DCM Farms Environmental Assessment Worksheet

RGU: City of Dayton
Proposer: Sundance Woods, LLC

Stantec

Prepared for:
City of Dayton

Prepared by:
Stantec Consulting Services Inc.

January 2025

Project/File:
193807316

Table of Contents

Tables

Figures

Appendices

December 2022 version

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

DCM Farms

2. Proposer

Proposer:	Sundance Woods, LLC
Contact person:	Tom Dehn
Title:	President
Address:	6781 US 10
City, State, ZIP:	Ramsey, MN 55303
Phone:	(612) 328-2215
Email:	tom.dehn@powerlodge.com

3. Responsible Governmental Unit (RGU)

RGU Agency:	City of Dayton
Contact person:	Jon Sevald, AICP
Title:	Community Development Director
Address:	12260 S. Diamond Lake Road
City, State, ZIP:	Dayton, MN 55327
Phone:	(763) 712-3221
Email:	jsevald@cityofdaytonmn.com

4. Reason for EAW Preparation

Required:	Discretionary:
□ EIS Scoping	□ Citizen petition
X Mandatory EAW	□ RGU discretion
	□ Proposer initiated

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

The Project would exceed the mixed residential and commercial thresholds per to Minn. Rule 4410.4300, Subpart 32, which states:

> *"If a project includes both residential and industrial-commercial components, the project must have an EAW prepared if the sum of the quotient obtained by dividing the number of residential units by the applicable residential threshold of subpart 19, plus the quotient obtained by dividing the amount of*

industrial-commercial gross floor space by the applicable industrial-commercial threshold of subpart 14, equals or exceeds one."

Pursuant to Minn. Rule 4410.4300, Subpart 14.A(2) the mandatory threshold for construction of a new commercial facility is 200,000 square feet for a third class city. Minn. Rule 4410.4300, Subpart 19.C, an EAW is required for construction of a permanent residential development of 100 unattached or 150 attached units in a city meeting the conditions of item D if the project is not consistent with the adopted comprehensive plan.

The sum of the quotient for the applicable residential and commercial thresholds exceeds one. Therefore, a mandatory EAW is required for the Project.

5. Project Location

County: Hennepin

City/Township: City of Dayton

PLS Location (¼, ¼, Section, Township, Range): SWNE, SENE, NENE, Section 33, Township 120 North, Range 22 West

Watershed (81 major watershed scale): Mississippi River – Twin Cities

GPS Coordinates: 45.162292, -93.466429

Tax Parcel Number: 3312022110001, 3312022130001

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

- County map showing the general location of the Project;

  See Figure 1 and Figure 2, Appendix A

- U.S. Geological Survey 7.5 minute, 1:24,000 scale map indicating Project boundaries (photocopy acceptable); and

  See Figure 1, Appendix A

- Site plans showing all significant Project and natural features. Pre-construction site plan and post-construction site plan.

  See Appendix B

- List of data sources, models, and other resources (from the Item-by-Item Guidance: *Climate Adaptation and Resilience* or other) used for information about current Minnesota climate trends and how climate change is anticipated to affect the general location of the Project during the life of the Project (as detailed below in item 7. Climate Adaptation and Resilience).

  Data sources reviewed to respond to Item 7 (Climate Adaptation and Resilience) included:

  - *Department of Natural Resources (DNR). Climate Trends. 2024. https://www.dnr.state.mn.us/climate/climate_change_info/climate-trends.html*
  - *DNR. Minnesota Climate Explorer. https://arcgis.dnr.state.mn.us/climateexplorer/main/historical*

6. Project Description

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

Sundance Woods, LLC is proposing the DCM Farms project (Project) on approximately 91 acres south of 117th Avenue North and west of Fernbrook Lane in the City of Dayton (City). The Project would include approximately 267 detached residential homes and approximately 43,680 square feet of commercial and

retail uses (including an approximately 10,000 square foot convenience store). The City's planned realignment of 113th Avenue North (approximately 800 feet north of the current 113th Avenue North /Fernbrook Lane intersection), to connect to the future, planned roundabout at 114th Avenue North/Fernbrook Lane, would be included in the review of the Project. It is anticipated that construction would begin in Spring 2025. Completion of the Project would be governed by market demand.

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

Proposed Project

Sundance Woods, LLC (the Proposer) proposes the phased development of residential and commercial uses within the Project area. The Project area consists of approximately 91 acres bound by 117th Avenue North to the north, Country State Aid Highway (CSAH) 121/ Fernbrook Lane to the east, 113th Avenue North to the south, and other residential development and a golf course to the west.

The Project proposes to construct a total of 267 detached residential homes consisting of 141 villa homes, 59 traditional single family homes, and 67 alley-style single family homes. The Project would also include commercial development along 113th Avenue North near the intersection with Fernbrook Lane. It is anticipated that commercial uses may consist of office/bank, restaurant, coffee shop, retail, daycare, and a convenience store/gas station. However, specific commercial end users are not known at this time and would be dependent on market conditions.

As part of the Project, 113th Avenue North would be reconstructed from Niagara Lane North to Fernbrook Lane. A section of 113th Avenue North would be realigned approximately 800 feet north of the current intersection at Fernbrook Lane, to connect with the planned roundabout at the intersection of 114th Avenue and Fernbrook Lane. The proposed realignment would reduce the number of number conflict points along Fernbrook Lane between Rush Creek Parkway and 117th Avenue North. The proposed realigned section of 113th Avenue North would be constructed as a two-lane urban roadway with a 10-foot trail facility along the south side of the roadway.

The Project is anticipated to be constructed in three phases. The phasing plan is preliminary and would be driven by market conditions. Based on the current phasing plan, Phase One would include the development of approximately 75 percent of the residential units along 113th Avenue North. Phase Two would include the construction of the remaining 25 percent of residential units along 113th Avenue North and construction of approximately 50 percent the residential units along 117th Avenue North. Phase Three would include the construction of the remaining residential units and commercial development along 113th Avenue North.

The phasing of the improvements to 113th Avenue North and the roundabout would be determined during final design. At this time, it is anticipated that the western portion of 113th Avenue North from Niagara Lane North to Kingsview Lane North would be reconstructed first, followed by the realignment of the eastern portion of 113th Avenue from Kingsview Lane North to Fernbrook Lane, and construction of the proposed roundabout at the Fernbrook Lane/ 114th Avenue North intersection. Traffic would be temporarily detoured to the connecting local roads north and south of 113th Avenue North during construction. A traffic detour plan would be developed during final design.

