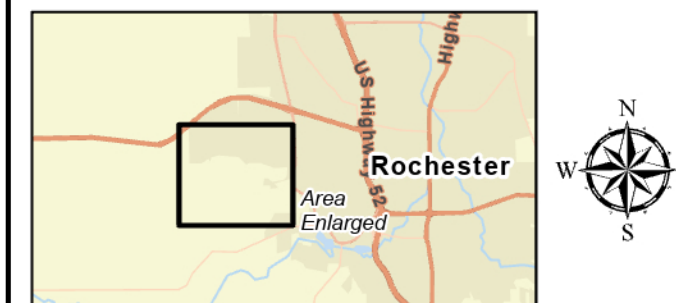


Figure 2

Decorah Edge Map

Rochester-Nigon Property

4700 Country Club Rd W
Rochester, MN 55902



Map Projection: NAD 1983 UTM Zone 15 N, Meters
Basemap: City of Rochester Minnesota Geological Survey



- Site Boundary
- Streams
- City Limits (9/06)
- Parcel Boundaries (9/06)
- Slope 18+%
- Springs 2005
- 50' Buffer of Springs in Edge
- 50' Buffer of Seeps in Edge
- Potential Edge Soils
- 1000' ERZ Buffer in Decorah Edge
- 1000' ERZ Buffer in Cummingsville
- 1000' ESA Buffer in Decorah Edge
- 1000' ESA Buffer in Cummingsville
- Decorah Edge
- Cummingsville Formation
- Hydric Soils



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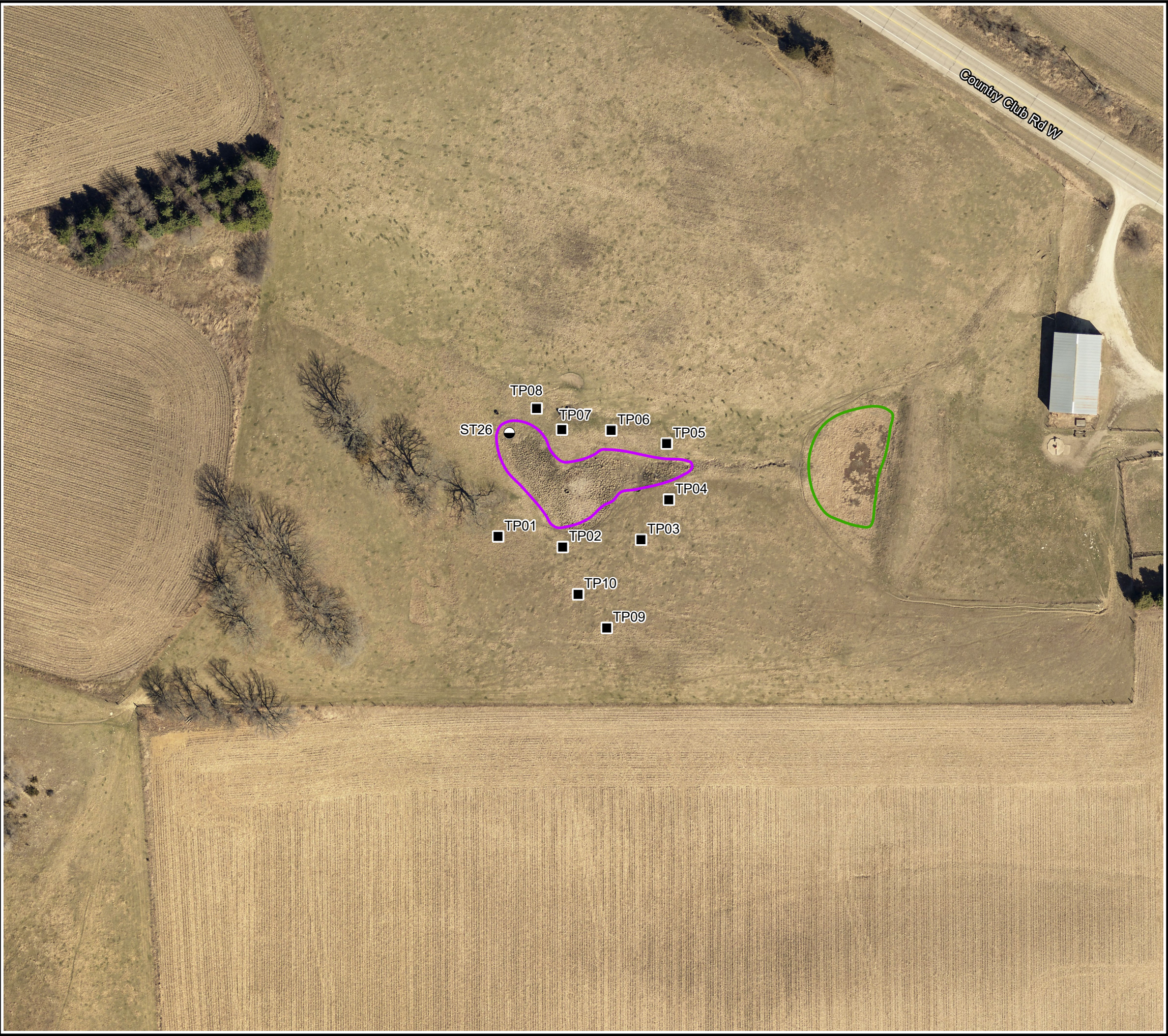
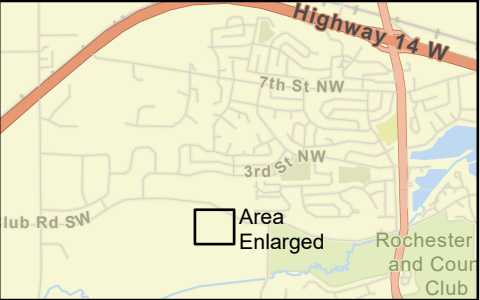


Figure 2

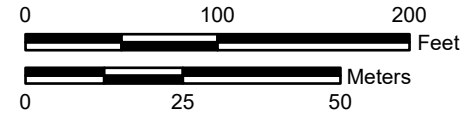
Site Map

Rochester-Nigon Property

4700 Country Club Rd W
Rochester, MN 55902



Map Projection: NAD 1983 UTM Zone 15 N, Meters
Basemap: ESRI World Imagery WMS



- Soil Boring
- Test Pit
- ▭ Incidental Wetland or Non-Wetland
- ▭ Wetland



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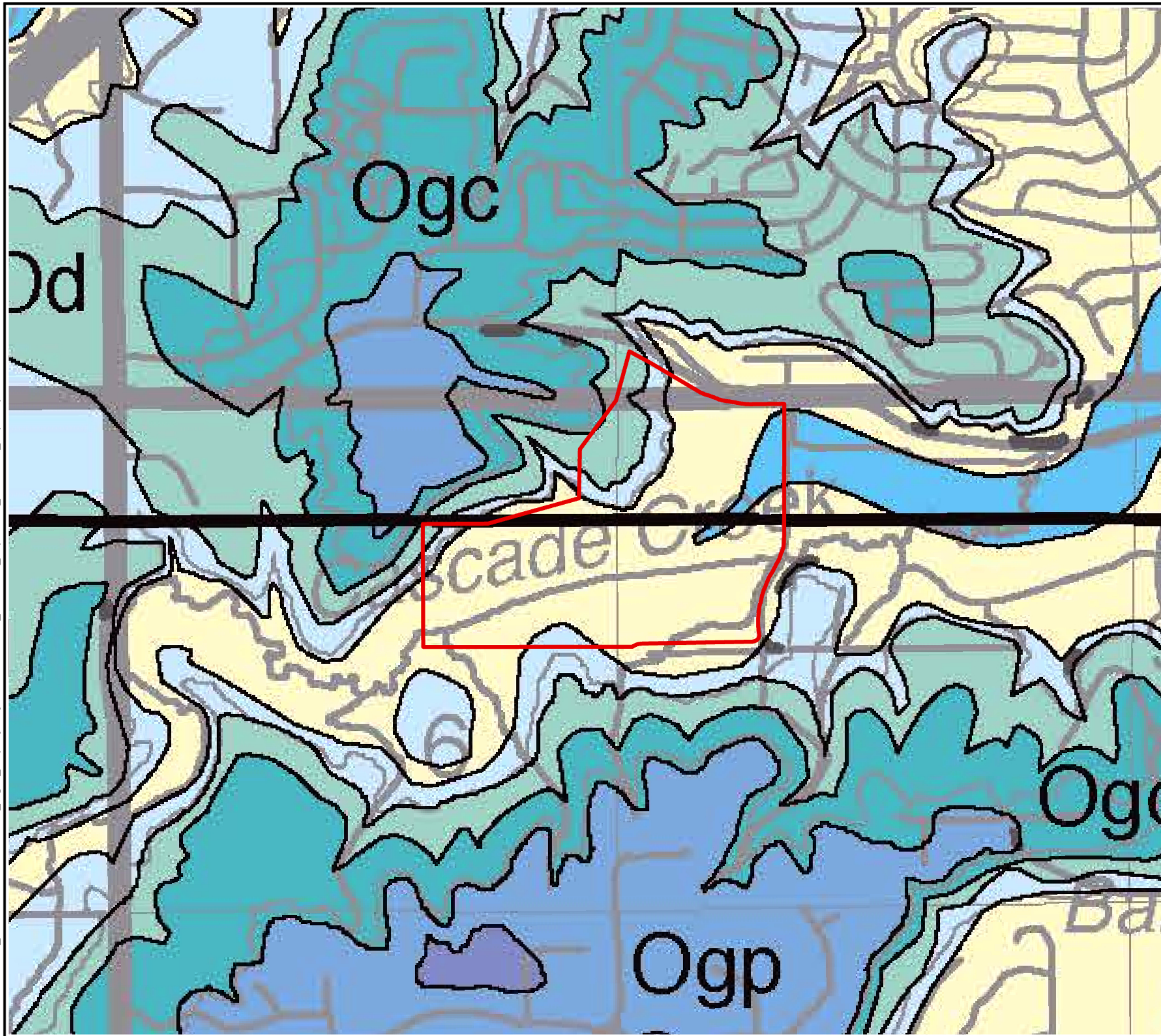
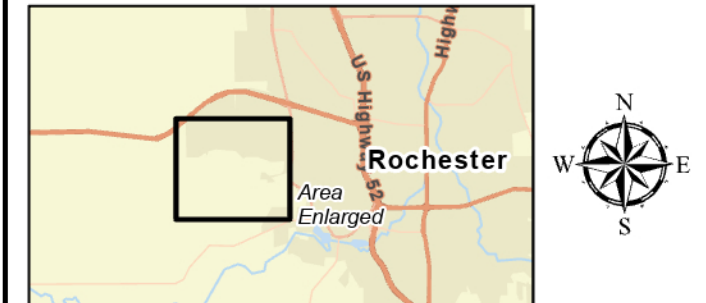


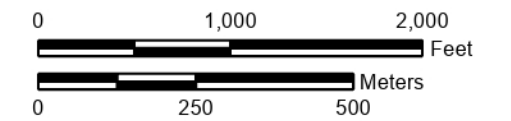
Figure 3 MGS Bedrock Map (Plate 2)

Rochester-Nigon Property

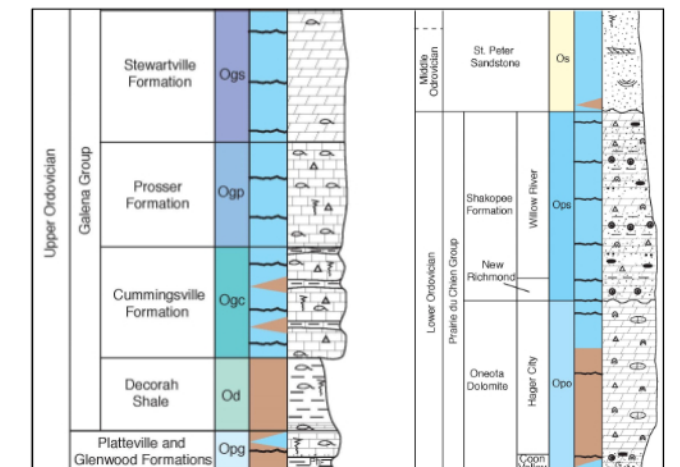
4700 Country Club Rd W
Rochester, MN 55902



Map Projection: NAD 1983 UTM Zone 15 N, Meters
Basemap: City of Rochester Minnesota Geological Survey



 Site Boundary



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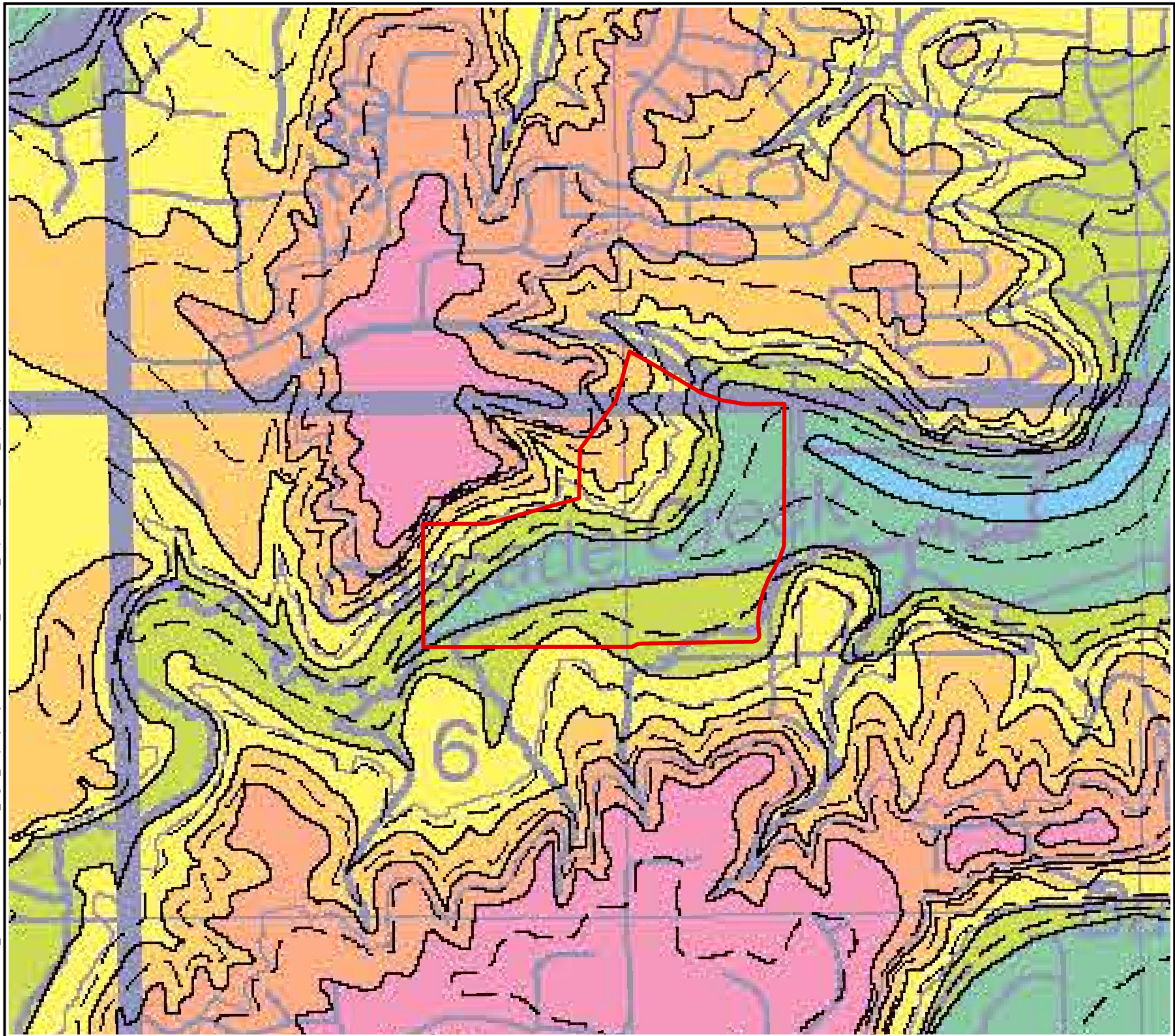
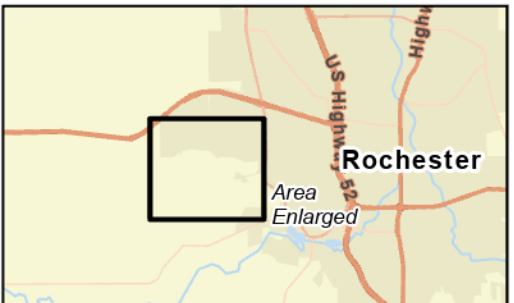


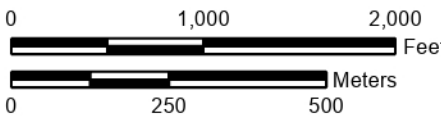
Figure 4 MGS Bedrock Map (Plate 6)

Rochester-Nigon Property

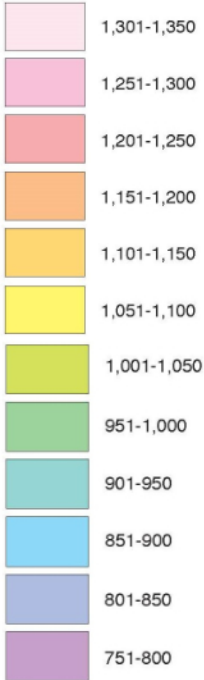
4700 Country Club Rd W
Rochester, MN 55902



Map Projection: NAD 1983 UTM Zone 15 N, Meters
Basemap: City of Rochester Minnesota Geological Survey



Site Boundary



Notes:
Elevation of the bedrock surface and legend is in feet above mean sea level.



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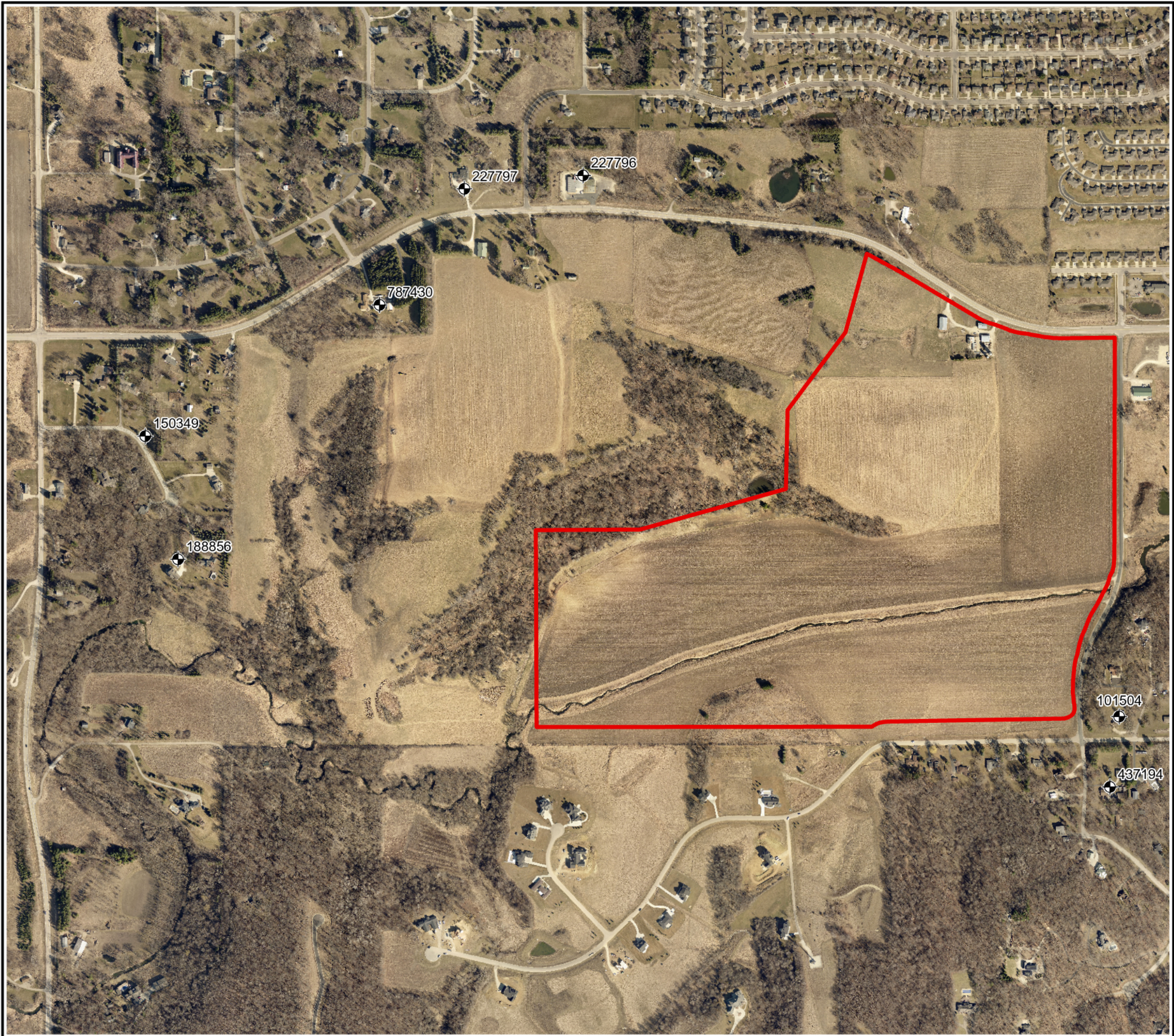
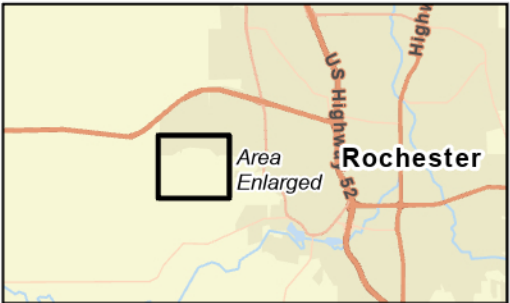


Figure 5

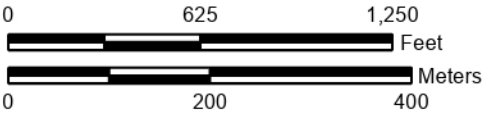
MDH MWI Map

Rochester-Nigon Property

4700 Country Club Rd W
Rochester, MN 55902



Map Projection: NAD 1983 UTM Zone 15 N, Meters
Basemap: Olmstead Aerial Imagery WMS, 2024



- Well Location
- Site Boundary

Notes:
MDH = Minnesota Department of Health
MWI = monitoring well index



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Figure 6

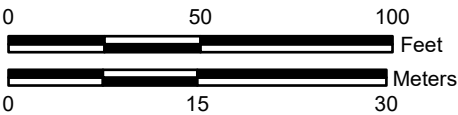
***Observed Decorah Shale
Influence Boundary Map***

Rochester-Nigon Property

4700 Country Club Rd W
Rochester, MN 55902



Map Projection: NAD 1983 UTM Zone 15 N, Meters
Basemap: ESRI World Imagery WMS



-  Soil Boring
-  Test Pit
-  Berm/Impoundment
-  50-foot Setback from Wetland or Influence Boundary
-  Decorah Edge Influence
-  Impoundment/Incidental Wetland
-  Wetland poly - TEP Revised (17,254 sf)
-  Site Boundary

Notes:
The 50-foot buffer has an extension on the North end due to the Decorah Edge Influence area.
sf = square feet



A background image of a topographic map with contour lines, showing a hilly or mountainous terrain. The lines are light gray and vary in thickness, indicating different elevations.