Construction Activities

1) Construction, operation methods and features that will cause physical manipulation of the environment or will produce wastes

Standard construction methods would be utilized during construction of the Project. The Project area would be graded in phases. Waste generated during construction and demolition would be properly

handled and disposed of in accordance with state requirements, which is described in further detail in Item 13 (Contamination/ Hazardous Materials/ Wastes) of the EAW.

2) *Modifications to existing equipment or industrial processes*

No modifications to existing equipment or industrial processes are anticipated.

3) *Significant demolition, removal or remodeling of existing structures*

Existing structures and buildings associated with the agricultural use of the Project area would be demolished or removed. These structures and buildings include the grain bins, pole building, house, and shed located in the southern portion of the Project area at 14800 13th Avenue North. No existing structures or buildings are proposed to be remodeled as part of the Project.

The existing residential home in the northwest corner of the Project area would not by demolished or modified as part of the Project.

4) *Timing and duration of construction activities*

It is anticipated that the Phase One of the Project would be initiated in summer 2025, and Phase Two and Three would be initiated in 2026 and 2027, respectively. Full buildout of the Project is anticipated to be completed in 2030.

c. **Project magnitude**

Table 1 summarizes the Project magnitude.

Table 1. Project Magnitude

Description	**Number**
Total Project Acreage	91
Linear Project length	1,445 ft. (113th Avenue North Realignment)
Number and type of residential units	267 Total single family units 141 Villa units 59 Single family units 67 Alley-style single family units
Residential building area (in square feet)	Approximately 756,000 sq. ft. total - 352,500 sq. ft. Villa units (approx. 2,500 sq.ft./ villa) - 236,000 sq. ft. Single family units (approx. 4,000 sq.ft./ single family home) - 167,500 sq. ft. Alley-style single family units (approx. 2,500 sq. ft./ alley-style unit)
Commercial building area (in square feet)	Approximately 43,680 total - 10,000 sq. ft. convenience store - 5,500 sq. ft. restaurant - 8,400 sq. ft. office/ bank - 5,500 sq. ft. daycare - 2,400 sq. ft. coffee shop - 11,800 sq. ft. retail
Industrial building area (in square feet)	Not applicable (N/A)
Institutional building area (in square feet)	N/A
Other uses – specify (in square feet)	N/A
Structure height(s)	2 stories

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 Project purpose is to increase the number of housing units and commercial development in the City of Dayton. The Project is proposed by a private entity and not by a governmental unit.

e. Are future stages of this development including development on any other property planned or likely to happen? ☐ **Yes** **X 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** **X 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.

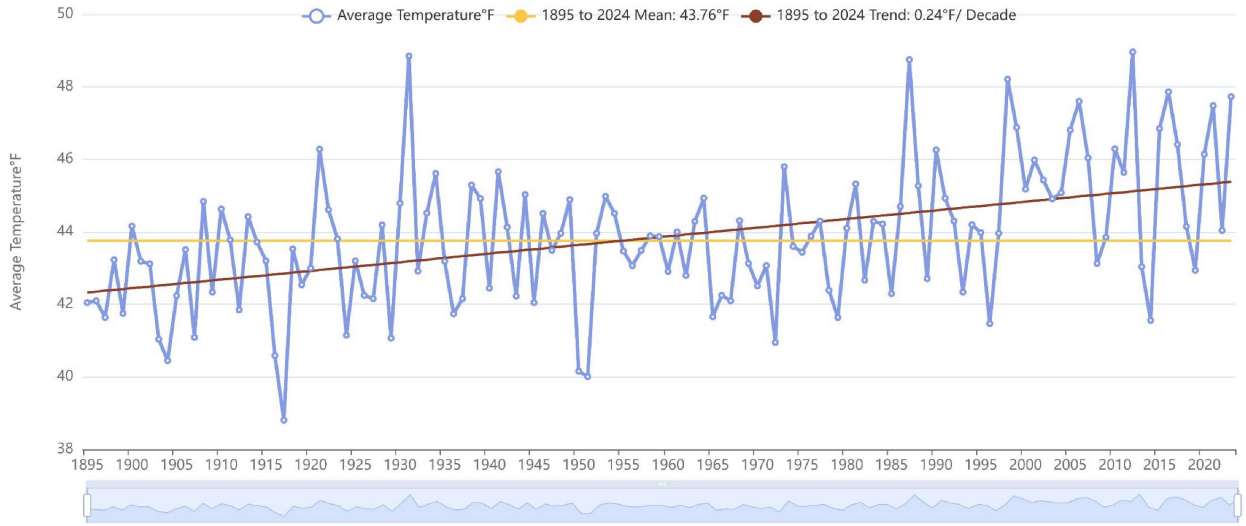
In general, Minnesota is anticipated to experience an increase in temperature, precipitation, and more frequent extreme precipitation events resulting from climate change. In Minnesota, annual average temperatures have risen two degrees over the past century and up to three degrees in the northern part of the state. The highest average temperature increases have occurred during the winter. Since 1895, temperatures during the winter have increased at a rate two to three times higher than during the summer. In particular, winter warming rates have risen more sharply in recent decades.[1] Current climate warming trends, most notably during the winter, are anticipated to continue.[2]

Heavy rain events have become more frequent in Minnesota and more intense. From 1973 to 2020, Minnesota experienced 17 mega-rain events[3] with a notable increase since 2000. Of these 17 events, three occurred in the 1970s, two in the 1980s, one in the 1990s, six mega-rain events occurred in the 2000s, four in the 2010s, and one in 2020. Thus, in the past 21 years (2000 to 2020), almost two times as many mega rain events occurred compared to the prior 27 years (1973 to 1999).[4]

Climate trends in Hennepin County parallel the overall statewide trends, indicating Minnesota's climate is becoming warmer and wetter. Exhibit 1 and Exhibit 2 illustrate historical average annual temperature and precipitation trends from 1895 to 2024, respectively. During this time period, the County experienced an average annual temperature increase of 0.24 degrees Fahrenheit (°F) per decade and an annual precipitation increase of 0.23 inches per decade.

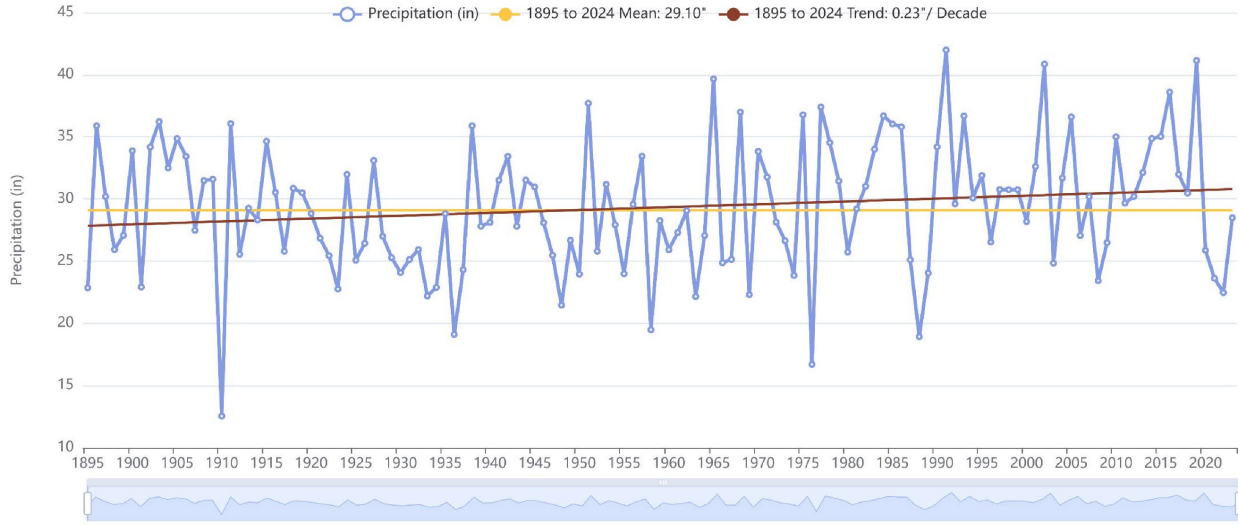
[1] DNR, undated(a). *Climate Trends*. Available at: https://www.dnr.state.mn.us/climate/climate_change_info/climate-trends.html. Accessed November 2024.
[2] MnDOT, 2021. *Minnesota Go Climate Change Report*. Available at: https://www.minnesotago.org/trends/climate-change. Accessed October 2024.
[3] Mega-rain events are defined as events in which six inches of rain covers more than 1,000 square miles and the core of the event tops eight inches.
[4] DNR, 2024(a). *Historic Mega-Rain Events in Minnesota.* Available at: https://www.dnr.state.mn.us/climate/summaries_and_publications/mega_rain_events.html. Accessed October 2024.

Exhibit 1. Historical Annual Average Temperature in Hennepin County (1895 – 2024)



Source: DNR. https://arcgis.dnr.state.mn.us/ewr/climateexplorer/main/historical

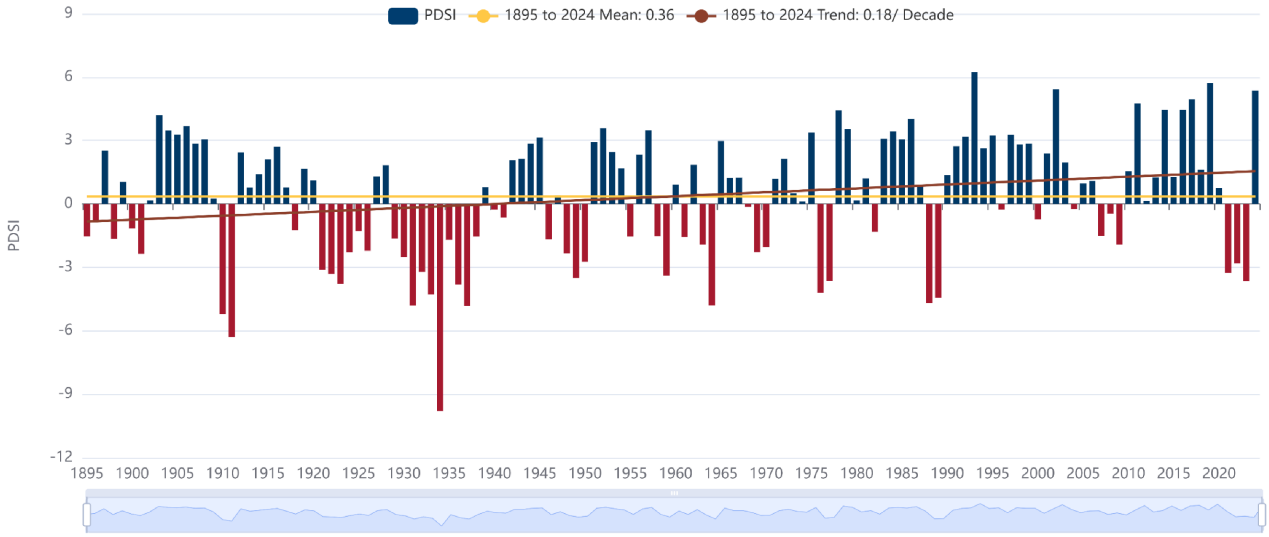
Exhibit 2. Historical Annual Average Precipitation in Hennepin County (1895 – 2024)



Source: DNR. https://arcgis.MnDNR.state.mn.us/ewr/climateexplorer/main/historical

The Palmer Drought Severity Index (PDSI) utilizes temperature and precipitation data to estimate relative soil moisture conditions and serve as an indicator of long-term drought conditions. The index ranges from -5 to +5 indicating dry and wet conditions, respectively. PDSI values are reported on a monthly basis. Exhibit 3 shows historic PDSI values for the month of August from 1895 to 2024 for Hennepin County, which indicates an increase of 0.18 per decade. Generally, the PDSI historical data indicates that the region is experiencing a wetter climate.

Exhibit 3. Historical PDSI Values for Hennepin County (1895 – 2024)

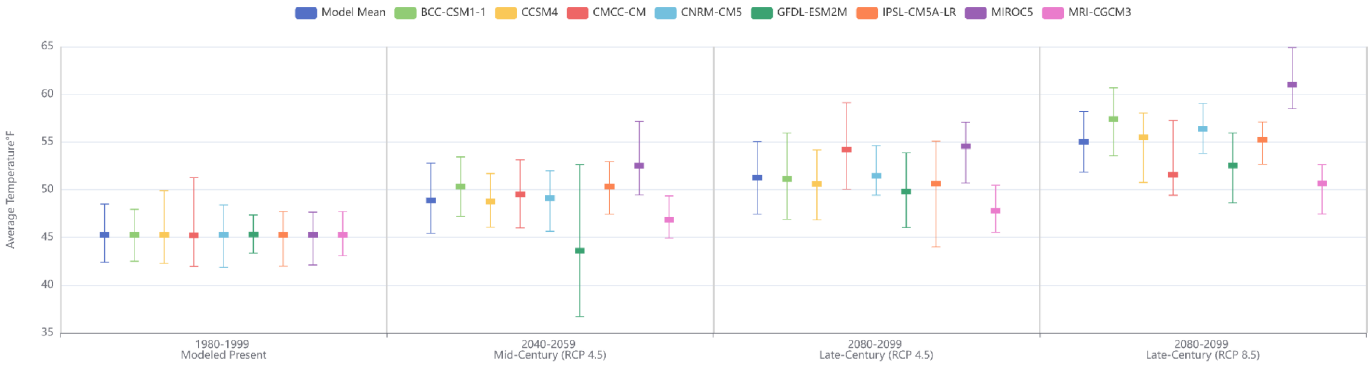


Source: DNR. https://arcgis.MnDNR.state.mn.us/ewr/climateexplorer/main/historical