APPENDIX E

Wetland Delineation Report

4700 Country Club Road

Rochester & Cascade Townships, Olmsted County, Minnesota

Wetland Delineation Report

Prepared for

Pulte Homes

by

Kjolhaug Environmental Services Company, Inc.

(KES Project No. 2025-030)

June 10, 2025

4700 Country Club Road

Rochester & Cascade Townships, Olmsted County, Minnesota

Wetland Delineation Report

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

APPENDICES

- A. Joint Application Form for Activities Affecting Water Resources in Minnesota
- B. Wetland Delineation Data Forms
- C. Precipitation Data
- D. Offsite Hydrology Review Recording Form and Aerial Photos
- E. Site Photos

4700 Country Club Road

Rochester & Cascade Townships, Olmsted County, Minnesota

Wetland Delineation Report

1. WETLAND DELINEATION SUMMARY

- The ~176-acre 4700 Country Club Road site was inspected on May 9 and May 22, 2025 for the presence and extent of wetland.
- The National Wetlands Inventory (NWI) map showed one PUBFh wetland (impoundment) in the north part of the site, and another PUBFh wetland (impoundment) just offsite to the northwest. The map also showed one R2UBHx (surface flooding, permanent) riverine feature flowing from west to east through the south half of the site.
- The soil survey showed Sawmill silty clay loam as the hydric soil type mapped within the site boundary.
- The DNR Public Waters Inventory showed DNR Public Watercourse M-034-071 (Cascade Creek) within site boundaries (corresponding to the NWI mapped R2UBHx feature).
- The National Hydrography Dataset showed three Stream/River surface water features within the site boundaries, one of which corresponds to the NWI mapped R2UBHx feature/Cascade Creek.
- One Type 1 (PEMAd) partially drained, wet meadow (seep fed) wetland and one Type 5 (PUBFh) impounded incidental wetland were delineated in the north part of the site as shown on **Figure 2**.

Table 1. Wetlands delineated on the 4700 Country Club Road site.

Wetland ID	Wetland Type				Dominant Vegetation	Area (ac)
	Circular 39	Cowardin	HGM Class	Eggers and Reed		
Wetland 1	Type 2	PEM1Ad	Slope (groundwater seep)	Partially drained (sloping) wet meadow seep	Sedge, woolgrass, bulrush, reed canary grass	0.23
Incidental Wetland A	Type 5	PUBFh	Depression	NA	Unvegetated	0.18

2. OVERVIEW

The ~176-acre 4700 Country Club Road site was inspected on May 9 and May 22, 2025 for the presence and extent of wetland. The site was located in Sections 5 & 6 of T106N, R14W and Section 32 of T107N, R14W, Olmsted County, Minnesota. More specifically, the site was located southwest of the intersection of Country Club Road West and 45th Avenue SW (**Figure 1**). The review area corresponded to parts of Olmsted County PARIDs 743233081149 and 640611084153, and all of PARID 640522041608.

The parcel was comprised primarily of row crop land planted with corn for the 2025 season. Unfarmed areas of the site were comprised of meadow and woodland used as pasture. A farmstead/outbuildings were located just south of Country Club Road. Topography on the site was highest along the north (~1172 ft), northwest (~1136 ft), and southcentral (~1072 ft MSL) and from there sloped downhill to the center of the site to Cascade Creek with a top of bank ranging from ~1038 to ~1030 ft from west to east.

One (1) natural wetland and one (1) incidental wetland were delineated within the site boundaries. The delineated wetland boundaries and existing conditions are shown on **Figure 2**. Figure 2 does not represent an 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 a wetland boundary and type determination approval for Wetland 1 and No Loss/incidental concurrence for Incidental Wetland A from the Olmsted County SWCD under the Minnesota Wetland Conservation Act (WCA).

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: Midwest 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. The wetland-upland boundaries were located within active pasture and were therefore located using a sub-meter accuracy GPS unit. 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) one PUBFh wetland (impoundment) in the north part of the site, and another PUBFh wetland (impoundment) just offsite to the northwest. The map also showed one R2UBHx (surface flooding, permanent) riverine feature flowing from west to east through the south half of the site (**Figure 3**).

The Soil Survey (USDA NRCS 2015) Sawmill silty clay loam as the hydric soil type mapped within the site boundary. Soil types mapped on the property are listed in **Table 2** on the following page and a map showing soil types is included in **Figure 4**.

The Minnesota DNR Public Waters Inventory (Minnesota Department of Natural Resources 2015) showed DNR Public Watercourse M-034-071 (Cascade Creek) within site boundaries (corresponding to the NWI mapped R2UBHx feature) (**Figure 5**).

The National Hydrography Dataset (U.S. Geological Survey 2015) three Stream/River surface water features corresponding within the site boundaries, one of which corresponds to the NWI mapped R2UBHx feature/Cascade Creek (**Figure 6**).

Table 2. Soil types mapped on the 4700 Country Club Road site.

Symbol	Soil Name	Acres	% of Area	% Hydric	Hydric Category
19	Chaseburg silt loam, moderately well drained, 0 to 2 percent slopes	2.2	1.20%	0	Not Hydric
173F	Frontenac loam, 15 to 35 percent slopes	0.2	0.10%	10	Predominantly Non-Hydric
289	Radford silt loam	90.2	51.10%	10	Predominantly Non-Hydric
322D2	Timula silt loam, 12 to 20 percent slopes, moderately eroded	37.2	21.10%	0	Not Hydric
467	Sawmill silty clay loam	7.7	4.40%	95	Predominantly Hydric
473D	Dorerton loam, 12 to 25 percent slopes	4.2	2.40%	0	Not Hydric
477B	Littleton silt loam, 1 to 4 percent slopes	1.7	1.00%	10	Predominantly Non-Hydric
593E	Elbaville silt loam, 18 to 30 percent slopes	0.4	0.20%	0	Not Hydric
N150E	Brodale channery loam, deep, 20 to 30 percent slopes	2.4	1.40%	0	Not Hydric
N501D2	Downs silt loam, 12 to 18 percent slopes, moderately eroded	3.5	2.00%	0	Not Hydric
N518B	Lindstrom silt loam, 2 to 6 percent slopes	25.2	14.30%	0	Not Hydric
N518C	Lindstrom silt loam, 6 to 12 percent slopes	1.6	0.90%	0	Not Hydric

4.2 Wetland Determinations and Delineations

Potential wetlands were evaluated during field observations on May 9 and May 22, 2025. One (1) natural wetland and one (1) incidental wetland 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 May 22 field visit. At that time, meadow and woodland vegetation was actively growing and the crop field has been planted to corn.

Precipitation conditions were Wet (atypical) based on the three-month antecedent precipitation data for a date of May 22, 2025, and within the normal range based on the Antecedent Precipitation Tool (APT) (**Attachment C**).

Wetland 1 was a Type 1 (PEMAd) partially drained (sloping), wet meadow wetland dominated by sedge, woolgrass, bulrush, and reed canary grass. The wetland hydrology source was from shallow groundwater seepage. Some of the wetland contained shallow (<3”), flowing surface water between sedge hummocks, while other parts of the wetland contained soils saturated at the surface.

At the time of the May 9th site visit, seep discharge was not sufficient to so as to contribute water to the downslope impoundment depression (Incidental Wetland A) even though climatic conditions were within or above the normal range according to the APT. Wetland 1 was not shown as wetland on the NWI map and was not located in a mapped hydric map unit.

Adjacent upland was comprised of active cow pasture dominated by Kentucky bluegrass. No primary or secondary hydrology indicators were observed in the upland.

Incidental Wetland A was a Type 5 (PUBFh) impoundment/retention pond that was unvegetated due to silt deposition. No surface water was present during the May 9th site visit, and no free water or saturated soils were observed within 24 inches of the soil surface. Indicators of hydrology included inundation visible on aerial imagery and geomorphic position.

Adjacent upland was comprised of active cow pasture dominated by Kentucky bluegrass. No primary or secondary hydrology indicators were observed in the upland.

Incidental Wetland A was shown as a PUBFh wetland on the NWI map but was not located in a mapped hydric soil unit. The berm along the south side of Incidental Wetland A does not have an outlet pipe/structure. Excess water can discharge from Wetland A at the north/northeast side of the depression, flowing over upland for a considerable distance to the east and then south.

A photo of Incidental Wetland A and Wetland 1 is included in **Appendix E**.

4.3 Aerial Review for Offsite Hydrology Determinations

Areas in agricultural cropland that exhibit potential wetland signatures on aerial photography and/or that are located within low or depressional topography are to be reviewed following methods described in Guidance for Offsite Hydrology/Wetland Determinations (St. Paul District Corps of Engineers and Minnesota Board of Water and Soil Resources (BWSR) 2016) 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).

Signatures at locations of potential wetlands on aerial photographs were interpreted and classified using seven codes (**Table 3**).

Table 3. 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. The 6 most recent normal photos were used for the assessment.

Four (4) areas showing potential wet signatures on the 2019 FSA photo (most recent “Wet” photo) were included in the review. The locations of *Areas D, E, F, G* 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**.

Areas D and F exhibited signatures in 0% of normal photos, did not require field verification, and *are not a wetland based on the recording form decision matrix*.

Areas E and G exhibited signatures in 17% of normal photos, did not require field verification, and *are not a wetland based on the recording form decision matrix*.

4.4 Other Areas

Area B was located downslope of an offsite mapped PUBFh wetland/impoundment (**Figure 2**). An outlet in the berm on the south side of the impounded wetland drained to an excavated channel, which then drained to an excavated depression with a low constructed berm on its south side. Sample points taken in the depression and upslope from the depression (see **SPB1-upl and SPB2-upl – Appendix B**) did not meet any hydric soil indicators.

Photos of areas Area B are included in **Appendix E**

Area C was located upslope and northwest of Area B (**Figure 2A**). In the field, Area C was a convex hillslope dominated by reed canary grass. Soils met hydric indicator F6/reodox dark surface. However, no free water or saturation were observed within 32 inches of the soil surface. Although seep discharge was present on the hillslope above Area C, it appears that seep water disperses over and/or infiltrates back into soil prior to reaching the project site.

Area D (**Figure 2**) is mapped with alluvial hydric soil (Sawmill) by the soil survey. Area D was included in the offsite review. See Section 4.3 of this report.

The PWI map (**Figure 5**) shows Cascade Creek (a DNR Public Watercourse) flowing from west to east through the site. The top of the bank of the creek was located. Intermittent areas of wetland were located below the top of the bank, but above the bed of creek. This feature is bordered by a 50-ft perennially vegetated buffer. See photos included in **Appendix E**.

The NHD map (**Figure 6**) showed three Stream/River surface water features within the site boundaries, one of which corresponds to Cascade Creek. The other two features are shown entering the site from the south and then flowing north to connect with Cascade Creek. In the field, these areas were cropland planted to corn. No defined surface swales or drainage paths were observed. See photos included in **Appendix E**.

No other areas were mapped as wetland on the NWI map or with hydric soil on the soil survey. No other areas dominated with hydrophytic vegetation were observed within site boundaries.

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 a wetland boundary and type determination approval for Wetland 1 and No Loss/incidental concurrence for Incidental Wetland A from the Olmsted County SWCD under the Minnesota Wetland Conservation Act (WCA).

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

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

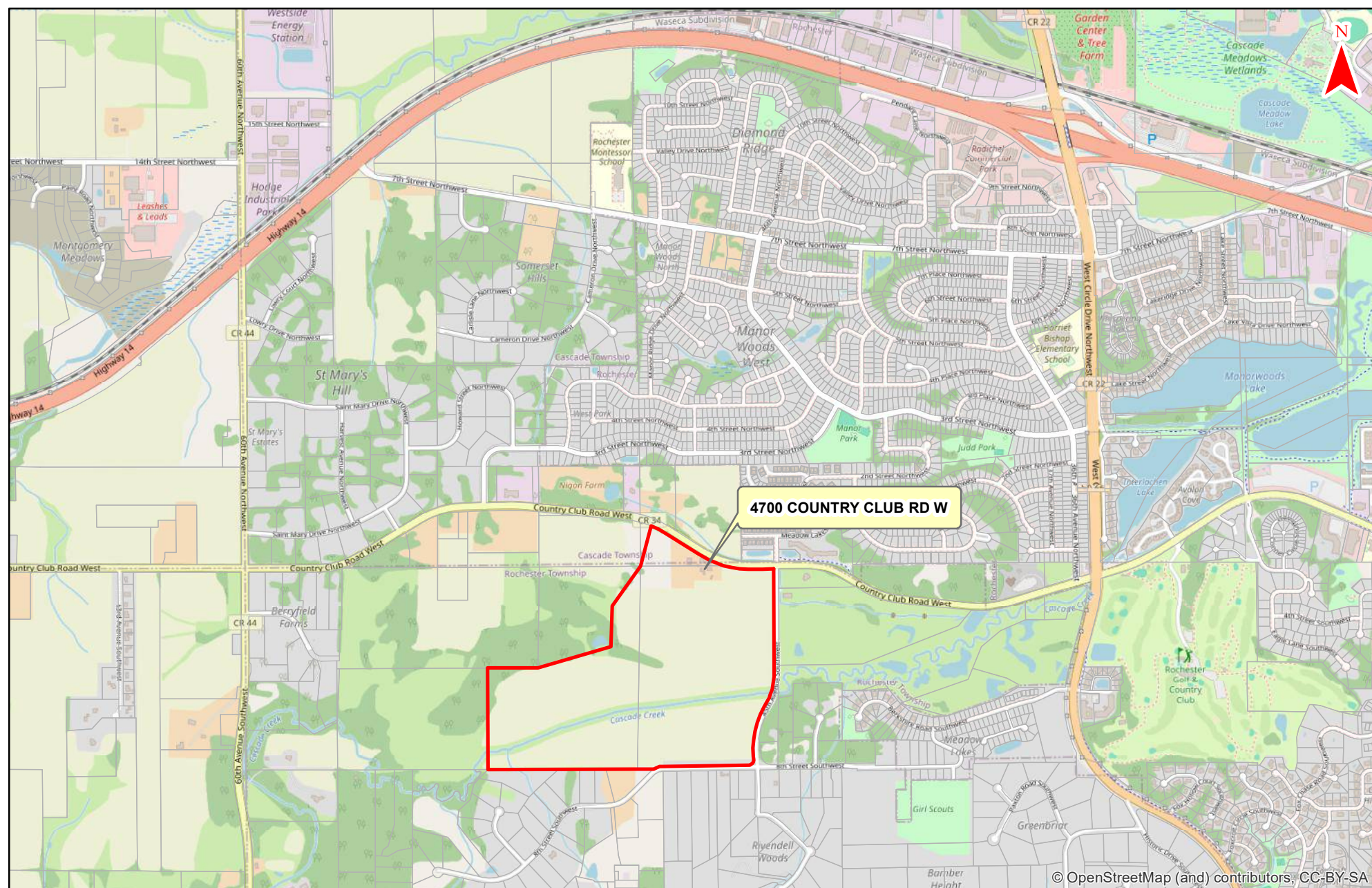
Report reviewed by:  _____ Date: June 10, 2025
Mark Kjolhaug, Professional Wetland Scientist No. 000845

4700 Country Club Road Rochester & Cascade Townships

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



© OpenStreetMap (and) contributors. CC-BY-SA



Legend

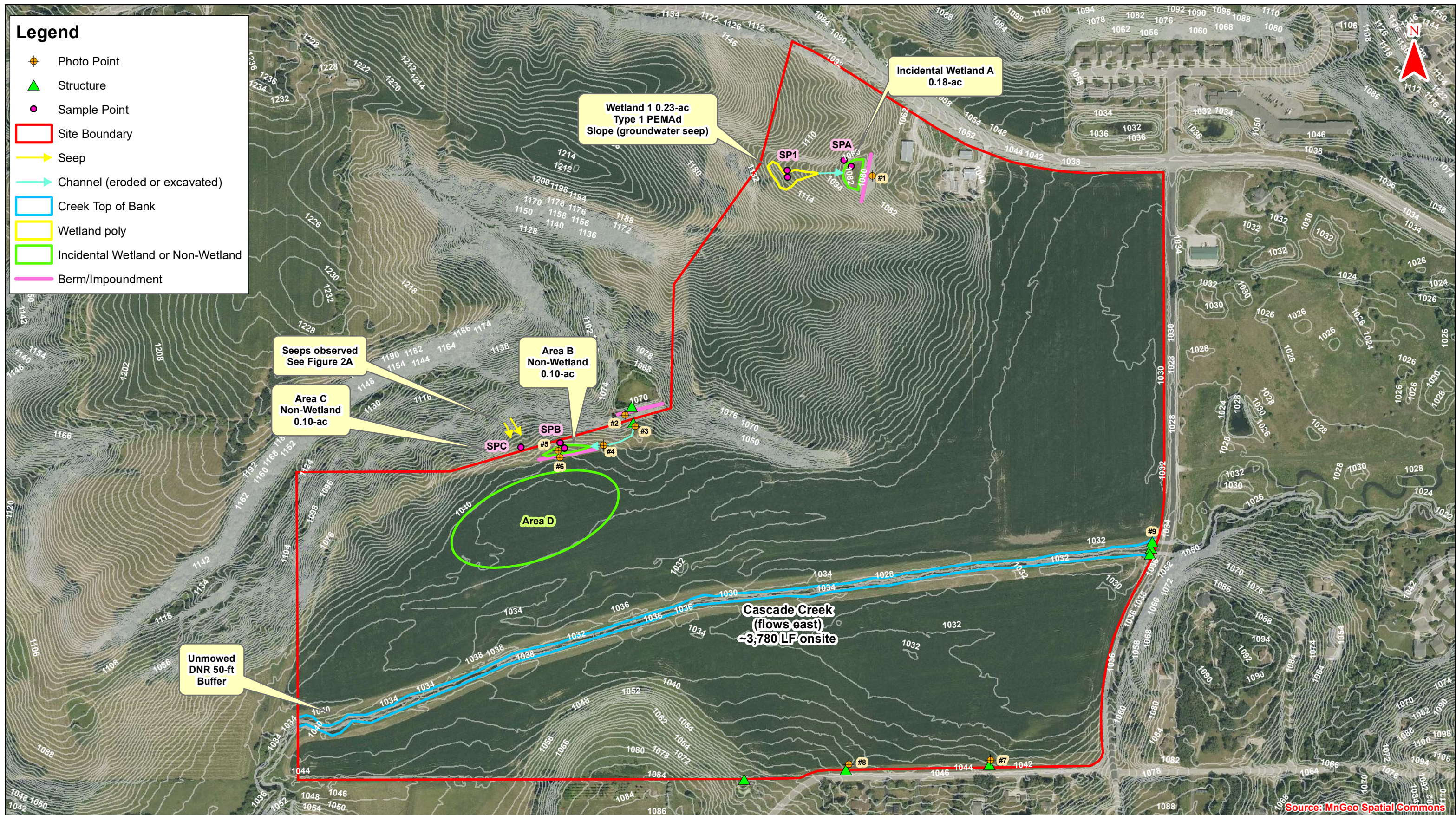
- Site Boundary
- Parcels of Open Data "Opt-In" Counties

0 2,500 Feet

Figure 1 - Site Location

Nigon Property - 4700 COUNTRY CLUB RD W (KES 2025-030)
Rochester & Cascade Townships, Minnesota

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



0 1,000 Feet

Figure 2 - Existing Conditions (2023 FSA)

Nigon Property - 4700 COUNTRY CLUB RD W (KES 2025-030)
Rochester & Cascade Townships, Minnesota

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

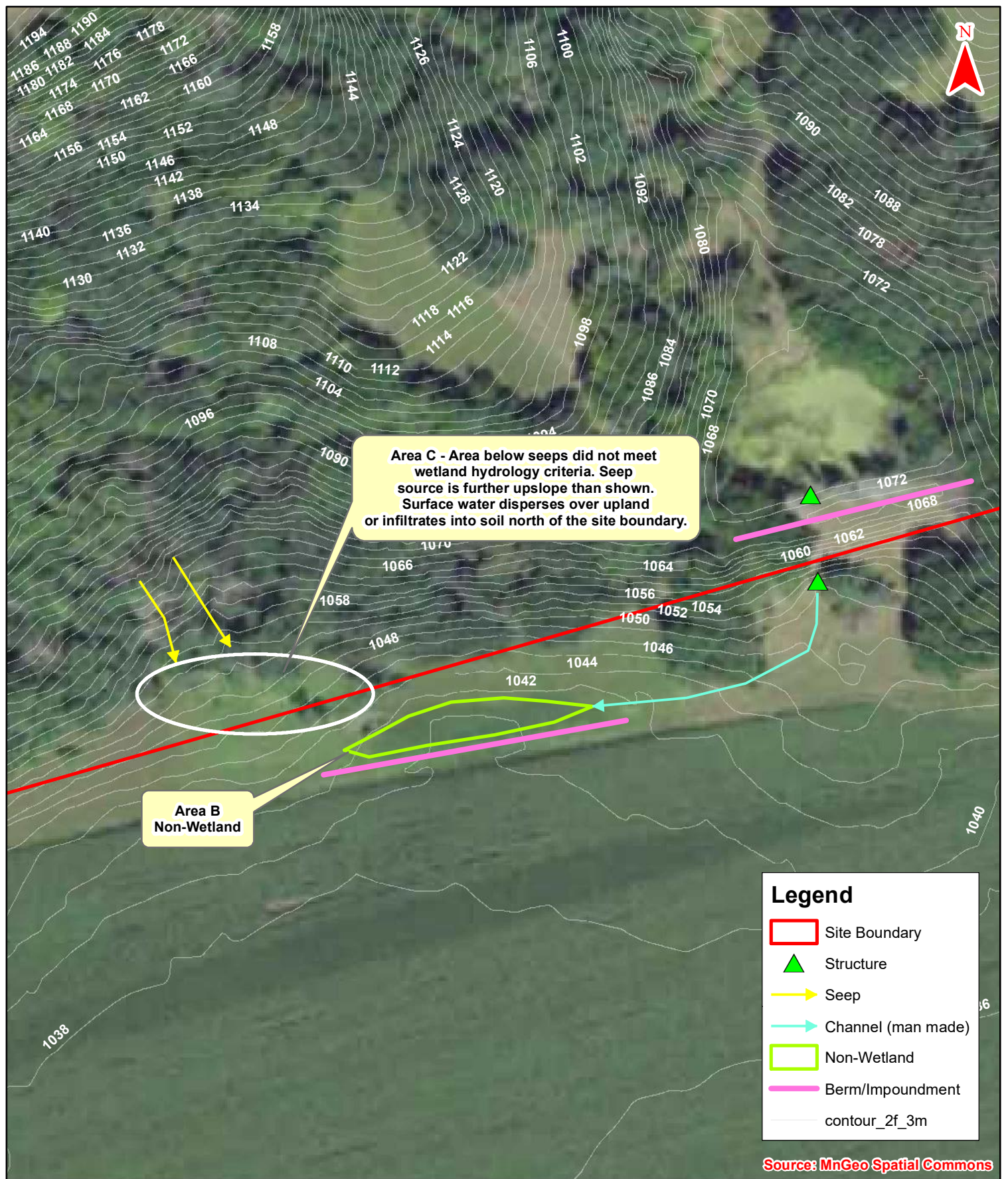


Figure 2A - Existing Conditions (2021 FSA)

**Nigon Property - 4700 COUNTRY CLUB RD W (KES 2025-030)
Rochester & Cascade Townships, Minnesota**

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



KJOLHAUG
ENVIRONMENTAL

0 150
Feet

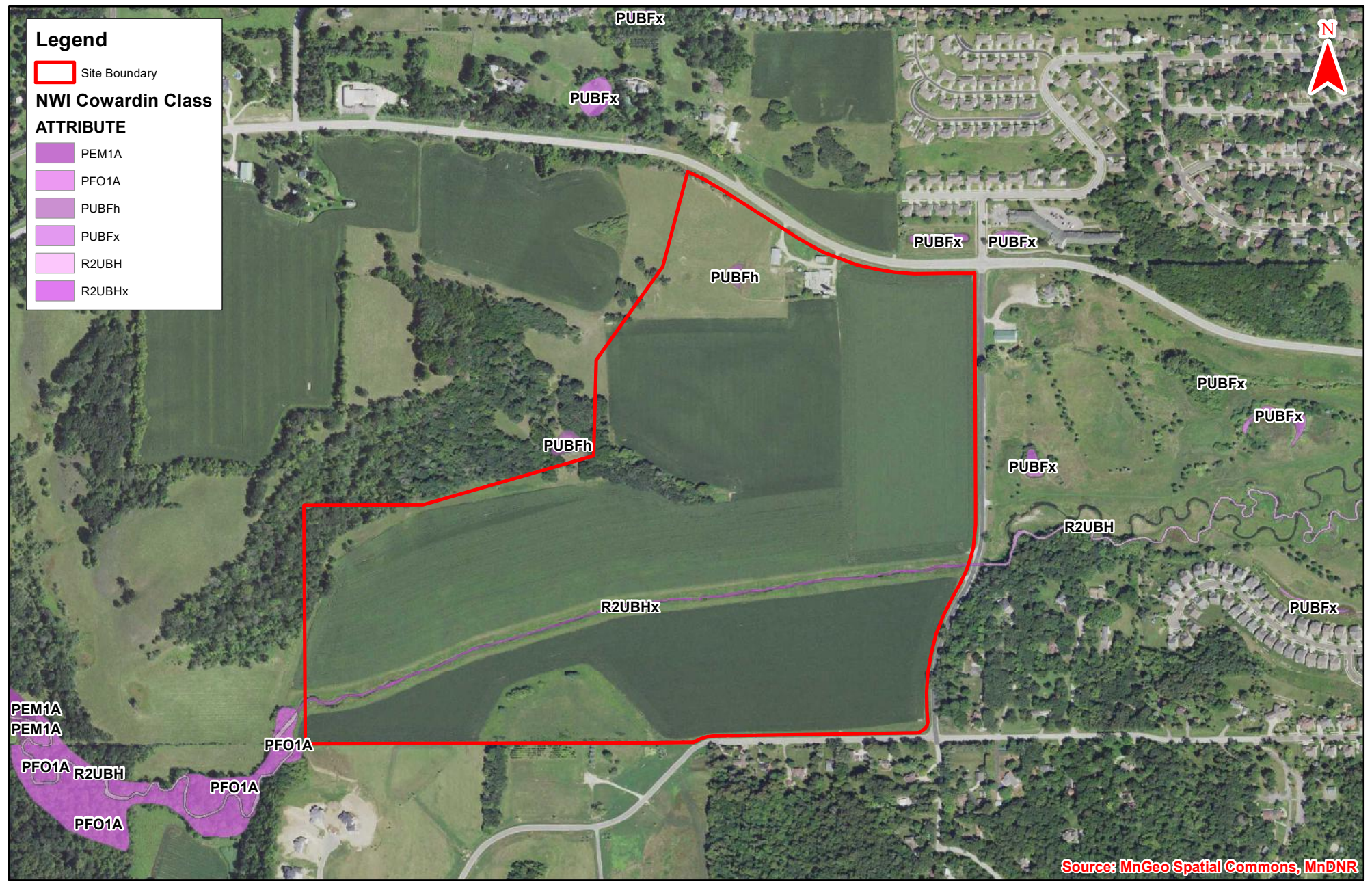


Figure 3 - MnDNR National Wetlands Inventory Update

**4700 Country Club Rd W (KES 2025-030)
Rochester and Cascade Townships, Minnesota**

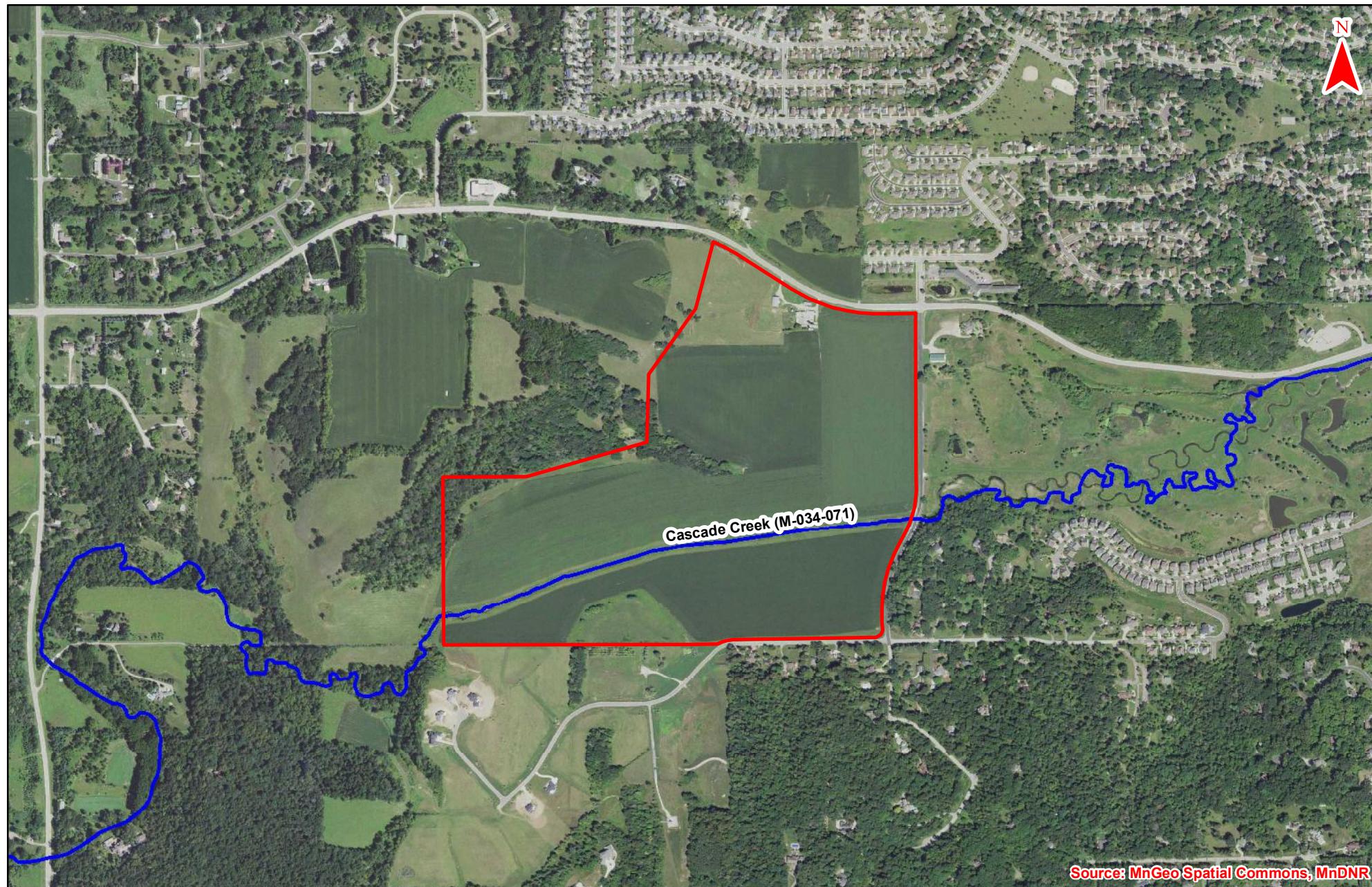
Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.

Map unit symbol	Map unit name	Rating
19	Chaseburg silt loam, moderately well drained, 0 to 2 percent slopes	0
173F	Frontenac loam, 15 to 35 percent slopes	10
289	Radford silt loam	10
322D2	Timula silt loam, 12 to 20 percent slopes, moderately eroded	0
467	Sawmill silty clay loam	95
473D	Dorerton loam, 12 to 25 percent slopes	0
477B	Littleton silt loam, 1 to 4 percent slopes	10
593E	Elbaville silt loam, 18 to 30 percent slopes	0
N150E	Brodale channery loam, deep, 20 to 30 percent slopes	0
N501D2	Downs silt loam, 12 to 18 percent slopes, moderately eroded	0
N518B	Lindstrom silt loam, 2 to 6 percent slopes	0
N518C	Lindstrom silt loam, 6 to 12 percent slopes	0



Figure 4 - Soil Survey

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



Legend

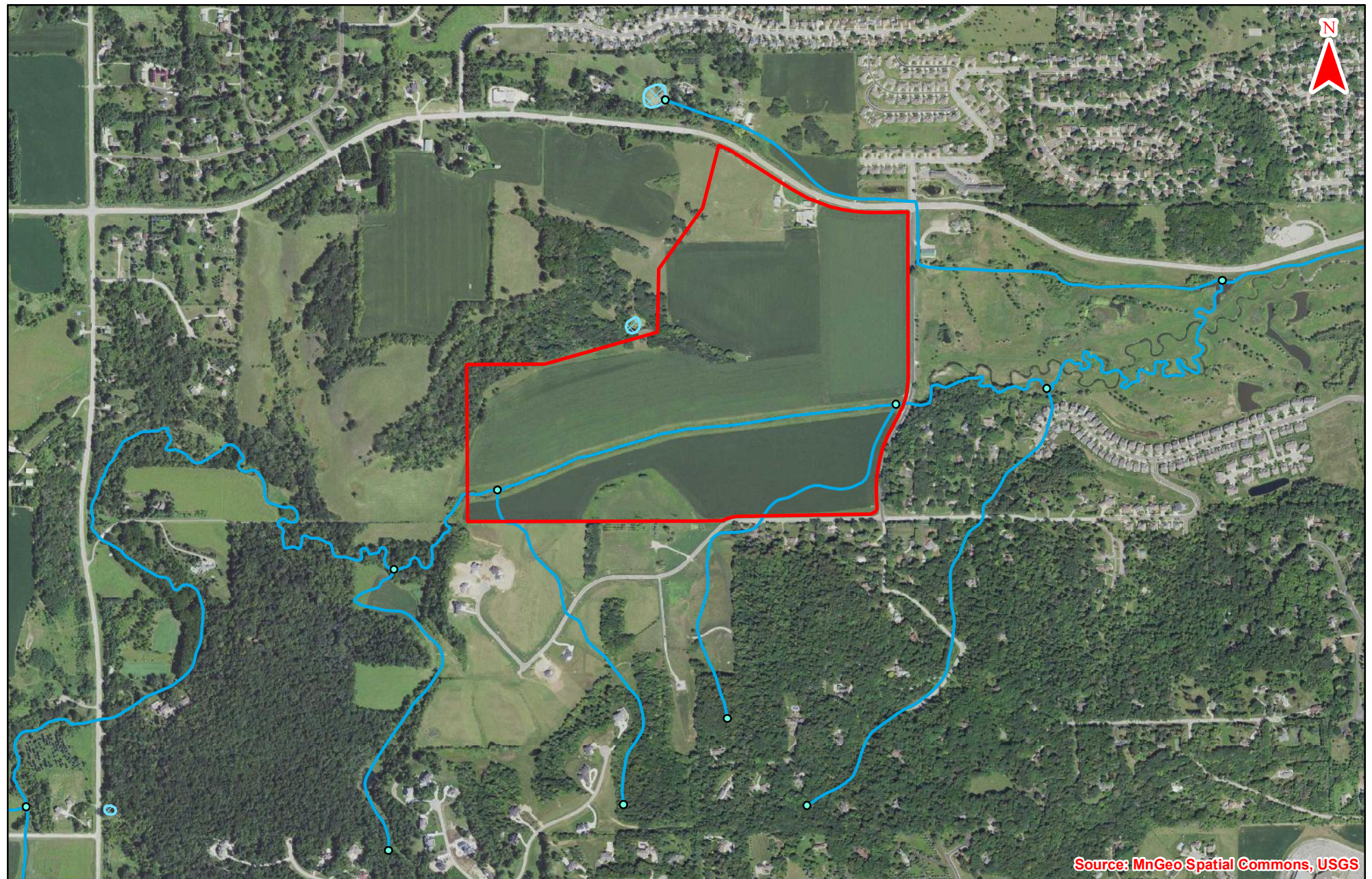
- ▬ Site Boundary
- ▬ Public Water Watercourse
- ⋯ Public Ditch/Altered Natural Watercourse
- ▭ Public Waters Basins

0 1,500 Feet

Figure 5 - DNR Public Waters Inventory

4700 Country Club Rd W (KES 2025-030)
Rochester and Cascade Townships, Minnesota

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



Legend

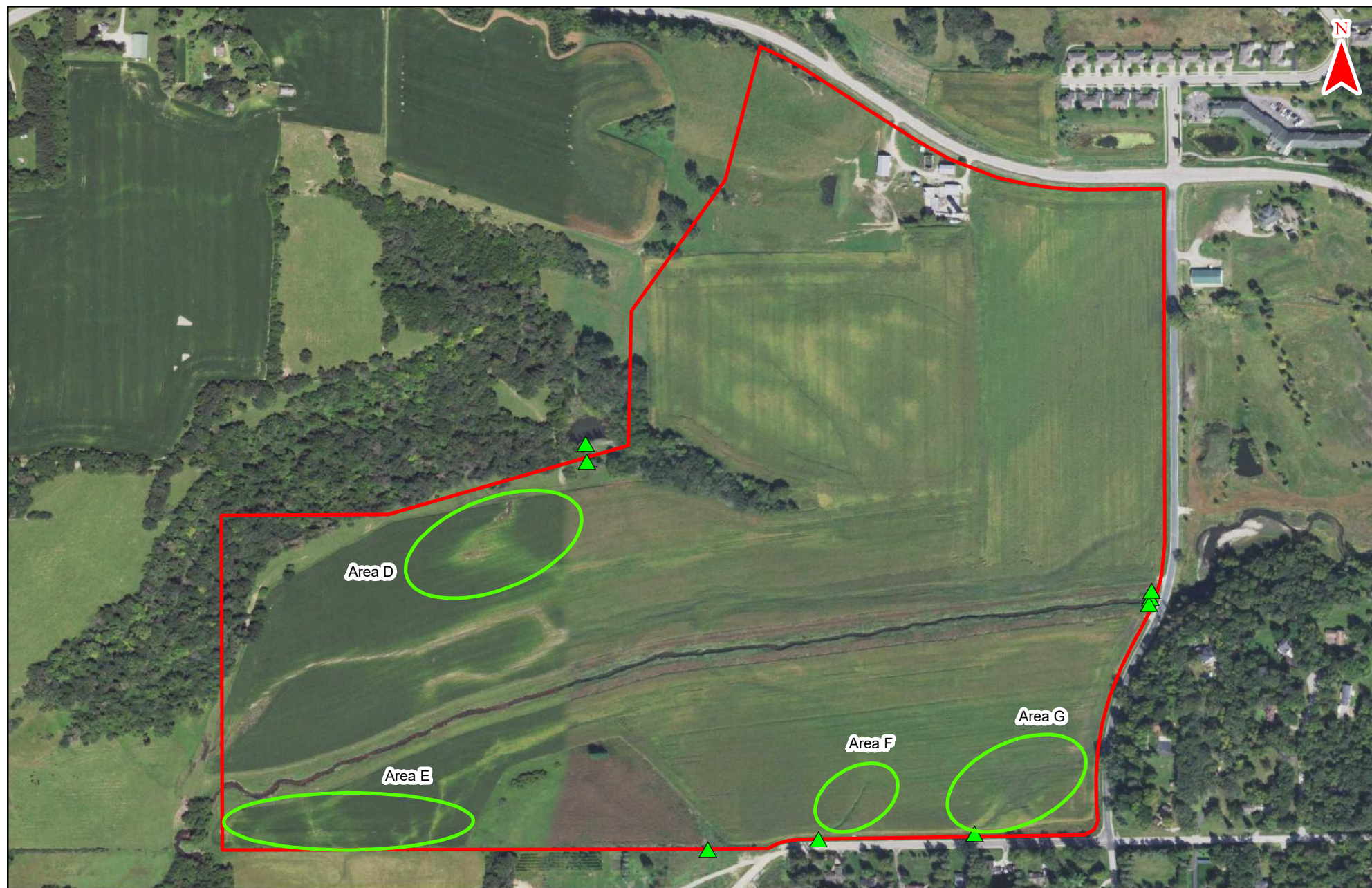
- Site Boundary
- HYDRO NET Junctions
- Stream/River
- Lake/Pond

0 2,000 Feet

Figure 6 - National Hydrography Dataset

**4700 Country Club Rd W (KES 2025-030)
Rochester and Cascade Townships, Minnesota**

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



Legend

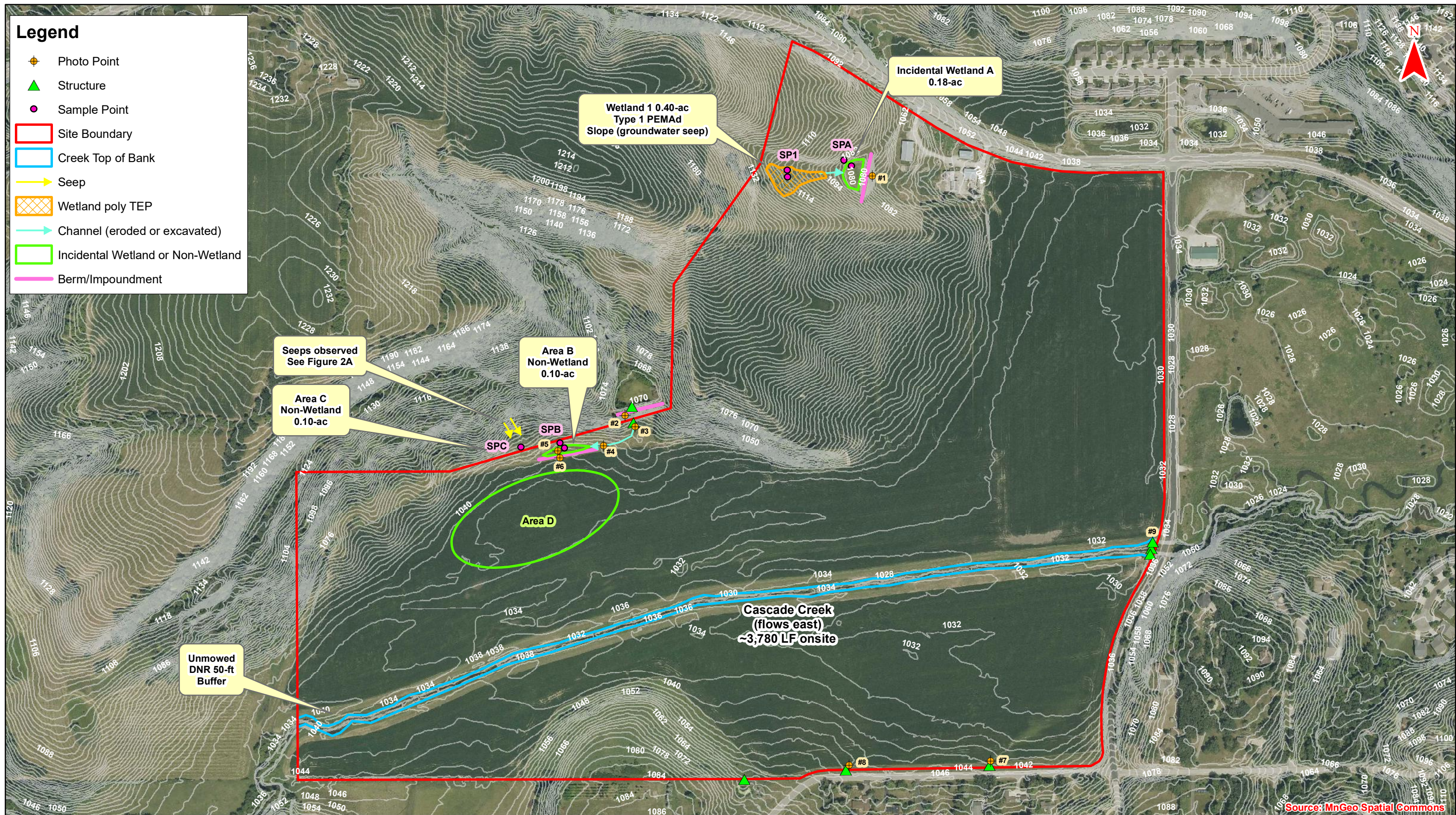
-  Structure
-  Site Boundary

0 1,000 Feet

Figure 7 - Offsite Assessment Areas (2019 FSA - overall Wet season)