Projected climate trends indicate that temperatures within the County would continue to increase. Exhibit 4 illustrates projected temperatures for the County. Several climate models are shown in the projected temperature analysis. The model mean, shown in blue, illustrates the average of all models included in the analysis. Exhibit 4 shows the modeled present condition, mid-century (2040-2059) at Representative Concentration Pathway (RCP) 4.5, late-century (2080-2099) at RCP 4.5, and late-century (2080-2099) at RCP 8.5. RCP is a greenhouse gas concentration scenario used by the Intergovernmental Panel on Climate Change in the fifth assessment report. RCP 4.5 is an intermediate scenario in which emissions decline after peaking around 2040 and RCP 8.5 represents a worst-case scenario in which emissions continue rising through the 21st century.

Under the RCP 4.5 scenario, the annual temperature is anticipated to increase within the County from a modeled present mean of 45.3°F (1980-1999) to a mid-century (2040-2059) model mean of 48.9°F and a late-century (2080-2099) model mean of 51.3°F. Under the RCP 8.5 worst-case scenario, the County would experience a late-century (2080-2099) model mean temperature of 55.0°F. In comparison to the modeled present mean (1980-1999), the late-century (2080-2099) modeled mean annual temperature would increase by approximately 12.4 percent under the RCP 4.5 scenario and increase by approximately 19.3 percent under the RCP 8.5 scenario.

Exhibit 4. Projected Temperatures in Hennepin County

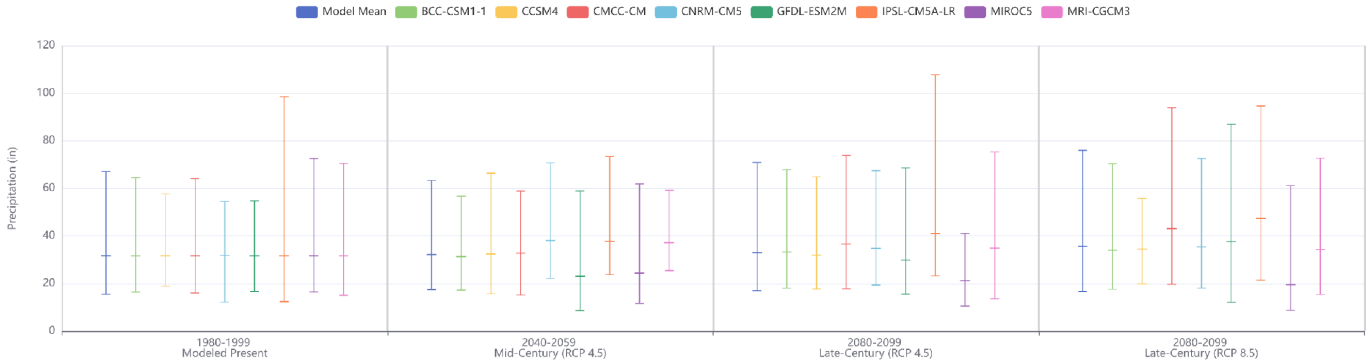


Source: DNR. https://arcgis.MnDNR.state.mn.us/ewr/climateexplorer/main/historical

Exhibit 5 presents Projected average annual precipitation for Hennepin County. Under the RCP 4.5 scenario, the annual precipitation is anticipated to increase within the County from a modeled present mean of 31.6 inches (1980-1999) to a mid-century (2040-2059) model mean of 32.1 inches and a late-

century (2080-2099) model mean of 32.9 inches. Under the RCP 8.5 worst-case scenario, the County would experience a late-century (2080-2099) model mean precipitation of 35.7 inches. In comparison to the modeled present mean (1980-1999), the late-century (2080-2099) modeled mean annual precipitation would increase by approximately 4.0 percent under the RCP 4.5 scenario and increase by approximately 12.2 percent under the RCP 8.5 scenario.

Exhibit 5. Projected Precipitation in Hennepin County



Source: DNR. https://arcgis.MnDNR.state.mn.us/ewr/climateexplorer/main/historical

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 2 summarizes climate considerations related to the Project and adaptation considerations.

Table 2. Climate Considerations and Adaptations

Resource Category	Climate Considerations	Project Information	Adaptations
Project Design	Projected climate trends include increasing temperatures, precipitation, and frequency of heavy rainfall events. Minnesota is trending towards warmer temperatures. Urban heat islands occur when impervious surfaces, such as roofs and paved surfaces, absorb heat during the day and release it at night, amplifying the warming trend.	Construction of buildings, roadways, pedestrian improvements, and parking areas associated with the Project would increase impervious surface area. Increased impervious surfaces would increase volume of stormwater runoff and potential flooding risk during heavy rain events. Impervious surfaces may create local heat island effects by absorbing heat during daytimes hours and radiating it at night leading to an increase in surface temperatures.	The Project would follow proposed and recommended actions outlined by the City of Dayton which may include planning documents such as the Dayton Forward: 2040 Comprehensive Plan (2023). Additional measures to minimize heat island effects may include strategically planting trees to increase shading near buildings to reduce energy use associated with air conditioning and incorporating green building design features such as green roofs or cool roofs to reduce energy costs, Greenhouse Gas (GHG) emissions,

Resource Category	Climate Considerations	Project Information	Adaptations
			and improvements to manage stormwater runoff rates.
Land Use	Heavier rainfall expected to bring a higher risk of localized flooding. Increased temperatures may create public health crises primarily for the vulnerable communities such as children and the elderly.	The majority of the Project area primarily consists of agricultural land under existing conditions. Conversion from agricultural and undeveloped land to residential and commercial development would increase impervious surfaces and may contribute to local heat island effects.	The Project may propose a critical facility (daycare center) within the Project area that would have heightened sensitivity to the climate considerations identified. The proposed daycare facility would not be located within an area prone to flooding. Opportunities to mitigate potential increased risk of flooding associated with a projected increase in heavy rainfall events may include constructing green infrastructure features such as rain gardens, catch basins, and infiltration systems. Local heat island effects from adding impervious surface to the Project area may be mitigated by avoiding removal of existing tree canopy and the planting of new trees and selective landscaping to increase shade in developed areas.
Water Resources	Addressed in Item 12.		
Contamination/ Hazardous Materials/Wastes	The Project area is projected to experience an increase in precipitation and heavy rainfall events.	The Project is not anticipated to involve the installation of chemical/ hazardous materials storage during operation.	A Spill Prevention, Control, and Countermeasures (SPCC) plan would be utilized during construction to minimize the potential for spill events. Waste generated during construction and demolition would be properly managed and disposed of in accordance with Minnesota Pollution Control Agency (MPCA) requirements.