**Nigon Property - 4700 COUNTRY CLUB RD W (KES 2025-030)
Rochester & Cascade Townships, Minnesota**

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



0 1,000 Feet

TEP Revised Figure 2 - Existing Conditions (2023 FSA)

Nigon Property - 4700 COUNTRY CLUB RD W (KES 2025-030)
Rochester & Cascade Townships, Minnesota

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

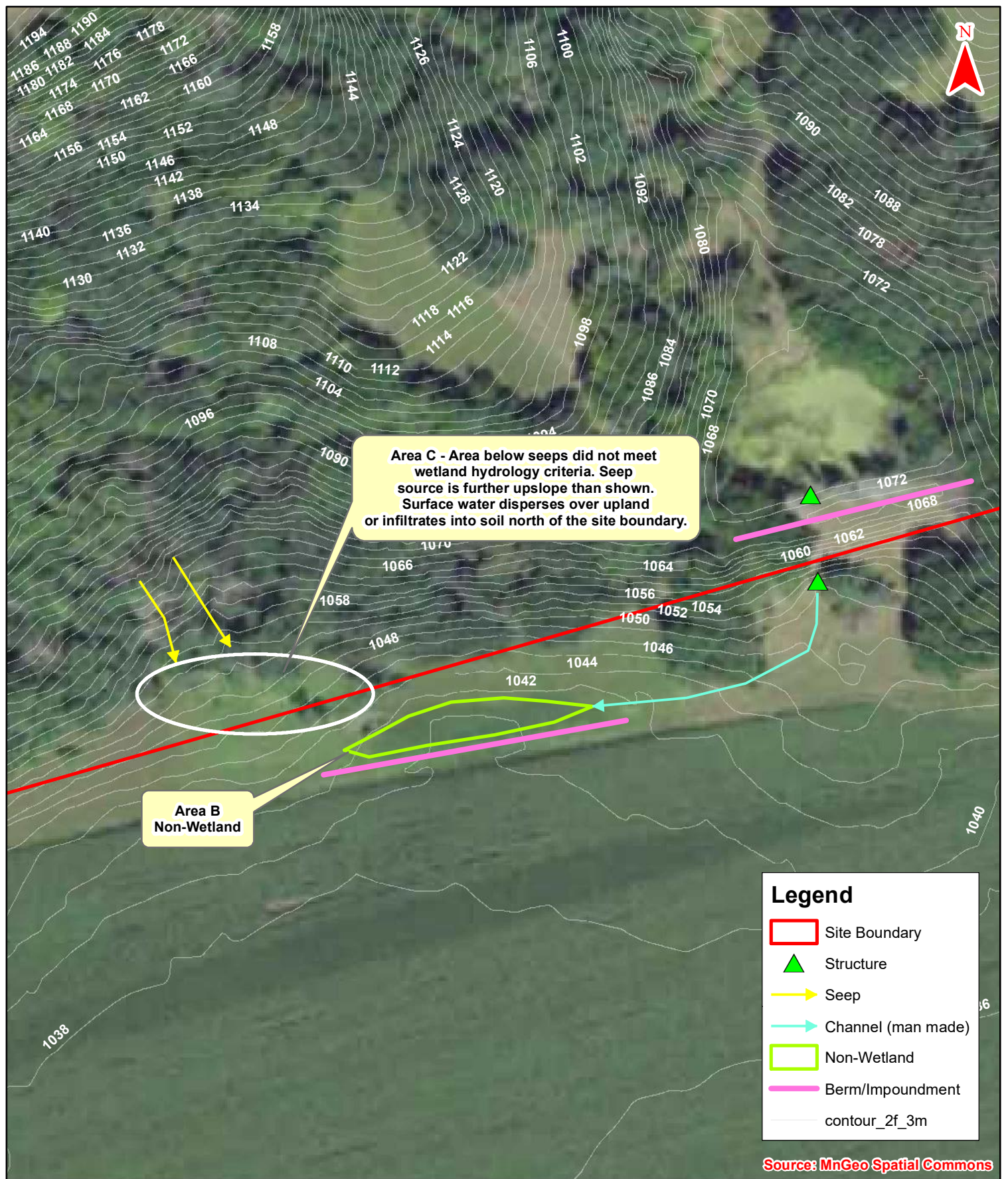


Figure 2A - Existing Conditions (2021 FSA)

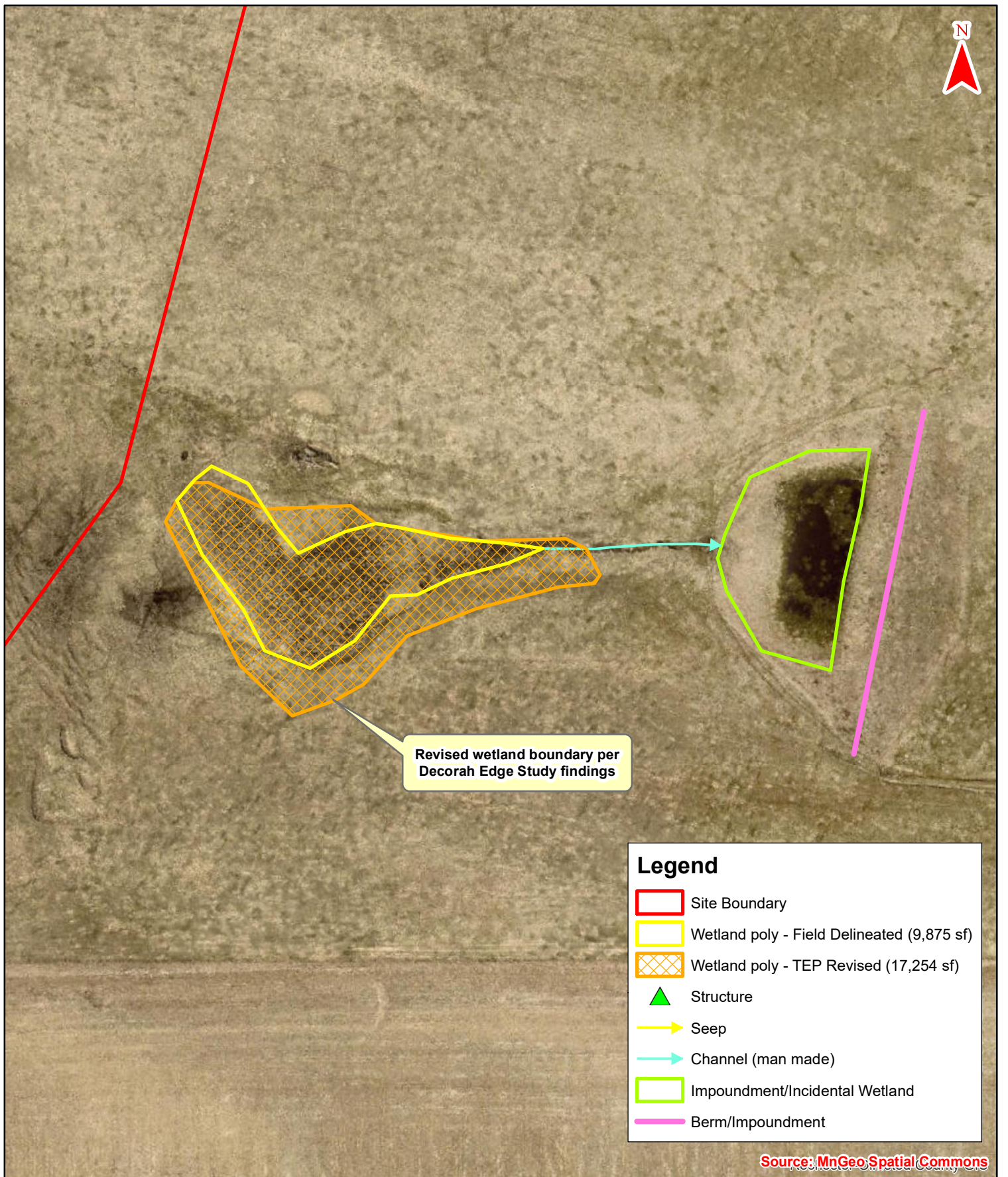
**Nigon Property - 4700 COUNTRY CLUB RD W (KES 2025-030)
Rochester & Cascade Townships, Minnesota**

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



KJOLHAUG
ENVIRONMENTAL

0 150
Feet



KJOLHAUG
ENVIRONMENTAL

TEP Revised Boundary - Figure 2B - Existing Conditions (Olmsted Co Photo)

**Nigon Property - 4700 COUNTRY CLUB RD W (KES 2025-030)
Rochester & Cascade Townships, Minnesota**

0 150 Feet

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

A background image of a topographic map with contour lines, rendered in a light gray color, covering the top portion of the page.

APPENDIX F

Phase I Environmental Site Assessment

Phase I Environmental Site Assessment

Proposed Residential Development – Nigon Property
4700 Country Club Road West
Rochester, Minnesota

Prepared For

PulteGroup, Inc.

February 21, 2025

Project B2500223

Haley Daily
PulteGroup, Inc.
1650 West 82nd Street, Suite 300
Bloomington, MN 55431

Re: Phase I Environmental Site Assessment
Proposed Residential Development – Nigon Property
4700 Country Club Road West
Rochester, Minnesota

Dear Ms. Daily:

In accordance with your written authorization, Braun Intertec Corporation conducted a Phase I Environmental Site Assessment (ESA) of the above-referenced property (Site). The objective of the Phase I ESA was to identify recognized environmental conditions in connection with the Site and to assist in satisfying All Appropriate Inquiries (AAI) standards and practices. The Phase I ESA was conducted in general conformance with the scope and limitations of ASTM International (ASTM) Practice E1527-21 and 40 Code of Federal Regulations (CFR) Part 312.

The Phase I ESA was prepared on behalf of, and for sole use by, PulteGroup, Inc. (Client) unless otherwise specified in Section 1.3 of the attached report. Please refer to the report for the scope, methods, and conclusions of our assessment.

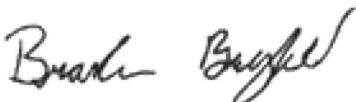
We appreciate the opportunity to provide professional services to you for this project. If you have any questions regarding the attached report, please contact Danielle Stickler at 612.325.6917 or (dstickler@braunintertec.com).

Sincerely,

BRAUN INTERTEC CORPORATION



Danielle Stickler
Project Scientist



Brandon M. Brayfield, PG
Senior Scientist

Attachment: Phase I Environmental Site Assessment Report

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Executive Summary

Braun Intertec Corporation conducted a Phase I Environmental Site Assessment (ESA) of the approximately 176-acre property located at 4700 Country Club Road West in Rochester, Minnesota (Subject Property, hereafter referred to as Site) in general conformance with the scope and limitations of ASTM International (ASTM) Practice E1527-21 and 40 Code of Federal Regulations (CFR) Part 312.

The 176-acre Site has been primarily developed as cultivated agricultural land with a farmstead located on the north part of the Site since at least 1937. The Site is comprised of Olmstead County Parcel 640522041608 and parts of Olmstead County Parcels 743233081149 and 640611084153. Parcel 743233081149 is developed with a machine shed and a hay shed (north) and pastureland; Parcel 640522041608 is developed with a hay shed (south), granary, lean-to, two silos, a feedlot and a feed bunk conveyor, cultivated agricultural land with Cascade Creek traversing in east-west orientation through the south portion of the parcel; and Parcel 640611084153 is cultivated land with Cascade Creek traversing in east-west orientation through the south portion of the parcel. All of the buildings are unheated and had concrete floors with the exception of the north hay shed that had a gravel floor. The south hay shed was being rented by a landscaping company, Decker Landscaping, for storage purposes. One approximately 1,000-gallon diesel fuel AST was located along the west exterior wall of the north hay shed. Staining was noted primarily along the south side of the tank on the concrete and gravel beneath the tank. A 200-gallon gasoline AST supported on stilts was reportedly formerly located near the southern silo on the Site. Historically, additional farmstead buildings were located on the Site in the vicinity of the existing buildings that have since been demolished including former horse barns, silos, and a machine shed.

Based on the readily available historical information, the surrounding area was largely cultivated agricultural land, tree-covered, and/or residential at the time of the earliest historical sources (1937). Residential development in the surrounding area progressively increased beginning in the 1960s with a more significant increase noted in the 1980s. Despite the increase in residential density, some adjoining land north, east, south and west continued to be cultivated agricultural land through 1991. A golf course was located east of the Site from 2003 through 2013 and residential development had expanded north of the Site boundary beginning in 2003. By 2013 it appears the golf course was not in use although the clubhouse and maintenance buildings remain. By approximately 2019 the cultivated land located south of the Site was redeveloped with residential dwellings. The only farmland that remains adjoining the Site, is a small section to the north and land west of the Site. By 2023 and at the time of this assessment, the Site was bound to the north and south by residential development; to the east by Homeward Bound Animal Clinic, Med City Electric, and vacant land; and to the west by cultivated agricultural land and woods. No obvious indications of environmental concerns were noted on adjoining or nearby properties

at the time of the reconnaissance and no listings indicative of a release were identified in the adjoining area through a review of the available regulatory information.

This assessment has revealed the following recognized environmental conditions, controlled recognized environmental conditions, or significant data gaps in connection with the Site.

Recognized Environmental Conditions (RECs)

- One approximately 1,000-gallon diesel fuel AST was located along the west exterior wall of the north hay shed. Staining was noted primarily along the south side of the tank on the concrete and gravel beneath the tank. A 200-gallon gasoline AST supported on stilts was reportedly formerly located near the southern silo on the Site and has since been relocated to a parcel owned by the Nigon family north of the Site. Based on the observations at time of the Site reconnaissance, it is our opinion that the staining and potential for releases of petroleum from the tanks to the subsurface represents a REC.
- The existing machine shed has been located on the north portion of the Site since approximately 1980. According to the property owner, a former machine shed was located directly north of the granary from the 1960s until approximately 2018. Based on the long history of farm equipment used, stored and maintained at the Site in those buildings, there is a potential that releases of hazardous substances or petroleum products may have occurred. This potential represents a REC.
- Reportedly sludge from the septic system connected to the Nigon family farmhouse located northwest of the Site at 4905 Country Club Road West was spread on the cultivated portion of the Site repeatedly whenever the septic tank was pumped out. Low concentrations of polyfluoroalkyl substances (PFAS) compounds, including perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA), are present in many household products; therefore, there is a potential that PFAS compounds may have been discharged to the septic system and spread onto the fields at the Site. It is our opinion that the potential PFOS and PFOA impacts at the Site from spreading residential septic system biosolids on the Site fields represents a REC.

Controlled Recognized Environmental Conditions (CRECs)

This assessment has revealed no CRECs in connection with the Site.

Significant Data Gaps

This assessment did not identify significant data gaps that affected our ability to identify the presence of RECs in connection with the Site.

Additional Considerations

An additional consideration is a condition that does not meet the definition of a REC, CREC, or historical recognized environmental condition (HREC) but, in our opinion, should be brought to the attention of the User. The following additional considerations were identified during the Phase I ESA.

- Historically, additional farmstead buildings were located on the Site in the vicinity of the existing buildings that have since been demolished including former horse barns, silos, and a machine shed. According to the Site representative, materials from the former buildings were typically recycled and used to build or add onto some of the existing structures at the Site. Therefore, it is unlikely that demolition debris associated with former structures were buried on the Site, however the potential remains. If fill soils, which could include demolition debris and other wastes, are encountered, then additional assessment may be required to evaluate appropriate management and/or disposal requirements.
- The Site, Stephan Nigon Farm was listed on the ERIS report FEEDLOTS database. The Minnesota Pollution Control Agency (MPCA) tracks locations of animal feedlot facilities. The locations of animal feedlots provide information and context to support decisions on animal health, land use, and maintaining environmental quality. This is listed as an active registration. Cattle are listed as having been at this location. This listing is not considered a REC for the Site; however, the feedlot registration should be closed with the MPCA.
- An active water well is located near the granary and two unused 6-to-10-foot hand dug wells are located west of the machine shed in the pasture area. Any wells encountered during future earthwork or redevelopment activities that will no longer be used, should be properly sealed.
- If the existing buildings are to be renovated or demolished, then a hazardous building materials survey should be conducted prior to commencement of those activities to identify the presence of asbestos-containing materials, lead-based paint, or regulated wastes that may require special handling, abatement, or disposal.

- A conservation dam is located southwest of the machine shed and a conservation easement is located along either side of Cascade Creek. These land use restrictions should be taken into consideration during the redevelopment of the Site.

A light gray topographic map with contour lines is visible in the background of the top half of the page.

APPENDIX G

Phase II Environmental Site Assessment

BRAUN INTERTEC

the science you build on

Phase II Environmental Site Assessment

Nigon Property
4700 Country Club Road West
Rochester, Minnesota

Prepared for

PulteGroup, Inc.

Braun Intertec Corporation

Project B2500223.00
September 23, 2025



September 23, 2025

Project B2500223.00

Haley Daily - Sievers

PulteGroup, Inc.

1650 W 82nd Street, Suite 300

Bloomington, MN 55431

Re: Phase II Environmental Site Assessment
Nigon Property
4700 Country Club Road West
Rochester, Minnesota

Dear Ms. Daily - Sievers:

On behalf of PulteGroup, Inc., Braun Intertec Corporation (Braun Intertec) conducted a Phase II Environmental Site Assessment (ESA) of the above-referenced site (Site) in accordance with the authorized scope of services described in our proposal dated March 19, 2025. The Phase II ESA was prepared in association the proposed purchase and redevelopment of the Site. For a complete discussion of our assessment, please refer to the attached Phase II ESA report.

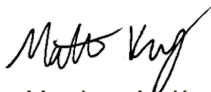
The objective of the Phase II ESA was to investigate the recognized environmental conditions (RECs) discovered during a recently completed Phase I ESA.

This Phase II ESA was prepared on behalf of and for use by PulteGroup, Inc.. No other party has a right to rely on the contents of this Phase II ESA without the written authorization of Braun Intertec.

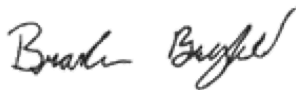
We appreciate the opportunity to provide our professional services to you for this project. If you have any questions or comments regarding this report or the project in general, please contact Brandon Brayfield at 218.310.6362.

Sincerely,

Braun Intertec Corporation



Matthew M. Kennedy, GIT
Staff Scientist



Brandon M. Brayfield, PG
Supervisor, Senior Scientist



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1.0 Introduction

1.1 Authorization

Braun Intertec received authorization from Ms. Haley Daily-Sievers of PulteGroup, Inc. to conduct a Phase II Environmental Site Assessment (ESA) of the Nigon Property located at 4700 Country Club Road West in Rochester, Minnesota (Site), in accordance with the scope of services described in the Braun Intertec proposal dated March 19, 2025. The Phase II ESA was prepared in association with the proposed acquisition and residential redevelopment of the Site.

This Phase II ESA was prepared on behalf of and for use by PulteGroup, Inc. in accordance with the contract between PulteGroup, Inc. and Braun Intertec. No other party has a right to rely on the contents of this Phase II ESA without the written authorization of Braun Intertec.

1.2 Project Objective

The objective of the Phase II ESA was to evaluate whether the soil, soil vapor, and groundwater beneath the Site has been impacted due to the recognized environmental conditions (RECs) identified in a recently completed Phase I ESA (see section 2.3.).

2.0 Site Background

2.1 Site Location and Description

The Site is located at 4700 Country Club Road West (see Figure 1). The Site is located within the NW quarter of the NW quarter of Section 05, Township 106 North, Range 14 West, in the city of Rochester, Olmstead County, Minnesota. A Site Location Map is included as Figure 1. A Site Layout is included as Figure 2.

The Site is approximately 176 acres in size and is comprised of Olmstead County parcel 640522041608 and parts of Olmstead County parcels 743233081149 and 640611084153. Parcel 743233081149 is developed with a machine shed and a hay shed (north) and pastureland; parcel 640522041608 is developed with a hay shed (south), granary, lean-to, two silos, a feedlot and a feed bunk conveyor, cultivated agricultural land with Cascade Creek traversing in east-west orientation through the south portion of the parcel; and parcel 640611084153 is cultivated land with Cascade Creek traversing in east-west orientation through the south portion of the parcel. All of the buildings are unheated and have concrete floors with the exception of the north hay shed that had a gravel floor. The south hay shed was being rented by a landscaping company, Decker Landscaping, for storage purposes. One approximately 1,000-gallon diesel fuel aboveground storage tank (AST) is located along the west exterior wall of the north hay shed. A 200-gallon gasoline AST supported on stilts was reportedly formerly located near the southern silo on the Site. Historically, additional farmstead buildings were located on the Site in the vicinity of the existing buildings that have since been demolished including former horse barns, silos, and a machine shed.



The Site is bound to the north by Country Club Road West with residential dwellings, agricultural land, and Meadow Lakes Senior Living with residential properties beyond; to the east by Homeward Bound Animal Clinic, Med City Electric, vacant land and residential dwellings with Rochester Golf and Country Club and residential properties located beyond; to the south by residential properties with residential properties located beyond; and to the west by cultivated agricultural land and woods with cultivated agricultural land, woods and residential properties located beyond.

2.2 Proposed Development

The Client is considering acquisition and redevelopment of the Site into residential housing. The proposed redevelopment includes residential lots with associated roadways, utilities, stormwater features and green space. The proposed conceptual development plan is included in [Appendix A](#).

2.3 Previous Site Investigations

Braun Intertec completed a Phase I ESA at the Site, the results of which are presented in the report entitled: *Phase I Environmental Site Assessment, Proposed Residential Development – Nigon Property, 4700 Country Club Road West, Rochester, Minnesota*, prepared by Braun Intertec, dated February 21, 2025 (Project B2500223) (2025 Phase I ESA).

The Phase I ESA identified the following RECs in connection with the Site:

- One approximately 1,000-gallon diesel fuel AST was located along the west exterior wall of the north hay shed. Staining was noted primarily along the south side of the tank on the concrete and gravel beneath the tank. A 200-gallon gasoline AST supported on stilts was reportedly formerly located near the southern silo on the Site and has since been relocated to a parcel owned by the Nigon family north of the Site. Based on the observations at time of the Site reconnaissance, it is our opinion that the staining and potential for releases of petroleum from the tanks to the subsurface represents a REC.
- The existing machine shed has been located on the north portion of the Site since approximately 1980. According to the property owner, a former machine shed was located directly north of the granary from the 1960s until approximately 2018. Based on the long history of farm equipment used, stored and maintained at the Site in those buildings, there is a potential that releases of hazardous substances or petroleum products may have occurred. This potential represents a REC.
- Reportedly sludge from the septic system connected to the Nigon family farmhouse located northwest of the Site at 4905 Country Club Road West was spread on the cultivated portion of the Site repeatedly whenever the septic tank was pumped out. Low concentrations of polyfluoroalkyl substances (PFAS) compounds, including perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA), are present in many household products; therefore, there is a potential that PFAS compounds may have been discharged to the septic system and spread onto the fields at the Site. It is our opinion that the potential PFOS and PFOA impacts at the Site from spreading residential septic system biosolids on the Site fields represents a REC.