Resource Category	Climate Considerations	Project Information	Adaptations
Fish, wildlife, plant communities, and sensitive ecological resources (rare features)	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 3 and Figure 4, Appendix A summarize cover types within the Project area.

Table 3. Cover Types

Cover Types	Before(acres)[1]	After (acres)
Wetlands and shallow lakes (<2 meters deep)	0.03	0.0
Deep lakes (>2 meters deep)	0.0	0.0
Wooded/forest	1.6	1.1
Brush/grassland	3.8	1
Cropland	81.0	0.0
Lawn/landscaping	0.0	45.5
Green infrastructure total (from table below)	0.0	0.0
Impervious surface	4.5	35.8
Stormwater Basins	0.0	7.5
Total	**90.9**	**90.9**

[1] *Before" Acreages are approximate and based on TCMA 1-Meter Land Cover geospatial data (see Figure 4, Appendix A), preliminary impervious calculations, and wetland delineation data.*

Table 4. Green Infrastructure

Green Infrastructure	Before (acreage)	After (acreage)
Constructed infiltration systems (infiltration basins/infiltration trenches/ rainwater gardens/bioretention areas without underdrains/swales with impermeable check dams)	0	0
Constructed tree trenches and tree boxes	0	0
Constructed wetlands	0	0

Green Infrastructure	Before (acreage)	After (acreage)
Constructed green roofs	0	0
Constructed permeable pavements	0	0
Other (describe) Landfill-based geothermal system	0	0
Total	**0**	0

Table 5. Tree Canopy

Trees	Percent	Number
Percent tree canopy removed, or number of mature trees[1] removed during development	Approx. 31%	Approx. 10 trees
Number of new trees planted[2]	N/A	Approx. 978 trees

[1]Number of trees to be removed and approximate acreage is conservatively estimated based on aerial imagery.
[2]Number of trees to be planted is based on preliminary estimates. A tree preservation and replacement plan would be developed as part of the future development application and in accordance with the City of Dayton's Zoning and Subdivision Code, Section 1001.25.

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 6. Permits and Approvals

Unit of Government	Type of Application	Status
State		
Minnesota Pollution Control Agency (MPCA)	National Pollutant Discharge Elimination System (NPDES) Permit	To be completed
MPCA	Sewer extension Permit	To be completed
Minnesota Department of Health	Watermain Extension Permit	To be completed
Minnesota Department of Labor and Industry (DOLI)	State Plumbing Permit	To be completed
State Historic Preservation Office Review	Archaeological/Historic Review	Review Request and Archaeological Reconnaissance Survey Report Submitted.
County		
Hennepin County	Plat Approval	To be completed
Hennepin County	Road Access Permit	To be completed

Unit of Government	Type of Application	Status
Local		
Metropolitan Council	Comprehensive Guide Plan Amendment	To be obtained, if required
Metropolitan Council Environmental Services (MCES)	Sewer Extension Permit/ Sewer Permit to Connect	To be submitted, if required
City of Dayton	EAW / EIS Need Decision	Draft prepared
City of Dayton	Wetland Conservation Act (Boundary Approval) Notice of Decision	Obtained
City of Dayton	Preliminary and Final Plat	To be completed
City of Dayton	Land Use and Development Application	To be completed
City of Dayton	Land Disturbance Permit	To be completed
City of Dayton	Filling Grading Permit	To be completed
City of Dayton	Building Permits	To be completed
Elm Creek Watershed Management Commission (ECWMC)	Stormwater, Erosion Control, and Site Plan Approval	To be completed
ECWMC	Stormwater Management Plan Review	To be completed

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.

Existing Land Uses

The Project area includes approximately 90 acres of developed land primarily consisting of agricultural land (approximately 81 acres). A single-family residential use is located in the far northwestern corner of the Project area, and a farmstead including an animal feedlot is located centrally along the southern border of the Project area.

The City of Dayton's 2040 Comprehensive Plan (adopted in 2022) Existing Land Use Map identifies the Project area as agriculture/farm. [5] Figure 5, Appendix A identifies the existing land uses based on the Metropolitan Council's 2020 Generalized Land Use Inventory.

Surrounding Land Uses

The 2040 Comprehensive Plan Existing Land Use Map primarily identifies agriculture uses to the north and south of the Project area and rural residential uses to the east and north of the Project Area. An existing commercial use, Dehn's Country Manor, is identified in the southwestern corner of the Fernbrook Lane/ 113th Avenue intersection. Currently, the area to the northwest of the Project area is being developed as low density residential (Brayburn East) and the area to the south was recently developed as low and medium density residential (Sundance Greens). Single-family

[5] City of Dayton, 2022(a). *2040 Comprehensive Plan*. Available at: https://cityofdaytonmn.com/resources/2040-comprehensive-plan/. Accessed November 2024.

detached residential uses, agricultural uses, park land, and some undeveloped lands are located to the east. A small commercial use, Dehn's Country Manor, is located in the southwestern corner of the Fernbrook Lane/ 113th Avenue intersection. The Sundance Greens golf course is located immediately west of the Project area. Figure 4, Appendix A identifies the land uses surrounding the Project area.

Parks and Trails

No cemeteries are present within or in the vicinity of the Project area. The Elm Creek Park Reserve, owned by Three Rivers Park District, and associated trails are located approximately one-quarter mile east of the Project area and the Sundance Woods Neighborhood Park is located approximately one-quarter mile south-southwest of the Project area. A snowmobile trail is present along the western border of the Project area and along 113th Avenue North which is the roadway adjacent to the southern border of the Project area. Figure 7, Appendix A identifies parks and trails within the vicinity of the Project area.

The City's Comprehensive Trail Plan in the adopted 2040 Comprehensive Plan proposes roadside trails alongside Fernbrook Lane and 117th Avenue North, as well as planned neighborhood trails and a neighborhood park to the west. The planned neighborhood park would encroach into the northwest corner of the Project area, encompassing approximately three acres.

Farmland

Based on the U.S. Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS) soil survey data, approximately 43 acres of the Project area is classified as prime farmland or farmland of statewide importance. The majority of the Project area is cropland, and the remaining portions include a farmstead, a single-family home, and small wooded and grassland areas. Figure 9, Appendix A identifies designated farmland classifications within the Project area.

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.

Per the City of Dayton's 2040 Comprehensive Plan Future Land Use Map, the Project area is identified as planned low density residential. Surrounding planned uses include low density residential to the north, west and south; medium density residential to the east; neighborhood commercial to the south-southeast; high density residential to the south-southwest; and some small park/open space areas to the west and south-southwest. Figure 6, Appendix A depicts the planned land use designations in the vicinity of the Project area per the City's Future Land Use Map.

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

The City of Dayton's Zoning Map (dated October 25, 2024) identifies the Project area as within the Agricultural District.[6] The proposed Project is not compatible with this zoning designation; thus, the Project area would be re-zoned by the City of Dayton in the City's Zoning Map. The Project area is not within shoreland, floodplain, wild and scenic reivers, critical areas, agricultural preserves, or other special district overlays. Figure 5, Appendix A identifies zoning districts in the vicinity of the Project area per the City's Zoning Map.

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 majority of the Project proposes low density residential uses and commercial uses concentrated

[6] City of Dayton, 2024(a). *Zoning Map*. Available at: https://cityofdayton.wpenginepowered.com/wp-content/uploads/2019/06/City-of-Dayton-Zoning_10_25_24.pdf. Accessed November 2024.

near the Fernbrook Lane/ 113th Avenue North intersection. The Project is conceptual and specific end users have not been identified at this time, which be driven by market conditions. The proposed commercial portion of the Project may include a daycare facility. The Project area is outside of the regulated 100-year floodplain/floodway and 500-year floodplain. The location of the potential daycare is an area of minimal flood hazard.

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

The majority of the Project is consistent with the City's 2040 Future Land Use Map with the exception of the small commercial area proposed in the southeast corner of the Project area. Currently, no specific end users have been identified for the proposed commercial area and it is anticipated that the commercial portion of the Project would not occur to a later phase in the development. At the time that a commercial project is proposed, a Comprehensive Plan Amendment would be required from the Metropolitan Council.

As discussed in in Item 10a.iii., the Project is not consistent with the current zoning designation and would require re-zoning. The surrounding land uses are primarily residential and are zoned primarily as single family and attached residential, thus, the Project is compatible with nearby land uses.

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

Incompatibilities with the current zoning and future land use designations would be addressed prior to Project approval and construction. No other incompatibilities are anticipated.

11. Geology, Soils and Topography/Land Forms

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

The surficial geology in the Project area has been mapped by the Minnesota Geological Survey's (MGS) Geologic Atlas of Hennepin County as being sediments consisting of glacial till. Specifically, the Project area contains loam till and clay loam till (Figure 8, Appendix A). The surface expression of the till is generally rolling and hummocky. Ice Margins are present in the area, representing the recessional positions of the Grantsburg sublobe. Ice margins may also include localized pockets of sand and gravel.[7]

The bedrock geology across the Project area has been mapped in the MGS Geologic Atlas of Hennepin County as being the Jordan Sandstone, the St. Lawrence Formation, and the Lone Rock Formations of the Tunnel City Group, all of which are from the late Cambrian Period. The upper most unit is the Jordan Sandstone which is characterized by medium- to coarse-grained, friable quartzose sandstone. The Jordan Sandstone gradually transitions to the St. Lawrence Formation, which is primarily dolomitic, feldspathic siltstone with interbedded, very fine-grained sandstone, and shale. There is a distinct contact between the St. Lawrence Formation and the underlying Tunnel City Group. The Mazomanie Formation is characterized as very fine-grained glauconitic, feldspathic sandstone which is interbedded at its lower contact with the Lone Rock Formation, characterized by very fine-grained glauconite, feldspathic sandstone and siltstone, with thin shale partings.[8]

The bedrock topography within the Project area is mapped to be approximately 676 to 800 feet above mean sea level (amsl), increasing from west to east, and the depth to bedrock is estimated between 126

[7] Steenberg, Julia R.; Bauer, Emily J.; Chandler, V.W.; Retzler, Andrew J.; Berthold, Angela J.; Lively, Richard S. 2018(a). Minnesota Geological Survey. *County Atlas Series. Atlas C-45, Hennepin County. Plate 3 – Surficial Geology*. Available at: https://hdl.handle.net/11299/200919. Accessed November 2024.
[8] Steenberg, Julia R.; Bauer, Emily J.; Chandler, V.W.;Retzler, Andrew J.; Berthold, Angela J.; Lively, Richard S. 2018(b). Minnesota Geological Survey. *County Atlas Series. Atlas C-45, Hennepin County. Plate 2 – Bedrock Geology*. Available at: https://hdl.handle.net/11299/200919. Accessed November 2024.

and 275 feet, decreasing from west to east.[9] According to the Minnesota Department of Health (MDH) Minnesota Well Index (MWI)[10], two wells were identified within the Project area, and 21 wells were identified within one-quarter mile. The two wells within the Project area were both constructed to depths less than 100 feet and did not intersect bedrock. Three wells, 2 located just east and 1 located west of the Project area (Unique Well 162064, Unique Well 166986 and Unique Well 209255) have well logs and stratigraphic reports recording the presence of bedrock; Jordan Sandstone, St, Lawrence Formation and Tunnel City Group; at 125 feet, 185 feet, and 245 feet respectively. The well log reports and stratigraphic records are available in Appendix B.

According to the DNR, Karst Feature Inventory, there are no known karst or sinkhole features within the Project area or within the vicinity of the Project area.[11] Further, the US Geological Survey (USGS) does not identify the Project area as being within a known or potential karst area.[12] The nearest known feature is a sinkhole approximately 8 miles to the northeast of the Project area in Andover, MN (field verified in 2017). The Jordan Sandstone and the Tunnel City Group are not known for karst features and are located at depths greater than 100 feet below grade. The St. Lawrence Formation does contain minor dolostone layers with abundant macropores but is not subject to karst development because the secondary porosity is unlikely from dissolution.[13] Due to the absence of soluble carbonate bedrock within 50 feet of the surface, the formation of, and the surface expression of karst within the Project Area is unlikely.

b. Soils and topography - Describe the soils on the site, giving NRCS (SCS) classifications and descriptions, including limitations of soils. Describe topography, any special site conditions relating to erosion potential, soil stability or other soils limitations, such as steep slopes, highly permeable soils. Provide estimated volume and acreage of soil excavation and/or grading. Discuss impacts from Project activities (distinguish between construction and operational activities) related to soils and topography. Identify measures during and after Project construction to address soil limitations including stabilization, soil corrections or other measures. Erosion/ sedimentation control related to stormwater runoff should be addressed in response to Item 12.b.ii.