2.4 Published Geologic Information

2.4.1 Topography

Surface elevations at the Site range from approximately 1,160 feet on the northwest portion of the Site to 1,040 feet above mean sea level on the south and east portions of the Site, according to the United States Geologic Survey (USGS) 7.5-minute quadrangle for Douglas, Minnesota. The Site generally slopes to Cascade Creek traversing through the south portion of the Site.

2.4.2 Geology

The unconsolidated sediment in the Site vicinity is Holocene age sand and gravel, sandy loam to silt loam and Pleistocene age loam deposits and locally includes silt to boulders (Marchall and McDonald, 2020).

The uppermost bedrock unit in the Site vicinity is the Middle Ordovician, St. Peter Sandstone and Lower Ordovician, Prairie du Chien Group, Shakopee Formation (Steenberg, 2020). The depth to bedrock in the Site vicinity is approximately less than 25 to 75 feet below land surface (Steenberg and Chandler, 2020).

2.4.3 Hydrogeology

The depth to groundwater in the vicinity of the Site is expected to lie within 20 feet below land surface. According to published geologic information, the regional groundwater flow direction within the unconsolidated deposits in the Site vicinity is generally to the north. However, the local direction of groundwater flow may be affected by nearby streams, lakes, wells, and/or wetlands and may vary seasonally.

During this Phase II ESA, groundwater was encountered between 8.0 and 11.0 feet below ground surface (bgs) during drilling and following drilling equilibrated to depths ranging from 12.0 to 14.6 feet bgs in the temporary monitoring wells.

3.0 Scope of Services

The following tasks were conducted at the Site as part of this Phase II ESA:

- Subcontracted a licensed drilling contractor to clear public utilities through Gopher State One Call and private utilities for the investigation locations.
- Subcontracted a licensed drilling contractor to complete soil borings, install temporary groundwater monitoring wells, and complete semi-permanent soil vapor probes.
- Advanced five environmental soil borings (SB-1 through SB-5) and collected soil samples.
- Installed three temporary monitoring wells in three of the soil borings (SB-1, SB-4, and SB-5) and collected groundwater samples.



- Completed three semi-permanent soil vapor probes (VP-1 through VP-3) and collected a soil vapor sample at each location.
- Collected two sub-slab soil vapor samples (SSV-1 and SSV-2), which were completed in the existing machine shed.
- Conducted environmental monitoring during drilling and screened soil samples collected from the borings for the presence of organic vapors using a photoionization detector (PID). Visual and olfactory observations regarding potential contamination were also made and recorded.
- Analyzed representative samples of soil and groundwater for one or more of the following parameters: volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs), diesel range organics (DRO), gasoline range organics (GRO), Eight Resource Conservation and Recovery Act (RCRA) metals, and lead.
- Analyzed soil vapor samples for VOCs and fixed gases including methane.
- Advanced five hand auger borings at the cultivated portions of the Site to collect soil samples for PFAS analyses.
- Evaluated the data and prepared this report.

3.1 Deviations from Work Plan/Proposal

Groundwater sampling was proposed for all temporary monitoring wells completed as part of the Phase II ESA. Soil boring SB-2 was completed to a depth of 16 feet bgs; however, groundwater was not encountered so no groundwater was sampled from the boring.

No other significant deviations from the proposal were noted during the Phase II ESA.

4.0 Investigation Methods and Procedures

The field work relating to the investigation was conducted on August 25 and August 26, 2025. Prior to beginning the field investigation, public utilities were cleared through Gopher State One Call and private utilities were cleared through a subcontracted private utility locator.

Field methods and results are discussed in the following sections. Soil boring logs are provided in [Appendix B](#), vapor pin installation and soil vapor sampling forms are provided in [Appendix C](#), laboratory analytical reports are provided in [Appendix D](#), and Braun Intertec Standard Operating Procedures (SOPs) are provided in [Appendix E](#).

Investigation locations are shown on Figure 2.



4.1 Soil Evaluation

4.1.1 Soil Borings

Braun Intertec subcontracted Bergerson Caswell Inc., of Maple Plain, Minnesota, to advance five soil borings, designated as SB-1 through SB-5 at the Site to depths ranging from 12 to 16 feet bgs.

The soil borings were completed with a hydraulically-driven push-probe sampling rig. To collect the soil samples from the borings, a disposable thin-walled PVC liner was placed inside of a 4 foot long sampling tool. The borehole was then advanced using the sampling tool to a total penetration depth of up to 4 feet. After advancing the tooling, the sampler was removed from the borehole and the soil sample was retrieved from the PVC liner for field screening and classification. The process was then repeated to the termination depths of the borings.

Prior to arrival onsite, the drill rig and sampling equipment were cleaned with a high pressure, hot water sprayer. Between sampling locations, non-dedicated sampling equipment was cleaned with a soap and water scrub followed by a clean water rinse.

This investigation includes soil borings advanced to depths of 15 feet or deeper. Following temporary well use, the well materials were removed, and the boreholes were sealed in accordance with Minnesota Department of Health (MDH) regulations.

4.1.2 Hand Auger Borings

Five hand auger borings, designated HA-1 through HA-5, were advanced at the cultivated portions of the Site. A hand-driven bucket auger was used to advance the hand auger borings to depths of 2 feet bgs.

4.1.3 Soil Classification and Monitoring

Soils samples from the soil borings and hand auger borings were visually and manually classified in the field by an environmental technician using ASTM D 2487 “Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)” and ASTM D 2488 “Standard Practice for Description and Identification of Soils (Visual-Manual Procedures)”. Additionally, soils were classified at the Braun Intertec soils laboratory by a geotechnical engineer using ASTM D 2487 and ASTM D 2488.

Soil samples retrieved were examined by an environmental technician for unusual staining, odors, and other apparent signs of contamination. In addition, the soil samples were screened for the presence of organic vapors using a PID. The PID was equipped with a 10.6 electron volt lamp and calibrated to an isobutylene standard. The PID was used to perform headspace method of field analyses in accordance with Braun Intertec SOPs and the MPCA recommended procedures.

4.1.4 Soil Analyses

Selected soil samples were collected from the soil borings and hand auger borings for laboratory analysis as identified in the following table. Samples were submitted to Pace Analytical Services, LLC, from Minneapolis, Minnesota (Pace).



Soil Boring/Hand Auger Sample Name	Sampling Depth (feet bgs)	Rationale	Soil Analytical Parameters
SB-1	1-2.5	Fill soils adjacent to the 1,000 -gallon AST.	VOCs, GRO, DRO with silica-gel cleanup, and PAHs
SB-2	2-4	Fill soils adjacent to the existing machine shed.	VOCs, GRO, DRO with silica-gel cleanup, PAHs, and 8 RCRA metals
SB-3	1-2	Fill soils in footprint of former machine shed.	VOCs, GRO, DRO with silica-gel cleanup, PAHs, and 8 RCRA metals
SB-4	2-4	Fill soils in footprint of former machine shed.	VOCs, GRO, DRO with silica-gel cleanup, PAHs, and 8 RCRA metals
SB-5	1-2	Fill soils adjacent to the former 200 -gallon AST.	VOCs, GRO, DRO with silica-gel cleanup, total lead, and PAHs
HA-1	0-1	Soils in upgradient location where septic system sludge was not likely applied (collected as ambient background location for comparison purposes).	PFAS
HA-2	0-1	Soils in areas where septic system sludge was likely applied.	PFAS
HA-3	0-1	Soils in areas where septic system sludge was likely applied.	PFAS
HA-4	0-1	Soils in areas where septic system sludge was likely applied.	PFAS
HA-5	0-1	Soils in areas where septic system sludge was likely applied.	PFAS

Analytical parameters for soil samples collected from each soil boring and hand auger boring are summarized in Table 1.

4.2 Groundwater Evaluation

Temporary monitoring wells (designated as SB-1, SB-4, and SB-5) were installed in three of the soil borings to evaluate groundwater conditions at the Site. The wells were permitted with the MDH. The temporary monitoring well locations are shown on Figure 2.

4.2.1 Temporary Monitoring Well Sampling

After the soil borings were advanced 5 feet into the water table, temporary monitoring wells were constructed using 1 inch diameter PVC riser and 5 foot long, 10 slot screens. Prior to sampling, static groundwater levels were measured in each monitoring well to the nearest 0.01 foot and recorded. The temporary monitoring wells were sampled using a peristaltic pump and length of new polyethylene tubing. Water samples retrieved



were examined by the field technician for unusual odors, petroleum-like sheen, and other apparent signs of contamination. The groundwater samples were placed directly into laboratory-supplied containers, preserved appropriately, and submitted to the laboratory for chemical analysis.

4.2.2 Groundwater Analyses

The groundwater samples collected from the temporary wells were submitted to Pace and analyzed for a combination of the following parameters:

- VOCs using EPA Method 8260
- Dissolved lead using EPA Methods 6010 (groundwater sample collected from boring SB-5 only, near former gasoline AST)
- DRO using the WDNR Method
- GRO using the WDNR Method

Analytical parameters for groundwater samples collected from each temporary well are summarized in Table 2.

4.3 Soil Vapor Evaluation

4.3.1 Soil Vapor Probes

Three semi-permanent soil vapor probes (VP-1 through VP-3) were completed by Bergerson Caswell Inc. in general accordance with the MPCA document entitled *Vapor Investigation and Mitigation Decision Best Management Practices* dated April 2020, c rem3 06e (MPCA 2020 Vapor Investigation Guidance). The semi-permanent soil vapor probes were installed using a hydraulically-driven push-probe rig advanced to a depth of 5 feet bgs. An inert glass bead pack was installed from 5 to 3 feet bgs, with a 6-inch-long soil vapor sampling screen installed at a depth of 4 feet bgs. The remaining annular space was sealed with hydrated bentonite and new, inert tubing was attached to the vapor sampling screen and extended to the surface. The sampling point and tubing were purged with a hand pump to remove two volumes of air directly after installation and again the following day prior to sample collection. Following each of the two purging events, organic vapor concentrations were screened with a PID, and the value was recorded. The soil vapor samples were then collected using laboratory-supplied negative pressure air-sample collection canisters (1-liter canisters) equipped with 200 milliliter per minute (mL/min) flow restrictors. Following sample collection, the tubing, valve, and tubing cap were removed from the borehole, and the borehole was sealed.

The soil vapor samples were submitted to Pace National Testing Center in Mt. Juliet, Tennessee (Pace National) and analyzed for a combination of VOCs using EPA Method TO 15 and fixed gases using EPA Method 3C.



4.3.2 Sub-Slab Vapor Points

Two sub-slab vapor sampling points (SSV-1 and SSV-2) were installed in the existing machine shed. Installation and sampling procedures were in general accordance with Appendix B of the MPCA 2020 Vapor Investigation Guidance. As part of the installation, a hole was drilled through the concrete floor slab, and an air-tight temporary soil vapor point connected to inert shut-in test tubing assembly was installed. The other end of the shut-in test assembly was connected to the valve and gauge assembly connected to the air canister. A water dam leak test and shut-in test were successfully performed verifying that there were no leaks in the sample train. The sampling point and tubing were purged to remove at least two volumes of air prior to sample collection. The soil vapor samples were then collected using laboratory-supplied negative pressure air-sample collection canisters (1-liter canisters) equipped with 200 milliliter per minute (mL/min) flow restrictors. The shut-in test assembly was disconnected. Following sampling, organic vapor concentrations at the vapor pin were screened with a PID and the value was recorded. The temporary sampling point was removed from the borehole and the borehole was patched with concrete.

The sub-slab vapor samples were submitted to Pace National and analyzed for VOCs using EPA Method TO 15.

5.0 Investigation Results

5.1 Geologic Conditions

Soil boring logs with descriptions of the various soil strata encountered during the soil boring operations and water level information are contained in [Appendix B](#). The depths shown as changes between the soil types are approximate. The actual changes may be transitional, and the transition depths are likely to be horizontally variable.

In the area of the farmstead, fill soils consisting primarily of lean clay and sandy lean clay, were encountered from the ground surface to depths of 4 feet bgs. Underlying the fill soil was apparent native soil consisting mainly of lean clay, sandy lean clay, silty sand, and/or silt. Groundwater was encountered in borings SB-1, SB-4, and SB-5 at depths ranging from 12.0 to 14.6 feet bgs. In the cultivated portions of the Site, native soils consisting primarily of lean clay, sandy lean clay, and/or silt, were encountered from ground surface to depths of 2 feet bgs.

5.2 Field Screening

Soil recovered from the soil borings was screened by the field technician for evidence of contamination, including odors, staining, and the presence of debris. No odors, staining, or debris were observed in the soils recovered from any of the soil borings or hand auger borings.



Organic vapor/PID readings were recorded for soil samples collected from each boring. Observed organic vapor concentrations ranged from 0.0 to 0.6 parts per million (ppm), which are considered to be general background readings. Soil screening PID results are included on the boring logs in [Appendix B](#).

Groundwater samples were examined by the field technician for evidence of contamination, including unusual odors, petroleum-like sheen, and other apparent signs of contamination. No odors, sheens, or other signs of contamination were observed in the groundwater recovered from any of the temporary monitoring wells.

5.3 Soil Analytical Results

This section provides a discussion of soil analytical results. A summary of the soil analytical results is provided in Table 1 and a summary of the soil PFAS analytical results is provided in Table 2. The complete laboratory reports with chain-of-custody forms are included in [Appendix D](#).

The soil analytical results can be compared with the SRVs, Background Threshold Values (BTVs), and Screening Soil Leaching Values (SLVs), which are also listed on Tables 1 and 2. The SRVs and SLVs are allowable risk-based contaminant concentrations derived by the MPCA using risk assessment methodology, modeling, and risk management policy to guide investigation and cleanup actions. SRVs relate to direct-contact exposure scenarios and SLVs relate to potential leaching of contaminants to groundwater. BTVs were established by the MPCA based on an estimate of state-wide natural background concentrations for inorganics and ambient background concentrations for organics. BTVs are used in instances where the MPCA calculated a health-based SRV that is below estimated background values (MPCA guidance document c-r1-05, April 2021).

Concentrations of contaminants in soil, SRVs, BTVs (where applicable), and SLVs are expressed in units of milligrams per kilogram (mg/kg).

The following provides a summary of the soil analytical results.

- No VOCs, DRO, or GRO were detected in the soil samples analyzed at concentrations greater than or equal to the laboratory reporting limits.
- Varying concentrations of PAHs were detected in 2 of the 5 soil samples analyzed. However, the concentrations of the detected PAHs were below the applicable regulatory standards.
- Varying concentrations of the eight RCRA metals were detected in the soil samples analyzed. However, none of the metal concentrations exceeded the respective Residential/Recreational SRVs and SLVs.
- No PFAS compounds were detected at or above the laboratory reporting limits in the soil samples analyzed with the exception of perfluorooctanesulfonic acid (PFOS) in hand auger boring HA-3 (0-1'). However, the concentration of PFOS in HA-3 (0-1') did not exceed the respective Residential/Recreational SRV or SLV.



5.4 Groundwater Analytical Results

This section provides a discussion of the groundwater analytical results. A summary of the groundwater analytical results is provided in Table 2. For comparison purposes, Table 2 includes current drinking water criteria (DWC) from the MDH Human Health-Based Water guidance applicable to groundwater. DWC include a combination of MDH Health Risk Limits (HRLs), MDH Health-Based Values (HBVs), MDH Risk Assessment Advice (RAA), and Maximum Contaminant Levels (MCLs) established by the EPA. There are no established criteria for DRO and GRO for water that is not collected directly from wells used as drinking water sources. Concentrations of contaminants in water and DWC are expressed in units of micrograms per liter ($\mu\text{g/L}$).

The complete laboratory reports with chain-of-custody forms are included in [Appendix D](#).

The following provides a summary of the groundwater analytical results.

- No VOCs were detected at concentrations greater than or equal to the laboratory reporting limits, with the exception of toluene in each of the groundwater samples analyzed. The concentration of toluene in each the groundwater samples analyzed did not exceed the respective MDH DWC.
- Dissolved lead was detected at a concentration of $37.6 \mu\text{g/L}$ in groundwater sample SB-5-GW, which exceeds the MDH DWC. Boring SB-5 was advanced near the former gasoline AST.
- DRO was detected in groundwater samples SB-1-GW and SB-2-GW at concentrations of 190 and $120 \mu\text{g/L}$ respectively. There is not an applicable drinking water standard for DRO for groundwater samples that are not collected from a potable water supply well. Note that MPCA typically uses a criterion of $1,000 \mu\text{g/L}$ to delineate the lateral extent of DRO and GRO in groundwater.
- No GRO were detected at concentrations greater than or equal to the laboratory reporting limits.

5.5 Soil Vapor Analytical Results

This section provides a discussion of the soil vapor analytical results. A summary of the soil vapor analytical results is provided in Table 3. The complete laboratory reports with chain-of-custody forms are included in [Appendix D](#).

For comparison purposes, Table 3 includes ISVs. ISVs were developed by the MPCA in coordination with the MDH as screening values for evaluating vapor intrusion risks from VOCs identified in indoor air. The potential for indoor air to be impacted by soil vapor intrusion can also be assessed using ISVs. Concentrations of VOCs in air or soil vapor and ISVs are expressed in units of micrograms per cubic meter ($\mu\text{g/m}^3$).

Per MPCA Vapor Investigation Guidance, soil vapor results are compared to 33X ISVs to assess vapor intrusion risk if building conditions are appropriate. According to the guidance, soil vapor concentrations greater than 33X ISVs indicate a vapor source with potential vapor intrusion risk is present. A Site with contaminant concentrations greater than 33X ISVs would typically require either mitigation or additional assessment of potential pathways and receptors to better quantify risks, which might include collection of sub-slab or indoor air samples.



Various petroleum and non-petroleum related VOCs were detected in each of the five analyzed soil vapor samples at concentrations that exceeded laboratory limits. However, none of the detected concentrations exceeded their respective 33X Residential ISVs, with the exception of naphthalene in soil vapor sample SSV-1. Naphthalene was detected at a concentration of 1,870 $\mu\text{g}/\text{m}^3$ in soil vapor sample SSV-1, which exceeds the MPCA 33X Residential ISV of 310 $\mu\text{g}/\text{m}^3$. Naphthalene is commonly associated with petroleum products.

Methane was not detected at concentrations that exceeded laboratory reporting limits in either of the two analyzed soil vapor samples.

5.6 Quality Assurance/Quality Control

A data quality assessment of field procedures and laboratory reports was performed to determine the effect of any deviations on data quality and used to support project objectives. All applicable Braun Intertec SOPs were followed as prescribed unless otherwise noted in this report. Notable findings are provided in more detail below and incorporated, where necessary, into this report.

Soil and groundwater samples were placed in clean, laboratory-supplied containers, preserved, labeled, and transported to Pace laboratory in Minneapolis, Minnesota under refrigerated conditions using chain-of-custody procedures. Soil vapor samples were collected in clean, laboratory-supplied canisters and transported to Pace laboratory in Mt. Juliet, Tennessee using chain-of-custody procedures. Chain-of-custody forms were reviewed at sample check-in and determined to be in general agreement with the contents of the sample coolers. Analyses were performed using EPA or other recognized standard procedures, and samples were analyzed within the EPA recommended holding times.

Laboratory reporting limits were compared against MPCA SLVs and Residential/Recreational SRVs for soil samples, and against DWC for groundwater samples. DRO and GRO in soil were compared against MPCA unregulated fill criteria. Vapor analytical results were compared against the MPCA 33x Residential ISVs. Methane reporting limits were compared against the MPCA Action Level. Reporting limits for the compounds analyzed during the investigation met their respective regulatory standards, except for perfluorodecanoic acid, perfluorohexanesulfonic acid, and perfluorooctanoic acid, which exceeded the SRVs. These exceedances are due to the laboratory method not being sensitive enough to detect these analytes at the low-level concentrations.

One soil trip blank and one water trip blank accompanied the investigative samples, and the trip blanks were analyzed for VOCs and GRO. Additionally, one equipment blank, one field blank, and one trip blank were collected for PFAS analysis. VOCs, GRO, and PFAS were not detected above the reporting limits in the blanks.

The laboratory reported the relative percent difference (RPD) of a VOC was above method acceptance criteria in a laboratory control sample (LCS), continuing calibration verification (CCV) issues, and secondary source verification (ICV) issues with 8260D VOC analyses of soil and groundwater samples. The affected analytes were non-detect, and the quantitation limits are considered estimated. However, all VOC results are below their applicable regulatory limits.



The laboratory indicated that samples SB-1-GW and SB-4-GW did not meet pH preservation criteria for WI DRO analysis. Additionally, the recoveries of DRO were outside of method acceptance criteria in the LCS/D samples associated with SB-1-GW and SB-4-GW. The DRO results in GW-1 and GW-4 are considered estimated due to incomplete preservation and LCS exceedances. DWC for DRO has not been established.

The recoveries of isotopically labelled standards were below method acceptance criteria for PFAS analysis of sample EB-1. By virtue of the use of isotope dilution and extracted internal standard quantification, the results for the target analytes are corrected for any losses that may occur during sample extraction, extract cleanup, and concentration. The quantitation limits of the associated analytes are considered estimated, and PFAS were non-detect in the equipment blank.

In sample SSV-1, acetone recovered above the upper calibration limit in the soil vapor analysis. The result is considered estimated, but this result is below 33x the Residential ISV.

In summary, data quality control items identified during the quality review were evaluated and all data collected are acceptable for use in this investigation for the intended purpose of identifying soil, groundwater, and vapor impacts within the area of concern.

6.0 Conclusions

The objective of the Phase II ESA was to evaluate whether the soil, soil vapor, and groundwater beneath the Site has been impacted due to the recognized environmental conditions identified in the 2025 Phase I ESA. The RECs were specifically related to one current diesel AST with minor surface petroleum drip-type staining, one former gasoline AST, the existing and former machine sheds, and the reported spreading of septic system sludge on the cultivated portions of the Site.

Naphthalene was detected in sub-slab soil vapor sample SSV-1 (collected inside the current machine shed building) at a concentration greater than the 33X Residential ISV. The source of the naphthalene but may be related to the use of petroleum products in the machine shed. Note that no VOCs were detected in a second sub-slab vapor sample collected in the machine shed building (SSV-2) at concentrations exceeding the respective 33X Residential ISVs, or in the soil boring SB-2 advanced near the machine shed. In addition, other petroleum VOCs were not detected in either vapor sample SSV-1 or SSV-2 at concentrations exceeding the respective 33X Residential ISVs. Based on the results of this investigation, the naphthalene detected in vapor sample SSV-1 appears to be related to an isolated area of petroleum impacts and not a significant petroleum release. Additional targeted soil screening beneath the machine shed and/or remediation during redevelopment is warranted to evaluate the potential vapor exposure to the residential receptors in the vicinity of the machine shed.