The approximately 90.9-acre Project area features mixed topography. Most of the site is relatively flat with gently, undulating contours. The lowest elevations are in the northeast and southeast with the highest elevation in between. Total elevation change within the site is approximately 40 ft. The existing site is primarily used for agriculture with the exception of two small farmsteads in the northeast and south.

According to the U. S. Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS) soil survey data[14], there are seven soil map units within the Project area. A soil map unit is typically comprised of more than one soil series. The various series in a map unit represent associated soils that formed on different landscape positions within the map unit. The map unit is named after the most dominant soil series by areal extent.

Table 7 below lists the soil map units within the Project area and select map unit attributes relevant to item 11b, such as Hydrologic Soil Group, Wind Erodibility Group, and Water Erodibility Factor. Attributes in Table 7 are for the dominant soil condition within the map unit. See Figure 9, Appendix A for soil survey mapping.

---

[9] Steenberg, Julia R.; Bauer, Emily J.; Chandler, V.W.;Retzler, Andrew J.; Berthold, Angela J.; Lively, Richard S. 2018(c). Minnesota Geological Survey. *County Atlas Series. Atlas C-45, Hennepin County. Plate 6 – Depth to Bedrock and Bedrock Topography*. Available at: https://hdl.handle.net/11299/200919. Accessed November 2024.

[10] MDH, 2024. *MWI*. Available at: https://www.health.state.mn.us/communities/environment/water/mwi/index.html. Accessed November 2024.

[11] MnDNR, undated(b). Karst Feature Inventory. Available at: https://arcgis.dnr.state.mn.us/portal/apps/webappviewer/index.html?id=9df792d8f86546f2aafc98b3e31adb62. Accessed November 2024

[12] Weary, D.J. and Doctor, D.H.. 2014. *Karst in the United States: A digital map compilation and database: U.S. Geological Survey Open-File Report 2014-1156, 23 p.* Available at: https://dx.doi.org/10.3133/ofr20141156. Accessed November 2024.

[13] Runkel, Anthony C.; Tipping, Robert R.; Green, J.A.; Jones, Perry M.; Meyer, Jessica R.; Parker, Beth L.; Steenberg, Julia R.; Retzler, Andrew J. 2014. *Minnesota Geological Survey Open File Report 14-04, Hydrogeologic Properties of the St. Lawrence Aquitard, Southeastern Minnesota.* Available at: https://conservancy.umn.edu/handle/11299/165299. Accessed November 2024.

[14] Soil Survey Staff, NRCS, USDA, 2024. *Soil Survey Geographic Database (SSURGO)*. Accessed via ESRI ArcGIS Online tool November 2024.

The soil map units within the Project area generally feature low wind or water erosion potential, and relatively slow permeability, Soils with slow permeability have a heightened risk for runoff concerns. Map units L23A, L36A, and L45A feature predominantly hydric soils with water tables at or near the surface during parts of the growing season, which would create limitations for infiltrative stormwater practices.

The Project would significantly alter the existing soil and topographic conditions through grading and construction activities. It is anticipated that approximately 90 acres of the Project area soils would be disturbed by grading or filling activities related to site leveling for structure and road construction. Soil balance and grading volumes are not yet known and would be determined when the design and grading plan are further developed.

The Project would adhere to erosion and sediment control practices during demolition, construction, and operations per the conditions of the Project's Stormwater Pollution Prevention Plan (SWPPP), National Pollution Discharge Elimination System (NPDES) Construction Stormwater Permit, and any local permitting conditions. See EAW item 12.b.ii for details on stormwater management and erosion and sediment control.

Table 7. Soil within the Project area

Map Unit Symbol	Map Unit Name	Hydrologic Group	Wind Erodibility Group	Water Erodibility Factor (K*f*)	Acres	% of Project area
L45A	Dundas-Cordova complex, 0 to 3% slopes	C/D	5	0.36	30.7	33.8%
L37B	Angus loam, 2 to 6 % slopes	C	6	0.32	22.5	24.8%
L44A	Nessel loam, 1 to 3 % slopes	C	5	0.32	15.3	16.8%
L36A	Hamel, overwash-Hamel complex, 0 to 3 % slopes	C/D	6	0.30	12.2	13.4%
L22C2	Lester loam, 6 to 10 % slopes, moderately eroded	C	6	0.32	5.6	6.2%
L22D2	Lester loam, 10 to 16 % slopes, moderately eroded	C	6	0.32	2.5	2.7%
L23A	Cordova loam, 0 to 2 % slopes	C/D	6	0.30	2.1	2.3%
				Total	**90.9**	**100.0**

The hydrologic soil groups are:

- **Group A**: Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.
- **Group B**: Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained, or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.
- **Group C**: Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.
- **Group D**: Soils having a very slow infiltration rate (high runoff potential). These consist chiefly of soils with high clay content, soils that have a high-water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

- **Dual Groups**: Dual Group designations (A/D, B/D, or C/D) are used to indicate wet soils that belong to Group D due to a high water table but would meet the drainage or textural criteria for Group A, B, or C if drained. Dual Group soils should be treated as Group D soils in the absence of effective artificial drainage.

The soil erodibility factors are:

- **Wind Erodibility Group**: Soils are assigned a Wind Erodibility Group (WEG) rating based on their inherent vulnerability to soil particle detachment from wind forces. Values range from 1 (most erodible) to 8 (least erodible).
- **Water Erodibility Factor (K*f*):** The Soil Erodibility Factor (K*f*) is a unitless quantitative description of the inherent vulnerability of a soil to water erosion. It provides a measurement of soil particles' susceptibility to detachment from rain drops or surface runoff. Values range from 0.02 (least erodible) to 0.69 (most erodible).

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.

Surface Waters

A review of Minnesota geospatial data determined that no lakes[15], wildlife lakes[16], migratory waterfowl feeding/resting lakes[17], outstanding resources value waters[18], DNR State Designated Trout Streams[19] or infested waters[20] are located within the Project area. Table 8 below lists the surface waters identified in the DNR Hydrography Dataset database located within one mile of the Project area. See Figure 11, Appendix A for select surface water features.

DNR Public Waters

No DNR Public Waters are located within the Project area. Seventeen DNR Public Waters and Watercourses are located within one mile of the Project area. Table 8 identifies DNR Public Waters and Public Water Watercourses within one mile of the Project area.