Per MPCA Vapor Investigation Guidance, soil vapor results are compared to 33X ISVs to assess vapor intrusion risk if building conditions are appropriate. According to the MPCA 2020 vapor guidance, soil vapor concentrations greater than 33X ISVs indicate a vapor source with potential vapor intrusion risk is present.



A Site with contaminant concentrations greater than 33X ISVs typically requires either mitigation, source removal or additional assessment of potential pathways and receptors to better quantify risks.

Groundwater in the vicinity of the former gasoline AST is contaminated with lead at concentrations exceeding the drinking water criteria. Lead was historically used in gasoline as an anti-knock additive. However, no evidence of a petroleum release was identified in the vicinity of the former AST based on field screening, soil sampling, and groundwater sampling. The source of the lead in groundwater is not clear.

No evidence of an actionable PFAS release to soil in the cultivated agricultural fields at the Site was identified based on the results of this Phase II ESA. Based on the results of this investigation, it does not appear that the application of residential septic sludge from the north adjoining property has impacted the Site with PFAS.

7.0 Recommendations

Based on the results of this Phase II ESA, the following recommendations are provided:

- The Site should be enrolled in the MPCA Brownfield Program, specifically the Voluntary Investigation and Cleanup (VIC) and Petroleum Brownfield (PB) Programs to obtain applicable approvals and assurances from the MPCA regarding the soil vapor and groundwater impacts and the proposed redevelopment.
- Environmental response actions will be required during redevelopment. Potential response actions might include segregation and disposal of petroleum-contaminated soil during redevelopment (i.e., source removal) with associated reevaluation of vapor conditions after Site grading. Note that additional vapor testing in the vicinity of SSV-1 will likely be required to obtain MPCA technical approvals and to determine if vapor mitigation controls are required for the proposed homes in the vicinity. Response actions should be conducted in accordance with an MPCA-approved Response Action Plan/Construction Contingency Plan (RAP/CCP).
- The dissolved lead groundwater impacts identified in the vicinity of the former gasoline AST are likely not actionable. However, if dewatering, irrigation wells, or other improvements are planned that will include accessing or using groundwater in this area, additional evaluation and planning will be warranted to manage the contaminated groundwater.

8.0 Assessment Limitations

The analyses and conclusions submitted in this report are based on field observations and the results of laboratory analyses of soil, groundwater, and soil vapor samples collected from the soil borings, hand auger borings, sub-slab vapor samples and soil vapor probes completed for this project.



In performing its services, Braun Intertec used that degree of care and skill ordinarily exercised under similar circumstances by reputable members of its profession currently practicing in the same locality. No warranty, express or implied, is made.



APPENDIX H

Greenhouse Gas (GHG) Calculator Analysis

Scope 1 Emissions from Mobile Sources

Guidance

(A) Enter annual data for each vehicle or group of vehicles (grouped by vehicle type, vehicle year, and fuel type) in ORANGE cells in **Table 1**. Example entry is shown in first row (GREEN *Italics*). Only enter vehicles **owned or leased** by your organization on this sheet. All other vehicle use such as employee commuting or business travel is considered a scope 3 emissions source and should be reported in the corresponding scope 3 sheets.

- Note: As of the v9 Simplified GHG Calculation tool update, the latest mobile combustion factors reflect year 2020 data. Therefore, for all vehicle model years 2021 onward, the 2020 year factor is used.
- Select "On-Road" or "Non-Road" from drop down box to determine the Vehicle Types available. **Must make this selection before picking vehicle type.**
- Select "Vehicle Type" from drop down box (closest type available).
- Enter "Fuel Usage" in appropriate units (units appear when vehicle type is selected).
- If mileage or fuel usage is unknown, estimate using approximate fuel economy values (see **Reference Table** below).
- Vehicle year and Miles traveled are not necessary for non-road equipment.

(B) When using biofuels, typically the biofuel (biodiesel or ethanol) is mixed with a petroleum fuel (diesel or gasoline) for use in vehicles. Enter the biodiesel and ethanol percentages of the fuel if known, or leave default values.

Biodiesel Percent:

20%

Ethanol Percent:

80%

(C) Biomass CO₂ emissions from biodiesel and ethanol are not reported in the total emissions, but are reported separately at the bottom of the sheet.

Source ID	Source Description	On-Road or Non-Road?	Vehicle Type	Vehicle Year	Fuel Usage	Units	Miles Traveled	CO ₂ (kg)	CO ₂ (tons)
<i>Fleet-012</i>	<i>HQ Fleet</i>	<i>OnRoad</i>	<i>Passenger Cars - Gasoline</i>	<i>2019</i>	<i>500</i>	<i>gal</i>	<i>11,450</i>		
Construction Equipment	Phase I - Construction Equipment	NonRoad	Industrial/Commercial Equipment - Diesel	2007	296,400	gallons		2,602,392	2,869
Passenger Cars	Phase I - Passenger Cars	OnRoad	Passenger Cars - Gasoline	2007	1,190,800	gallons	52,000	12,158,068	13,402

Vehicle Type	Average Fuel Economy (mpg)
Passenger Cars	22.9
Motorcycles	44.0
Diesel Buses (Diesel Heavy-Duty Vehicles)	7.3
Other 2-axle, 4-Tire Vehicles	18.0
Single unit 2-Axle 6-Tire or More Trucks	7.6
Combination Trucks	6.2

Average mpg values from the U.S. Department of Transportation, Federal Highway Administration, Highway Statistics 2020 (November 2022), Table VM-1.

GHG Emissions

Vehicle Type	Vehicle Year	Mileage (miles)	CH ₄ (g)	N ₂ O (g)
Passenger Cars - Gasoline	1984-93	0	0.0	0.0
	1994	0	0.0	0.0
	1995	0	0.0	0.0
	1996	0	0.0	0.0
	1997	0	0.0	0.0
	1998	0	0.0	0.0
	1999	0	0.0	0.0
	2000	0	0.0	0.0
	2001	0	0.0	0.0
	2002	0	0.0	0.0
	2003	0	0.0	0.0
	2004	0	0.0	0.0
	2005	0	0.0	0.0
	2006	0	0.0	0.0
	2007	52,000	374.4	270.4
	2008	0	0.0	0.0
	2009	0	0.0	0.0
	2010	0	0.0	0.0
	2011	0	0.0	0.0
	2012	0	0.0	0.0
	2013	0	0.0	0.0
	2014	0	0.0	0.0
	2015	0	0.0	0.0
	2016	0	0.0	0.0
	2017	0	0.0	0.0
	2018	0	0.0	0.0
	2019	0	0.0	0.0
	2020	0	0.0	0.0
	2021	0	0.0	0.0
	2022	0	0.0	0.0
	2023	0	0.0	0.0

Vehicle Type	Fuel Type	Fuel Usage (gallons)	CH ₄ (g)	N ₂ O (g)
Construction/Mining Equipment	Gasoline (2 stroke)	-	-	-
	Gasoline (4 stroke)	-	-	-
	Gasoline Off-Road Trucks	-	-	-
	Diesel Equipment	296,400	299,364	278,616
	Diesel Off-Road Trucks	-	-	-
	LPG	-	-	-

Total CO ₂ Equivalent Emissions (metric tons) - Mobile Sources	16,270.3
Total Biomass CO ₂ Equivalent Emissions (metric tons) - Mobile Sources	0.0

Scope 2 Emissions from Purchase of Electricity

Guidance

The Indirect Emissions from Purchased Electricity Guidance document provides guidance for quantifying two scope 2 emissions totals, using a **location-based method** and a **market-based method**. The organization should quantify and report both totals in its GHG inventory. The location-based method considers average emission factors for the electricity grids that provide electricity. The market-based method considers contractual arrangements under which the organization procures electricity from specific sources, such as renewable energy.

- (A) Enter total annual electricity purchased in kWh and each eGRID subregion for each facility or site in ORANGE cells of **Table 1**.
- (B) If electricity consumption data are not available for a facility, an estimate should be made for completeness.
See the "Items to Note" section of the Help sheet for suggested estimation approaches.
- (C) Select "eGRID subregion" from drop box and enter "Electricity Purchased."
- Use map (Figure 1) at bottom of sheet to determine appropriate eGRID subregion. If subregion cannot be determined from the map, find the correct subregion by entering the location's zip code into EPA's Power Profiler:
<https://www.epa.gov/eGRID/power-profiler/>
- (D) See the market-based emission factor hierarchy on the market-based method Help sheet. If any of the first four types of emission factors are applicable, enter the factors in the yellow cells marked as "<enter factor>". If not, leave the yellow cells as is, and eGRID subregion factors will be used for market-based emissions.
Example entry is shown in first row (*GREEN Italics*) for a facility that purchases RECs for 100% of its consumption, and therefore has a market-based emission factor of 0.

Help - Market-Based Method

Tips: Enter electricity usage by location and then look up the eGRID subregion for each location.
If you purchase renewable energy that is less than 100% of your site's electricity, see the example in the market-based method Help sheet.

Table 1. Total Amount of Electricity Purchased by eGRID Subregion

					Market-Based						Location-Based		
					Use these cells to enter applicable market-based emission factors						Emissions		
					Emission Factors			Emissions					
Source ID	Source Description	Source Area (sq ft)	eGRID Subregion where electricity is consumed	Electricity Purchased (kWh)	CO ₂ Emissions (lb/MWh)	CH ₄ Emissions (lb/MWh)	N ₂ O Emissions (lb/MWh)	CO ₂ Emissions (lb)	CH ₄ Emissions (lb)	N ₂ O Emissions (lb)	CO ₂ Emissions (lb)	CH ₄ Emissions (lb)	N ₂ O Emissions (lb)
Bldg-012	East Power Plant	12,517	HIMS (HICC Miscellaneous)	200,000	0	0	0	0.0	0.0	0.0	226,880.0	27.0	4.2
Residential	Single-Family Detached Residential 323 Units	4,791,600	MROW (MRO West)	3,013,913	<enter factor>	<enter factor>	<enter factor>	3,001,254.6	322.5	45.2	3,001,254.6	322.5	45.2
					<enter factor>	<enter factor>	<enter factor>						
					<enter factor>	<enter factor>	<enter factor>						
					<enter factor>	<enter factor>	<enter factor>						
					<enter factor>	<enter factor>	<enter factor>						
					<enter factor>	<enter factor>	<enter factor>						
Total Emissions for All Sources				3,013,913				3,001,254.6	322.5	45.2	3,001,254.6	322.5	45.2

GHG Emissions

CO ₂ Equivalent Emissions (metric tons)	
Location-Based Electricity Emissions	1,371.1
Market-Based Electricity Emissions	1,371.1

Notes:
1. CO₂, CH₄ and N₂O emissions are estimated using methodology provided in EPA's Center for Corporate Climate Leadership Greenhouse Gas Inventory Guidance
- Indirect Emissions from Purchased Electricity (January 2016).

Scope 3 Emissions from Waste

Guidance

- (A) Enter annual waste data in ORANGE cells. Example entry is shown in first row (*GREEN Italics*).
- (B) First, choose the appropriate material then the disposal method from the drop down options. For the average-data method, use one of the mixed material types, such as mixed MSW. If the exact waste material is not available, consider an appropriate proxy. For example, dimensional lumber can be used as a proxy for wood furniture.
- (C) Choose an appropriate disposal method. Note that not all disposal methods are available for all materials. If there is a #NA or # Value error in the emissions column, you must pick a new material type or appropriate disposal method.

Table 1. Waste Disposal Weight by Waste Material and Disposal Method (CO₂, CH₄ and N₂O)

Source ID	Source Description	Waste Material	Disposal Method	Weight	Unit	CO ₂ e Emissions (kg)
<i>Bldg-012</i>	<i>East Power Plant Finished Goods</i>	<i>Copper Wire</i>	<i>Landfilled</i>	<i>1,000</i>	<i>metric ton</i>	<i>22,040</i>
Residential	323 Units	Mixed MSW municipal solid waste	Landfilled	707,808	pounds (lb)	184,030
Residential	323 Units	Mixed Recyclables	Recycled	353,904	pounds (lb)	15,926

GHG Emissions

Total Emissions by Disposal Method - Residential

Waste Material	CO ₂ e (kg)	Estimated Residents	Rate Generated (lbs/day/person)	Total Rate Generated (lbs/day)	Total Rate Generated (lbs/year)
Recycled	15,926	808	1.2	969.6	353,904.0
Landfilled	184,030	808	2.4	1,939.2	707,808.0
Combusted	-				
Composted	-				
Anaerobically Digested (Dry Digestate with Curing)	-				
Anaerobically Digested (Wet Digestate with Curing)	-				

Total CO₂ Equivalent Emissions (metric tons) - Waste

200.0

A background image of a topographic map with contour lines in shades of gray, covering the top half of the page.

APPENDIX I

Traffic Impact Study

Traffic Impact Study

NIGON PROPERTY (ROCHESTER, MN)

DRAFT DOCUMENT

August 8th, 2025

Prepared By:

Nick Grage, PE, PTOE, RSP₁

ALLIANT ENGINEERING, INC. | 733 S Marquette Ave UNIT 700, Minneapolis, MN 55402

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1. Introduction

Alliant Engineering has completed a traffic impact study for a proposed residential development located in the southwest quadrant of CSAH 34 (Country Club Road SW) and 45th Avenue SW in Rochester, MN (see **Figure 1**). The proposed development, referred to as the Nigon Property, encompasses approximately 175.88 acres, consisting of 317 senior adult housing – single-family homes. These homes are organized into three plot sizes: 120 units on 44-foot-wide lots, 135 units on 50-foot-wide lots, and 62 units on 64-foot-wide lots. Cascade Creek divides the development into northern and southern sections, with dedicated access points to 45th Avenue SW and 8th Street SW respectively, as well as bridge access over Cascade Creek that connects the two sections.

The objectives of this study are to evaluate existing traffic operations within the study area, identify any potential traffic impacts to the adjacent roadway network due to the proposed development trips, and recommend improvements to address issues if necessary. The following provides the assumptions, analysis, and study conclusions / recommendations offered for consideration.

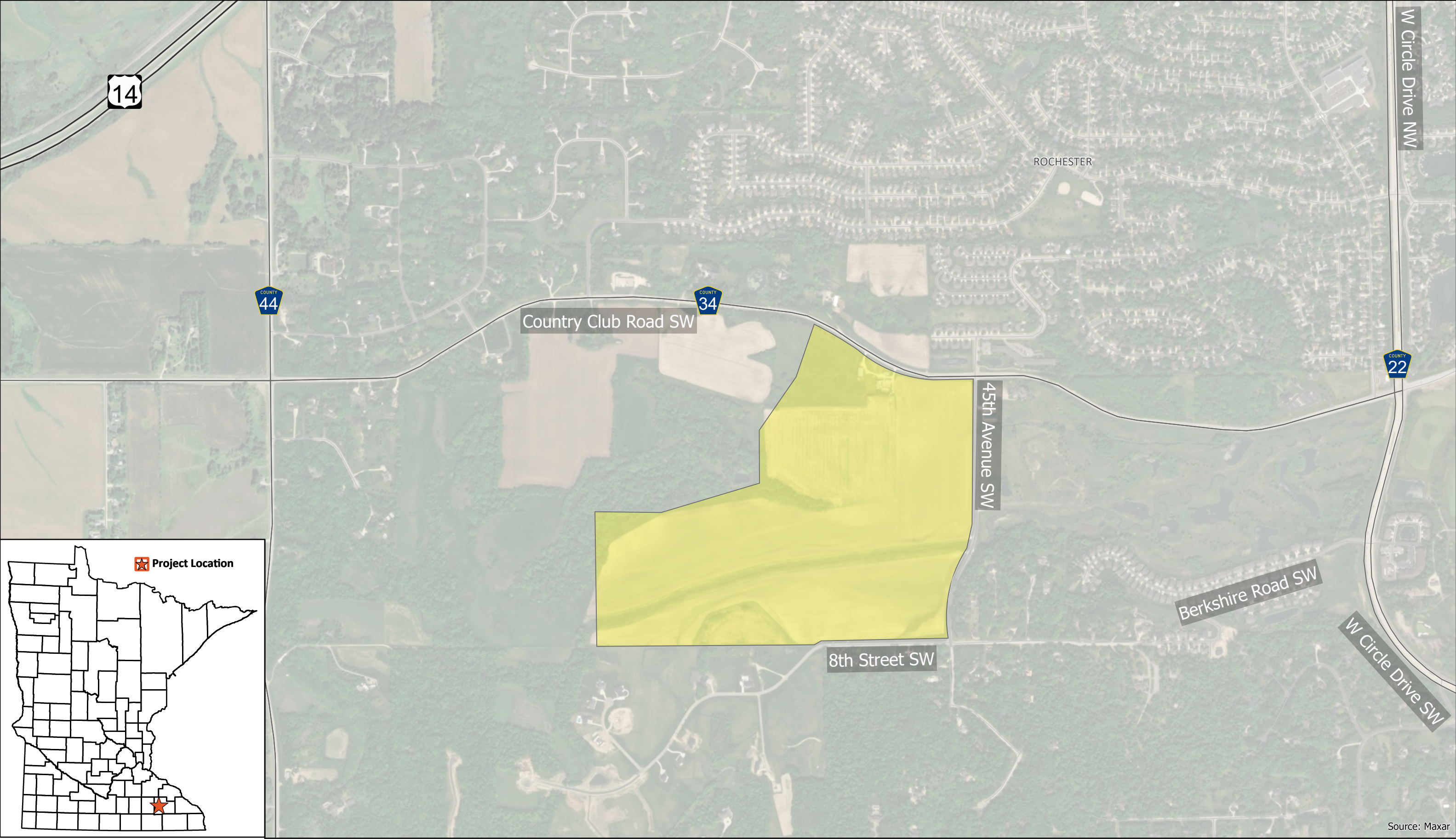
2. Existing Conditions

The existing conditions were reviewed to establish a baseline for identifying any future impacts associated with the proposed development. The evaluation of existing conditions includes various field observations and research, turning movement counts, and an intersection capacity analysis.

2.1 STUDY AREA INTERSECTIONS

The following study intersections were identified:

- Country Club Road SW & 45th Avenue SW
- Country Club Road SW & W Circle Drive NW / W Circle Drive SW
- W Circle Drive SW & Berkshire Road SW / Fairway Ridge Lane SW
- 45th Avenue SW & 8th Street SW
- The following development accesses were identified:
 - o 45th Avenue SW & North Access (Site Access)
 - o 8th Street SW & South Access (Site Access)



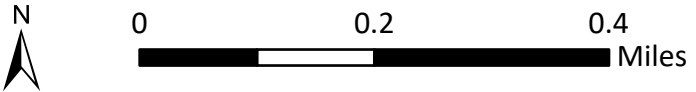
Nigon Property Traffic Impact Study



Legend

Proposed Development

Figure 1
Project Location



2.2 DATA COLLECTION

2.2.1 Existing Traffic Volumes

To document existing conditions, intersection turning movement counts (TMCs) were collected at the existing study intersections by Alliant Engineering on Tuesday, June 24th, 2025, over the following time periods:

- AM Peak Period: 6:00 – 9:00 a.m.
- PM Peak Period: 4:00 – 7:00 p.m.

The peak hours were observed to be 7:30 to 8:30 a.m. and 4:30 to 5:30 p.m. during the data collection period, respectively. Collected intersection turning movement counts are included in the **Appendix**.

2.2.2 Roadway / Intersection Characteristics

In addition to traffic volume data collection, observations were completed to identify roadway / intersection characteristics within the study area (i.e. geometry, posted speed limits, and traffic control), which are summarized in **Table 1** and **Table 3**. Existing traffic volumes within the study area are shown in **Figure 2**.

Table 1. Roadway Characteristics

Roadway	Cross-Section	Speed Limit	Functional Classification
Country Club Road SW	2-Lane Undivided	55 mph	Major Arterial
45 th Avenue SW	2-Lane Undivided	35 mph	Local
W Circle Drive NW / W Circle Drive SW	4-Lane Divided / 4-Lane Undivided	45 mph	Strategic Arterial
Berkshire Road SW / Fairway Ridge Lane SW	2-Lane Undivided	25 mph	Local
8 th Street SW	2-Lane Undivided	25 mph	Local

In addition to the existing study intersections two accesses along 45th Avenue SW and 8th Street SW are proposed with the development. Proposed geometry and traffic control for these accesses are summarized in **Table 2**. Error! Reference source not found..

Table 2. Development Intersection Characteristics

Intersection	Traffic Control	Lane Designations by Approach ¹			
		NB	SB	EB	WB
45 th Avenue SW & North Access	Through / Stop	LT	TR	LR	-
8 th Street SW & South Access	Through / Stop	-	LR	LT	TR

¹L=Left-Turn, T=Through, R=Right-Turn

²Separate Lanes are Denoted by /

Table 3. Intersection Characteristics

Intersection	Traffic Control	Lane Designations by Approach ¹			
		NB	SB	EB	WB
Country Club Road SW & 45th Avenue SW	Through / Stop	LTR	LTR	LT / R	LT / R
Country Club Road SW & W Circle Drive NW/SW	Traffic Signal	L / T / T / R	L / T / T / R	L / T / R	L / T / R
W Circle Drive SW & Berkshire Road SW / Fairway Ridge Lane SW	Through / Stop	L / T / T / R	L / T / T / R	LT / R	LTR
8th Street SW & 45th Avenue SW	Through / Stop	LTR	LTR	LTR	LTR

¹L=Left-Turn, T=Through, R=Right-Turn

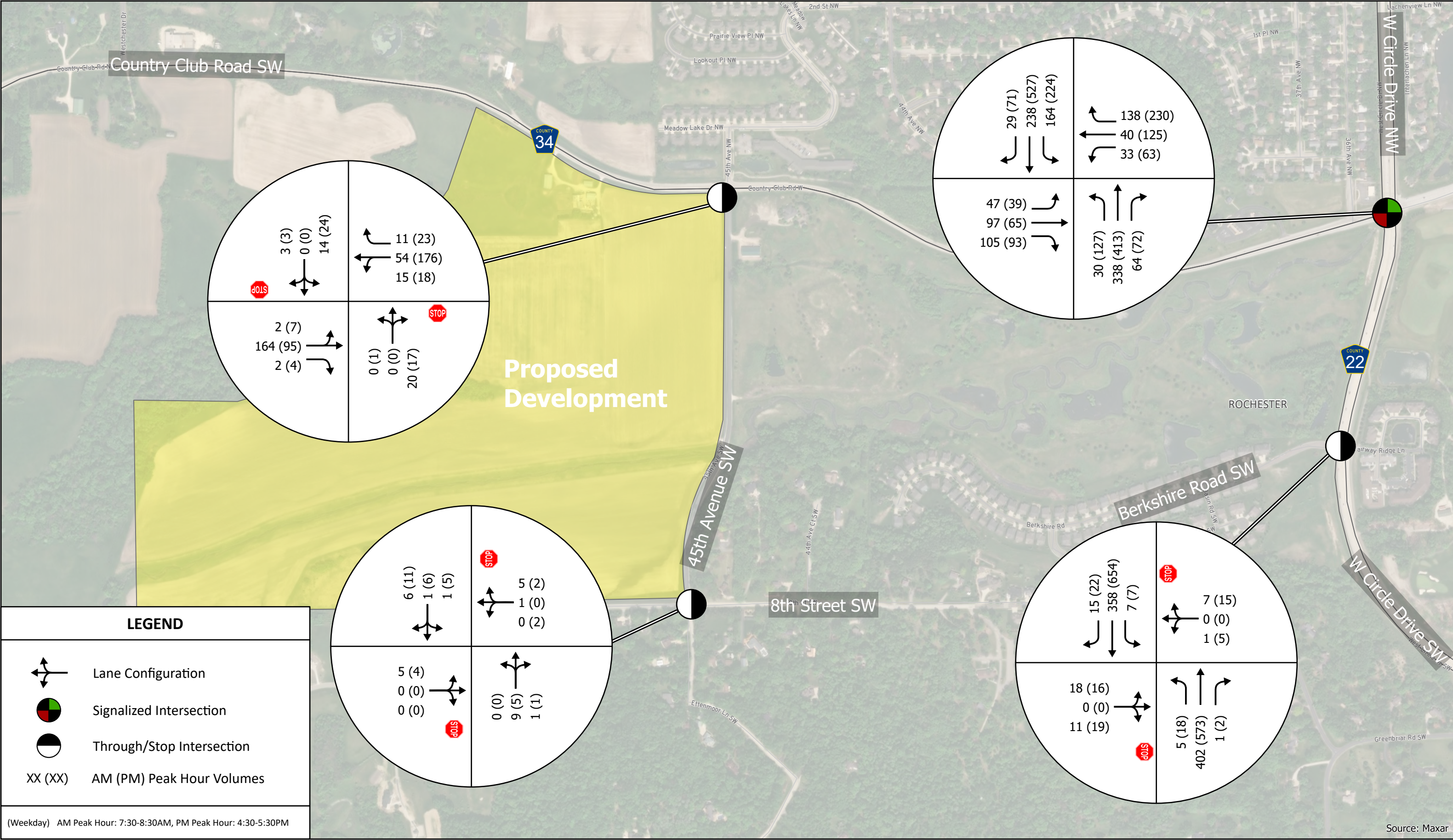
²Separate Lanes are Denoted by /

2.2.3 Multimodal and Pedestrian/Bicycle Accommodations

Existing pedestrian / bicycle accommodations in the vicinity of the proposed development were reviewed. Sidewalks are present along both sides of 45th Avenue SW north of Country Club Road SW, although no pedestrian infrastructure currently extends south of Country Club Road SW along the boundary of the proposed development. Similarly, sidewalk coverage is present along both sides of 8th Street SW but only begins approximately one-third of a mile east of the intersection of 8th Street SW with 45th Avenue SW. No dedicated bicycle lanes or shared use paths are present along either of these roadways.

Transit service in the area is limited. Local bus route 408 operates north of the site and serves neighborhoods west of West Circle Drive, including the intersection of Country Club Road SW & W Circle Drive NW/SW, however, no transit stops are located along any roadways adjacent to the site of the proposed development.

According to the City of Rochester's Active Transportation Plan, several roadways near the development are included in the long-range multimodal network. Segments of 45th Avenue SW, Berkshire Road SW, and W Circle Drive are identified as low to moderate priority corridors (ranging in level 1 to level 6 on a 10-point scale), indicating that bicycle, pedestrian, and transit improvements are considered in the city's planning but are not anticipated in the near term.

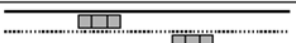


2.3 INTERSECTION CAPACITY ANALYSIS

An existing year 2025 intersection capacity analysis was completed using Synchro/SimTraffic software to establish a baseline condition to which future traffic operations could be compared. Capacity analysis results identify a Level of Service (LOS), which indicates the quality of traffic flow through an intersection. Intersections are given a ranking from LOS A through LOS F. The LOS results are based on average delay per vehicle, which corresponds to the delay threshold values shown in **Table 4**. LOS A indicates the best traffic operation, with vehicles experiencing minimal delays. LOS F indicates an intersection where demand exceeds capacity, or a breakdown of traffic flow. The LOS D/E boundary for overall operations is often used as the indicator of congestion in an urban area, with local agencies adopting additional requirements as needed.

The City of Rochester's Engineering Standards state that LOS C is to be maintained on any arterial, freeway, or expressway and LOS D is to be maintained on other designated non-local streets. For side-street stop-controlled intersections, a key measure of operational effectiveness is the side-street LOS. Lengthy delays and poor LOS can occur on side-street approaches even if the overall intersection is functioning well, making side-street LOS a valuable design criterion. Turning movements for all intersections must be at or above LOS E.

Table 4. Level of Service Criteria

Level of Service	Description	Delay per Vehicle (seconds)	
		Signalized Intersection	Unsignalized Intersection
A	 Free Flow: Low volumes and no delays.	0 - 10	0 - 10
B	 Stable Flow: Speeds restricted by travel conditions, minor delays.	> 10 - 20	> 10 - 15
C	 Stable Flow: Speeds and maneuverability closely controlled due to higher volumes.	> 20 - 35	> 15 - 25
D	 Stable Flow: Speeds considerably affected by change in operating conditions. High density traffic restricts maneuverability, volume near capacity.	> 35 - 55	> 25 - 35
E	 Unstable Flow: Low speeds, considerable delay, volume at or slightly over capacity.	> 55 - 80	> 35 - 50
F	 Forced Flow: Very low speeds, volume exceed capacity, long delays with stop and go traffic.	> 80	> 50

Source: Highway Capacity Manual, 2010 Edition, Transportation Research Board, Exhibits 18-4 & 19-1.

After LOS, the second component of the capacity analysis is a study of vehicular queuing, or the lineup of vehicles waiting to pass through an intersection. An intersection can operate with an acceptable LOS, but if queues from the intersection block entrances to turn lanes or adjacent driveways, unsafe operating conditions could result. The 95th percentile queue, or the length of queue with only a five percent probability of being exceeded during an analysis period, is considered the standard for design purposes.

2.3.1 Intersection Capacity Analysis

The existing year 2025 intersection capacity analysis was performed for the study intersections during the weekday a.m. and p.m. peak hours as observed by Alliant Engineering as noted previously. Results of the existing year 2025 intersection capacity analysis presented in **Table 5** indicate that all study intersections currently operate at overall LOS A during the a.m. and p.m. peak hours under existing year 2025 traffic volumes except for W Circle Drive NW & Country Club Road SW which operates at overall LOS C or better. Detailed operations and queuing analysis results are presented in the **Appendix**.

Table 5. Existing Year 2025 Intersection Capacity Analysis

Intersection	AM Peak Hour		PM Peak Hour	
	LOS	Delay (s)	LOS	Delay (s)
Country Club Road SW & 45th Avenue SW	A / A	1.6 / 7.2	A / A	2.9 / 6.8
W Circle Drive NW & Country Club Road SW	B / C	13.5 / 28.6	C / C	20.1 / 26.7
W Circle Drive NW & Berkshire Road SW / Fairway Ridge Lane SW	A / A	1.7 / 7.5	A / A	3.3 / 9.6
45th Avenue SW & 8th Street SW	A / A	1.5 / 4.8	A / A	1.5 / 3.9

Overall Intersection LOS / Worst Approach LOS

Overall Intersection Delay / Worst Approach Delay

3. Traffic Growth Rates

3.1 TRAFFIC GROWTH

Based on the traffic data available, two forecasting methodologies were considered to best identify a traffic growth rate. The forecasting methodologies are detailed below.

3.1.1 Historical AADT Analysis

A regression analysis was completed based on historical AADT volumes obtained from MnDOT's Traffic Mapping Application, which shows traffic volumes increasing over the past 30 years but leveling off more recently. An approach that considers future development in the area and consultation with ROCOG may be appropriate.

3.1.2 MnDOT Cumulative ESAL Worksheet

A least squares analysis was completed using MnDOT's Cumulative ESAL's worksheet. The recommended traffic growth rates are demographically adjusted for Olmsted County. The recommended traffic growth rates from MnDOT's Cumulative ESAL worksheet range from 0.50 to 1.83 percent, slightly lower than the growth rate identified using historical AADTs. MnDOT Cumulative ESAL Worksheets can be found in the **Appendix**.

3.2 PROPOSED DAILY FORECASTS

Two forecasting methodologies were considered to identify a traffic growth rate for the study intersections. Based on the results of the historical AADT analysis and the MnDOT Cumulative ESAL worksheets, a 1.0 percent growth rate was applied to background traffic volumes to obtain forecast year 2027 and 2037 traffic volumes. This is expected to be sufficient for completion of the EAW, with ROCOG staff being consulted later on.

4. Proposed Development

The proposed residential development is located on an undeveloped 175.88-acre parcel in Rochester, MN. The proposed development consists of 317 senior adult housing – single-family homes, divided into northern and southern sections by Cascade Creek, with a private vehicle bridge allowing cars to travel between the two sections of the developments. No development phasing was assumed for this study.

4.1 PROPOSED ACCESS

Access to the proposed development is planned at the following two full movement intersections:

- 45th Avenue SW & North Access
 - A full-access intersection along 45th Avenue SW, between Country Club Road SW and 8th Street SW, will serve the northern portion of the property which contains 220 senior adult housing – single family units. Due to its proximity to Country Club Road SW, this access is expected to serve approximately 70 percent of site-generated trips.
- 8th Street SW & South Access
 - A second full-access intersection along 8th Street SW, west of the existing intersection of 45th Avenue SW & 8th Street SW, will serve the southern portion of the property which contains the remaining 97 senior adult housing – single family units. This access will accommodate the remaining 30 percent of site-generated trips.

4.2 TRIP GENERATION

To account for traffic impacts associated with the proposed development, trip generation estimates were developed for the weekday a.m. and p.m. peak hours. The trip generation estimates were developed utilizing trip generation rates for similar land uses as documented in the *ITE Trip Generation Manual, 11th Edition*.

4.2.1 ITE Trip Generation Manual

The ITE Trip Generation Manual was utilized to estimate the trip generation potential for the proposed development. The ITE Trip Generation Manual provides peak hour and daily trip generation rates based on studies of similar land uses. Estimated site generated traffic based on the ITE Trip Generation Manual is detailed in **Table 6**. Results of the trip generation estimates indicate the current development plan is expected to generate approximately 76 a.m. peak hour, 95 p.m. peak hour, and 1,366 daily trips. Based on the methodology described in the ITE Trip Generation Manual, and to provide a conservative estimate of the impact of the current development plan, pass-by trips and multi-used reductions were not applicable.

4.2.2 Trip Distribution & Assignment

The distribution of site-generated traffic (shown in **Figure 4**) was estimated based on a review of historical traffic volumes, collected TMCs, know traffic patterns, and engineering judgment. It is anticipated that approximately 70 percent of site-generated trips will utilize the north access along 45th Avenue SW, with the remaining 30 percent utilizing the south access along 8th Street SW. From those respective access points, 75 percent of site generated traffic is expected to travel east along Country Club Road SW toward W Circle Drive, with 20 percent traveling to the west. The remaining 5 percent was assumed to utilize Berkshire Road SW. This trip distribution was applied to the respective estimated site-generated traffic volumes to generate development added trips, shown in **Figure 5**.

Table 6. Trip Generation Estimate

Land Use (ITE Code)	Units	Size	AM			PM			Daily Trips
			Trips In	Trips Out	Total Trips	Trips In	Trips Out	Total Trips	
Senior Adult Housing – Single-Family (251)	Dwellings	317	25	51	76	58	37	95	1,366
	Multi-Use Reduction (N/A) ²		Not Applicable						
	Land Use Gross Trips		25	51	76	58	37	95	1,366
	Pass-By Trips (N/A) ²		Not Applicable						
	Land Use Net Trips		25	51	76	58	37	95	1,366
Subtotal ITE Trips			25	51	76	58	37	95	1,366
Multi-Use Reduction (N/A) ²			Not Applicable						
Subtotal Gross Trips			Applicable						
Pass-By Trips ²			Not Applicable						
Project Net New Trips			25	51	76	58	37	95	1,366

Source: Institute of Transportation Engineers (ITE) Trip Generation Manual, 11th Edition.

1: Trips generated for the a.m. and p.m. peak hour of the adjacent roadway network.

2: Internal capture rates and pass-by trips were not applicable.

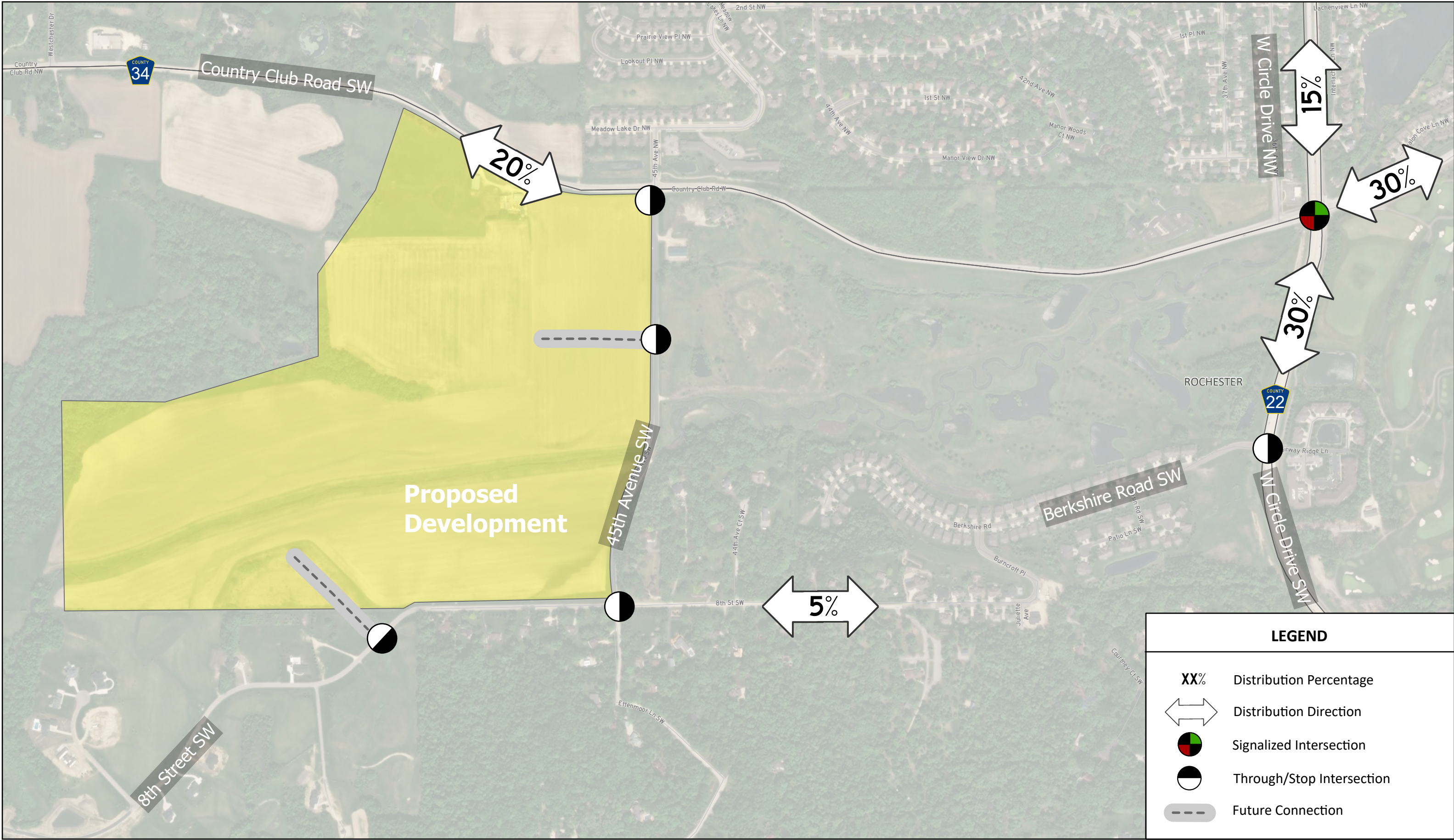


Figure 4
Proposed Development Directional Distribution

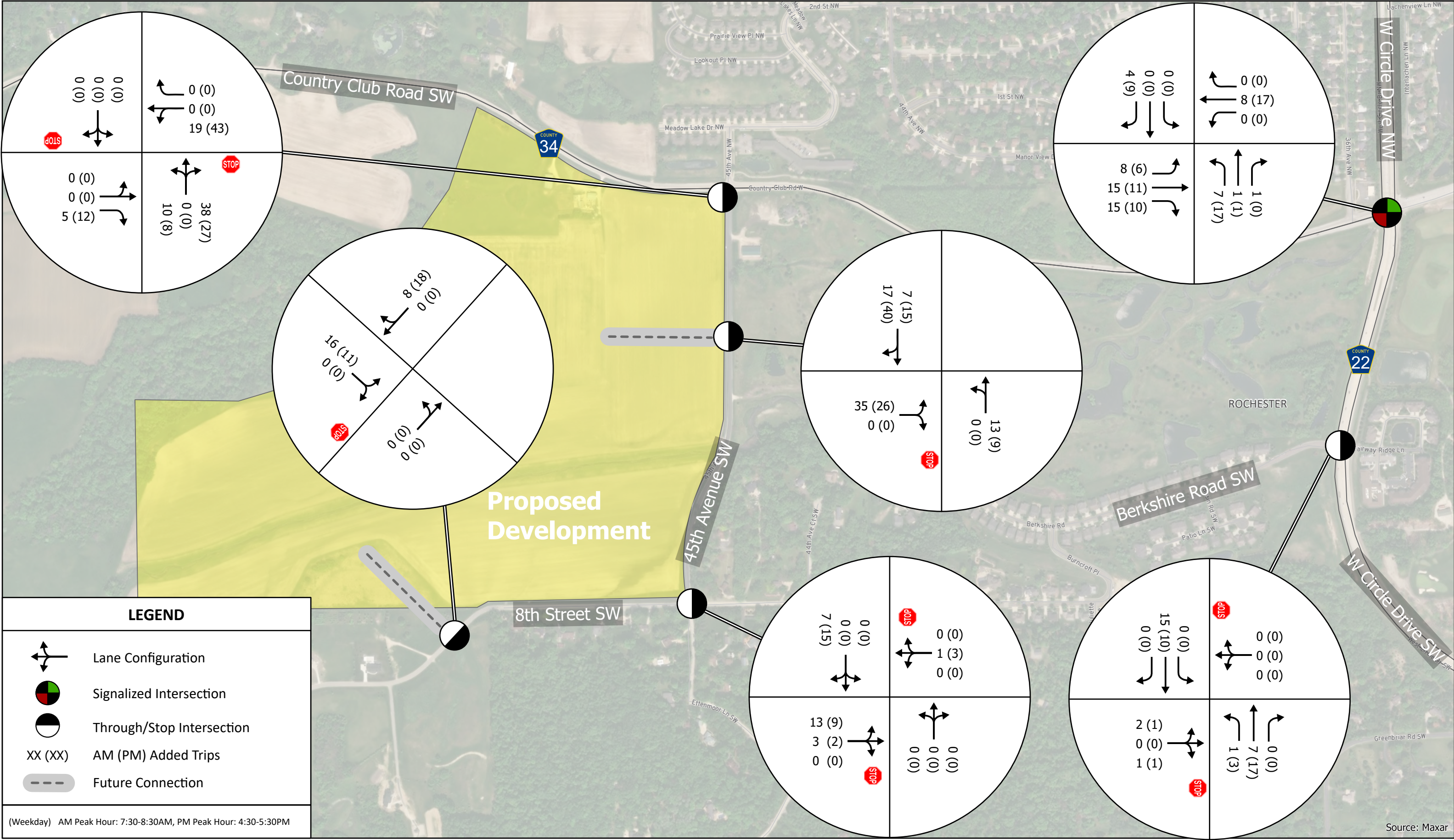


Figure 5

Added Development Trips

5. Future Traffic Operations

5.1 2027 TRAFFIC OPERATIONS ANALYSES

To understand the extent to which the proposed development impacts the study area roadway network, the forecast year 2027 No Build and Build conditions were analyzed. Results of the forecast year 2027 No Build and Build analysis, presented below in **Table 7** and **Table 8**, indicate that all study intersections are expected to operate at overall LOS A during the a.m. and p.m. peak hours under forecast year 2027 traffic volumes except for W Circle Drive NW & Country Club Road SW which operates at overall LOS C or better. In addition, no significant side-street delay or queuing issues were observed in the traffic simulations under either the No Build or Build scenario. Detailed operations and queuing analysis results are presented in the **Appendix**. 2027 No Build and Build traffic volumes are presented in **Figure 6** and **Figure 7**.

Table 7. 2027 No Build Traffic Operations

Intersection	AM Peak Hour		PM Peak Hour	
	LOS	Delay (s)	LOS	Delay (s)
Country Club Road SW & 45th Avenue SW	A / A	1.6 / 7.7	A / A	3.0 / 6.4
W Circle Drive NW & Country Club Road SW	B / C	14.1 / 28.8	C / C	20.9 / 26.0
W Circle Drive NW & Berkshire Road SW / Fairway Ridge Lane SW	A / A	1.9 / 7.8	A / C	3.6 / 15.4
45th Avenue SW & 8th Street SW	A / A	1.4 / 5.1	A / A	1.3 / 4.4
45th Avenue SW & North Access	A / A	1.1 / 1.2	A / A	0.2 / 0.2
8th Street SW & South Access	A / A	0.2 / 0.3	A / A	0.1 / 0.2

Overall Intersection LOS / Worst Approach LOS

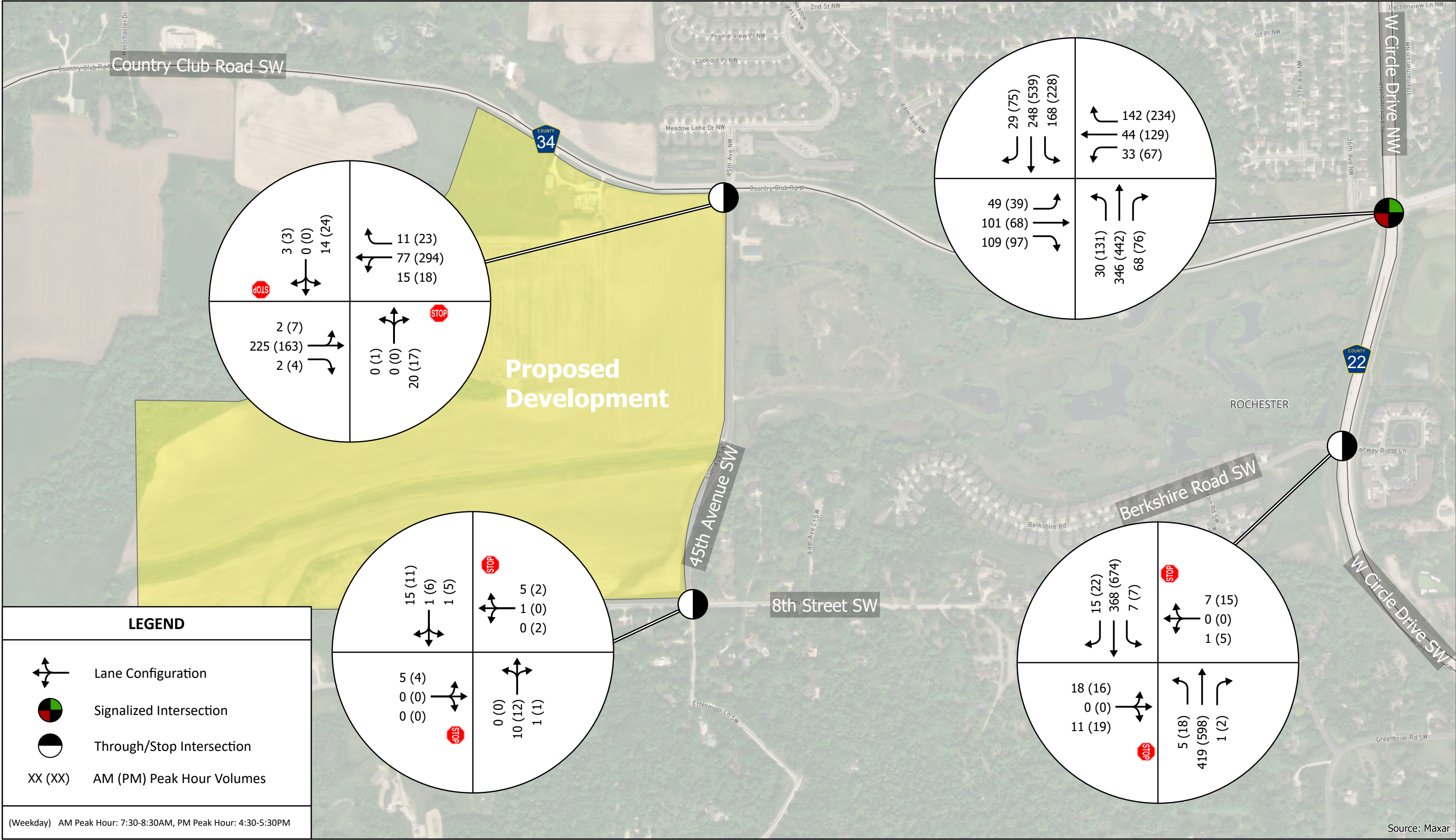
Overall Intersection Delay / Worst Approach Delay

Table 8. 2027 Build Traffic Operations

Intersection	AM Peak Hour		PM Peak Hour	
	LOS	Delay (s)	LOS	Delay (s)
Country Club Road SW & 45th Avenue SW	A / A	2.9 / 8.8	A / A	3.7 / 7.0
W Circle Drive NW & Country Club Road SW	B / C	14.5 / 27.2	C / C	22.0 / 28.5
W Circle Drive NW & Berkshire Road SW / Fairway Ridge Lane SW	A / A	1.9 / 8.0	A / B	3.4 / 12.8
45th Avenue SW & 8th Street SW	A / A	2.4 / 5.3	A / A	2.1 / 4.3
45th Avenue SW & North Access	A / A	2.1 / 2.9	A / A	0.9 / 3.1
8th Street SW & South Access	A / A	1.2 / 2.7	A / A	1.2 / 2.7

Overall Intersection LOS / Worst Approach LOS

Overall Intersection Delay / Worst Approach Delay



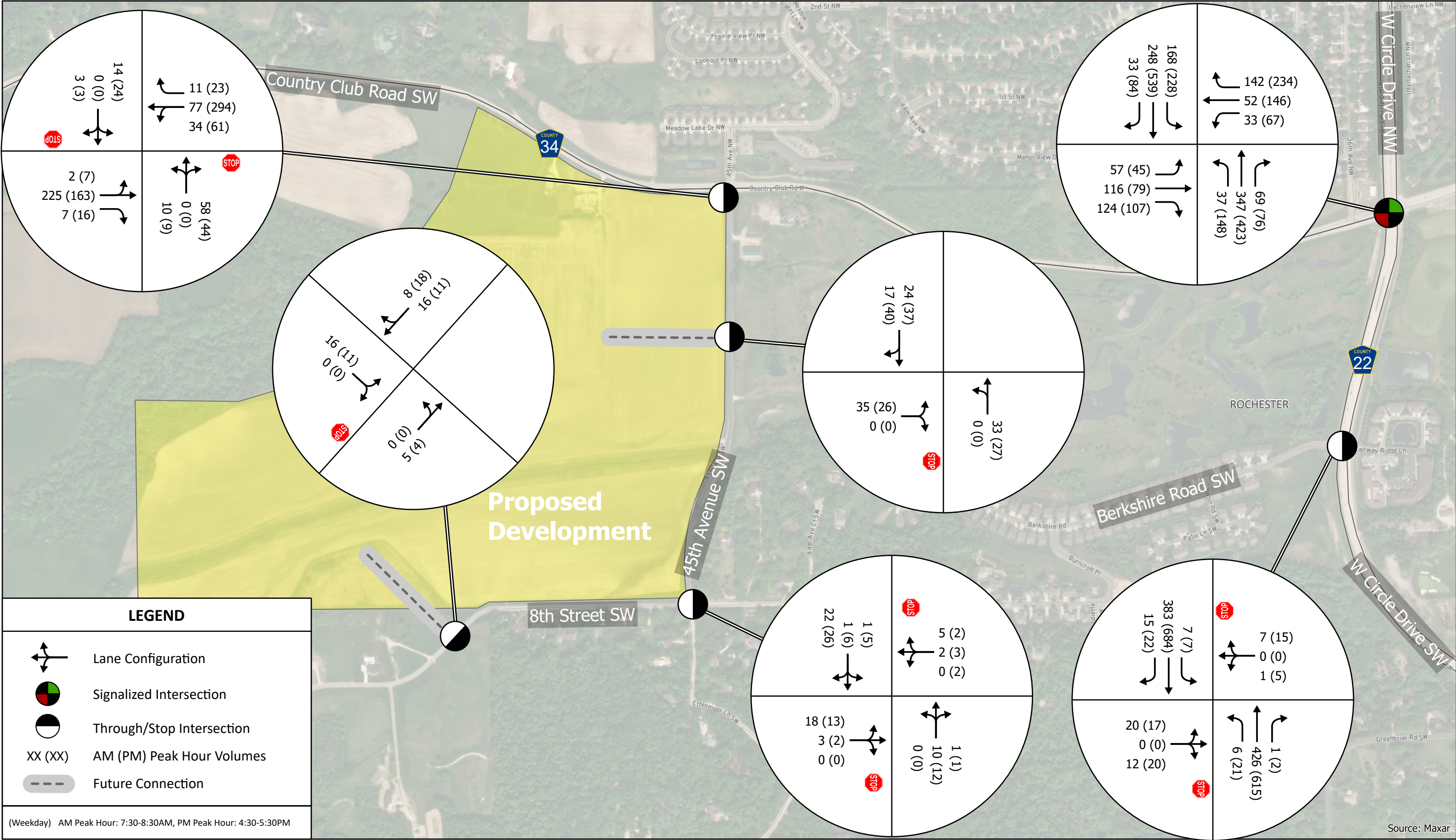


Figure 7
2027 Build Volumes

Source: Maxar

5.2 2037 TRAFFIC OPERATIONS ANALYSES

The City of Rochester requires an additional forecast year analysis 10 years after completion of the development to fully understand the impact on the adjacent roadway network. Results of the forecast year 2037 No Build and Build analysis, presented below in **Table 9** and **Table 10**, indicate that all study intersections are expected to operate at overall LOS A during the a.m. and p.m. peak hours under forecast year 2037 traffic volumes except for W Circle Drive NW & Country Club Road SW which operates at overall LOS C or better. In addition, no significant side-street delay or queuing issues were observed in the traffic simulations under either the No Build or Build scenario. Detailed operations and queuing analysis results are presented in the **Appendix**. 2037 No Build and Build traffic volumes are presented in **Figure 8** and **Figure 9**.

Table 9. 2037 No Build Traffic Operations

Intersection	AM Peak Hour		PM Peak Hour	
	LOS	Delay (s)	LOS	Delay (s)
Country Club Road SW & 45th Avenue SW	A / A	2.0 / 7.1	A / A	3.5 / 7.5
W Circle Drive NW & Country Club Road SW	B / C	16.3 / 30.5	C / C	23.7 / 27.3
W Circle Drive NW & Berkshire Road SW / Fairway Ridge Lane SW	A / A	2.0 / 8.5	A / C	3.8 / 15.2
45th Avenue SW & 8th Street SW	A / A	1.4 / 4.9	A / A	1.5 / 4.4
45th Avenue SW & North Access	A / A	1.1 / 1.3	A / A	0.2 / 0.3
8th Street SW & South Access	A / A	0.4 / 0.5	A / A	0.3 / 0.4

Overall Intersection LOS / Worst Approach LOS

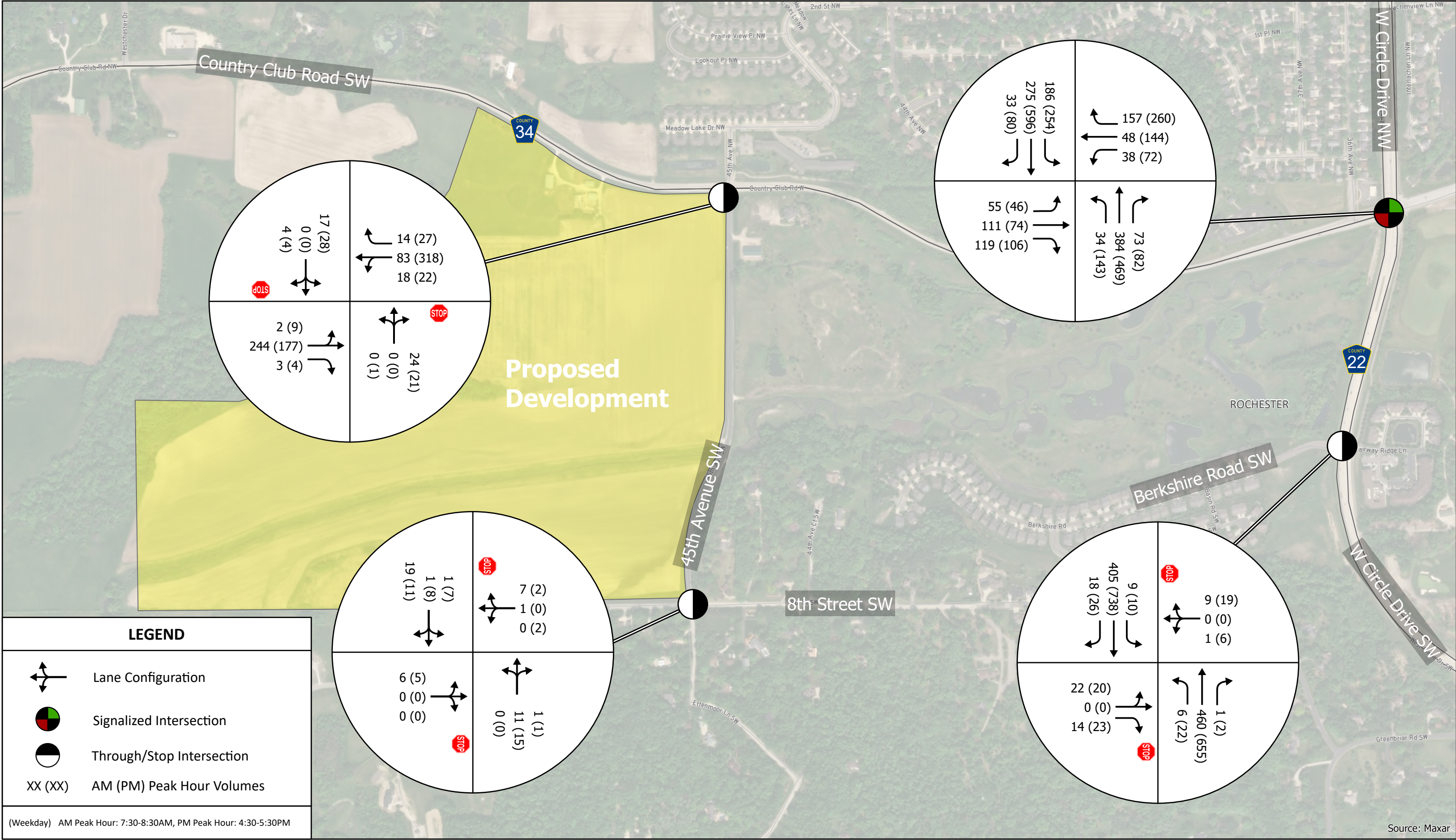
Overall Intersection Delay / Worst Approach Delay

Table 10. 2037 Build Traffic Operations

Intersection	AM Peak Hour		PM Peak Hour	
	LOS	Delay (s)	LOS	Delay (s)
Country Club Road SW & 45th Avenue SW	A / A	3.1 / 8.2	A / A	4.1 / 8.0
W Circle Drive NW & Country Club Road SW	B / C	16.6 / 28.9	C / C	25.4 / 29.1
W Circle Drive NW & Berkshire Road SW / Fairway Ridge Lane SW	A / A	2.1 / 8.8	A / C	3.7 / 15.5
45th Avenue SW & 8th Street SW	A / A	2.1 / 4.9	A / A	1.9 / 4.1
45th Avenue SW & North Access	A / A	1.9 / 2.9	A / A	0.9 / 3.3
8th Street SW & South Access	A / A	1.1 / 2.5	A / A	0.9 / 2.4

Overall Intersection LOS / Worst Approach LOS

Overall Intersection Delay / Worst Approach Delay



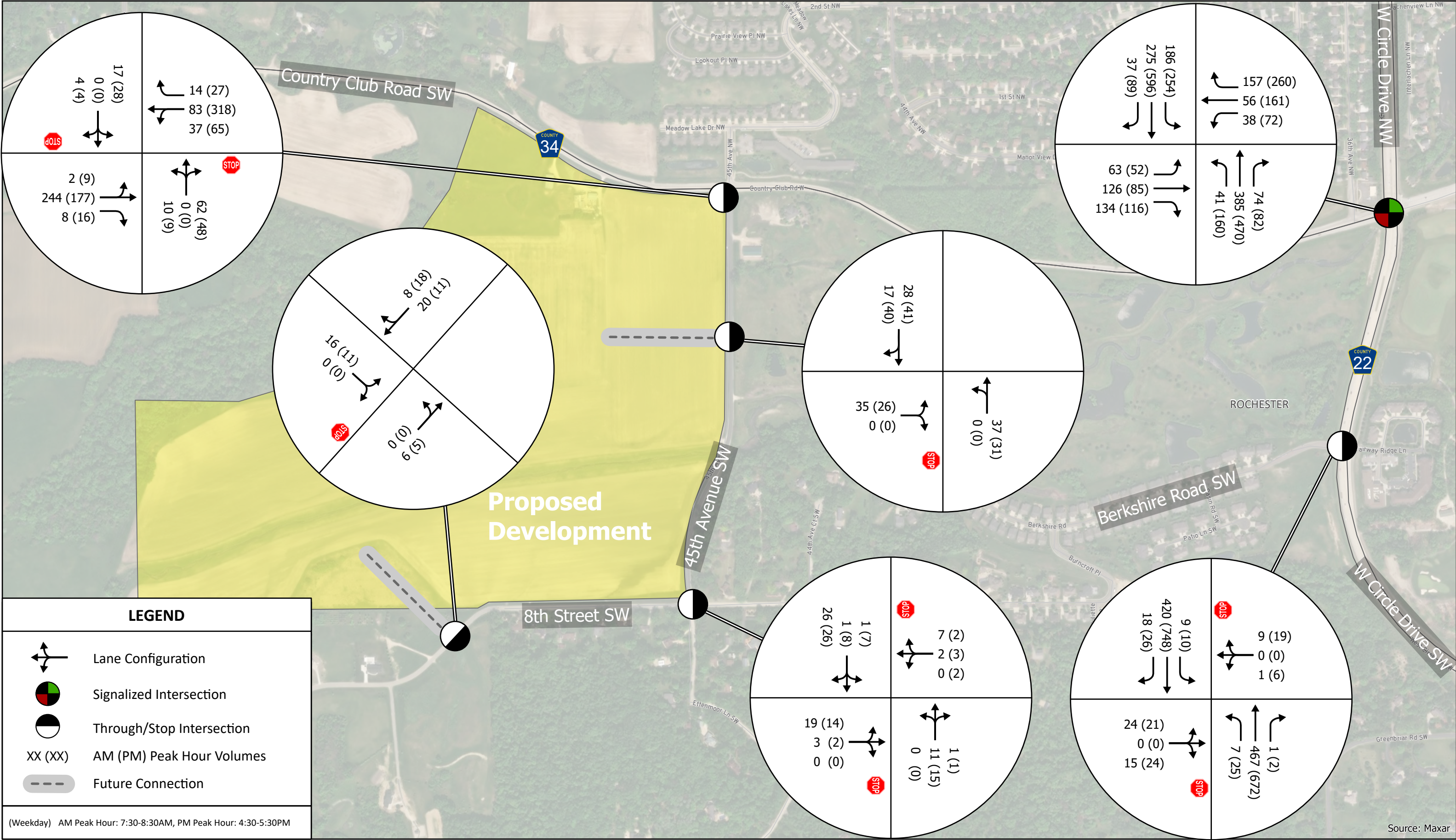


Figure 9
2037 Build Volumes

Source: Maxar

5.3 CAPACITY & ACCESS SPACING ANALYSIS

The City of Rochester Engineering Standards, Unified Development Code, and 2040 Comprehensive Plan, in addition to ROCOG's 2045 Long Range Transportation Plan, were consulted to establish AADT capacity thresholds and access spacing guidelines for 45th Avenue SW. Per Section 60.400.040 of the Unified Development Code, Local Streets should not exceed 1,000 average daily trips and the City may require a street to be of a Primary Collector level design where the anticipated average daily trips will exceed 3,000 trips. Per Table 2-17 of the Rochester Comprehensive Plan 2040, volumes less than 1,200 trips are acceptable on Local Streets with volumes of 1,200 to 1,800 performing poorly.

Based on the results of the trip generation analysis, it is expected that the AADT along 45th Avenue SW will exceed 1,000 daily trips with construction of the proposed development. As noted in Table 2-17 of the Rochester Comprehensive Plan 2040, volumes between 1,200 and 1,800 would be expected to perform poorly but could be allowed for a short time prior to expansion of the roadway. The AADT with the development trips is likely to be around 1,400 or the lower end of the range where performance may be affected.

5.3.1 Access Spacing

Access to the proposed development is provided in two locations, one along 45th Avenue SW and another along 8th Street SW. Although there are other driveways along both roadways, they are primarily driveways for single-family homes. As a result, distances between driveways are unlikely to impact operations or safety.

6. Site Plan Review

A review of the proposed site plan was completed to identify any issues and recommend potential improvements regarding vehicle ingress / egress and internal circulation. The following should be considered:

- The proposed internal roadways and parking layouts appear to adequately accommodate typical passenger vehicles. However, truck turning movements should be reviewed to ensure that delivery and garbage trucks have adequate accommodations to negotiate internal roadways.
 - o Appropriate traffic control and signing should be considered for internal roadways to ensure motorists understand which roadways have the right of way to reduce crash risks.
- Sidewalk and/or trails are not currently shown in the site plan and were therefore not evaluated. Internal connections to the amenity center may be beneficial to residents, however, there are no external pedestrian or bicycle facilities along 45th Avenue SW or 8th Street SW to connect to.

7. Conclusions & Recommendations

The following study conclusions / recommendations are offered for consideration:

- The proposed development would be expected to generate approximately 76 a.m. peak hour, 95 p.m. peak hour, and 1,366 daily trips based on ITE Trip Generation Manual (11th Edition) estimates for senior adult housing – single-family units.
- Results of existing year 2025, forecast year 2027, and forecast year 2037 intersection capacity analyses indicate that all study intersections are expected to operate at overall LOS A during the a.m. and p.m. peak hours except for W Circle Drive NW & Country Club Road SW which operates at overall LOS C or better. In addition, no significant side-street delay or queuing issues were observed in the traffic simulations under either the No Build or Build scenario.
 - o Overall, the proposed development is expected to have minimal impact to the existing transportation system and no immediate measures or mitigation efforts are necessary.
 - o A westbound left-turn lane is not present at the Country Club Road SW & 45th Avenue SW intersection, and based on the traffic operations analysis is not needed for the intersection to continue to perform at overall LOS A. However, increased westbound left-turns may require further observations and consideration of a dedicated left-turn lane if safety becomes an issue.
- The intersection at 45th Avenue SW & 8th Street SW is currently through-stop controlled, with northbound and southbound approaches uncontrolled and eastbound and westbound approaches controlled by stop signs. This configuration is appropriate given current traffic volumes, which are heavier for the northbound and southbound movements.
 - o Although additional trips to/from the 8th Street SW & South Access will increase volume along 8th Street SW, this would not change the preferred through/stop configuration at the intersection and 8th Street SW should continue to be controlled by stop signs.
 - o A planning-level all-way stop warrant analysis was also conducted to evaluate if the intersection should be converted to all-way stop traffic control. However, based on the warrant analysis the intersection did not meet any of the warrants for this to be considered at this time.

A review of the proposed site plan was completed to identify any issues and recommend potential improvements regarding vehicle ingress / egress, internal circulation, and pedestrian / bicycle connectivity. A summary is provided in **Section 6: Site Plan Review**.