Table 8. Surface Waters and DNR Public Waters within One Mile of the Project area

Water Resource	Type	PW ID/ Kittle No.
Rush Creek	Perennial Stream, Public Ditch/ Altered Natural Watercourse	M-062-004
Unnamed	Public Water Wetland	27023800
Unnamed	Lake/Pond	27024600

[15] MNDNR, 2024(b). *DNR Hydrography Dataset*. Available at: DNR Hydrography Dataset . Accessed November 2024.
[16] MNDNR, 2016(a). *Designated Wildlife Lakes*. Available at: https://gisdata.mn.gov/dataset/env-designated-wildlife-lakes. Accessed November 2024.
[17] MNDNR. 2016(b). *Migratory Waterfowl Feeding and Resting Areas*. Available at: Migratory Waterfowl Feeding and Resting Areas - Resources - Minnesota Geospatial Commons. Accessed November 2024.
[18] MNDNR, 2024(c). *Lakes of Biological Significance*. Available at: https://gisdata.mn.gov/dataset/env-lakes-of-biological-signific. Accessed November 2024.
[19] MNDNR, 2020. *State Designated Trout Streams*, Minnesota. Available at: https://gisdata.mn.gov/dataset/env-trout-stream-designations. Accessed November 2024.
[20] MNDNR, 2024(d). *Listed Infested Waters*. Available at: https://gisdata.mn.gov/dataset/env-listed-infested-waters. Accessed November 2024.

Water Resource	Type	PW ID/ Kittle No.
Unnamed	Public Water Wetland	27024300
Unnamed	Intermittent Water	27027900
Unnamed	Intermittent Water	27024400
Unnamed	Public Water Wetland	27023600
Unnamed	Lake/Pond	27024500
Dubay Lake	Lake/Pond	27012900
Powers Lake	Lake/Pond	27013000
Unnamed	Lake/Pond	27023700
Unnamed	Intermittent Water	27023200
Unnamed	Intermittent Water	27023400
Unnamed	Intermittent Water	27028100
Hayden Lake	Lake/Pond	27012800
Unnamed	Public Water Wetland	27023500
Unnamed	Intermittent Water	27023300

Wetland Resources

Based on a wetland delineation conducted by Kjolhaug Environmental Services on July 10, 2024, one wetland is present within the Project area. The wetland delineation report was submitted to City of Dayton for review and was approved in September 2024. The 1,090-square foot wetland is located in the eastern portion of the Project area and was classified as a seasonally flooded basin palustrine emergent wetland (PEMAf). .Appendix E includes the wetland delineation report and WCA Notice of Decision.

MPCA 303d Impaired Waters List

No impaired waters are located within the Project area. One impaired water is present within one mile of the Project area.[21] Table 9 identifies impaired waters within one mile of the Project area. See also Figure 11, Appendix A.

Table 9. Impaired Waters within One Mile of the Project area

Waterbody Name	AUID[1]	Affected Designated Use	Pollutant or Stressor	TMDL[2] ID
Rush Creek	07010206-528	Aquatic Life, Aquatic Recreation	Dissolved oxygen, Escherichia coli (E. Coli), Fish bioassessments, Benthic macroinvertebrates bioassessments	PRJ06872-001

[1] *Assessment Unit Identification (AUID)*
[2] *Total Maximum Daily Load (TMDL)*

Floodway/Floodplain

A FIRMette was generated through the Federal Emergency Management Agency (FEMA) National Flood Hazard Layer (NFHL) mapping tool[22], which indicates that the Project area is located within Zone X, an area with minimal flood hazard. Appendix C includes the FEMA FIRMette for the Project area.

ii. Groundwater – aquifers, springs, seeps. Include: 1) depth to groundwater; 2) if Project is

[21] MPCA, 2024(a). *Impaired Waterbodies 2024*. Available at: Impaired Waterbodies, Minnesota, 2024. Accessed November 2024.
[22] FEMA, 2024. *National Flood Hazard Layer FIRMette*. Available at: FEMA Flood Map Service Center. Accessed November 2024.

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.

There are no known springs, seeps or karst features present in the Project area. The nearest known spring and seep are located approximately three-quarters of a mile southeast of the Project area, within the Elm Creek Park Reserve (Figure 11, Appendix A).

A review of the MDH MWI[23] identified two verified wells within the Project area and 21 verified wells within a quarter-mile radius of the Project area. These wells are presented in Table 10 and Figure 10, Appendix A. Based on a review of the wells located near the Project area, the depth to static water level ranges from approximately 15 feet to 65 feet. Well log reports are included in Appendix D.

Table 10. Verified Wells Within and Adjacent to the Project area

Well ID	Use Type	Distance from Project	Status	Depth (ft.)	Static Water Level (ft.)
4488759	Domestic	Within Project area	Active	79	58
425099	Domestic	Within Project area	Active	94	50
162064	Domestic	Approx. 100 ft E	Active	215	50
623582	Domestic	Approx. 100 ft E	Active	120	65
559030	Domestic	Approx. 100 ft E	Active	78	15
166986	Domestic	Approx. 100 ft E	Active	310	65
202781	Domestic	Approx. 200 ft E	Active	119	22
555241	Domestic	Approx. 200 ft E	Active	82	40
197428	Domestic	Approx. 400 ft E	Active	92	40
579137	Domestic	Approx. 400 ft E	Active	92	35
202779	Domestic	Approx. 500 ft N	Active	119	22
202780	Domestic	Approx. 700 ft N	Active	154	46
767816	Domestic	Approx. 700 ft N	Active	80	30
168710	Domestic	Approx. 800 ft E	Active	139	41
417496	Domestic	Approx. 800 ft E	Active	243	40
517882	Domestic	Approx. 800 ft E	Active	93	30
133254	Domestic	Approx. 1,000 ft E	Active	137	24
417042	Domestic	Approx. 1,200 ft E	Active	71	50
168667	Domestic	Approx. 1,200 ft NE	Active	285	50
655001	Domestic	Approx. 1,200 ft N	Active	96	30

[23] Ibid MDH, 2024 (10)

Well ID	Use Type	Distance from Project	Status	Depth (ft.)	Static Water Level (ft.)
457043	Domestic	Approx. 1,300 ft E	Active	116	27
854464	Thermometer	Approx., 1,300 ft N	Active	380	33
209255	Irrigation	Approx., 1,300 ft W	Active	626	26

According to the MDH Source Water Protection Map[24], the Project area is not within a MDH Wellhead Protection Area or a Drinking Water Supply Management Area.

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 andwaste loadings, including any effects on, or required expansion of, municipal wastewater infrastructure.

Metropolitan Council of Environmental Services (MCES) operates and maintains the wastewater collection and treatment system in the seven-county Twin Cities metro region, serving 111 cities and townships. MCES has 9 treatment plants which convey and treat approximately 250 million gallons per day (MGD) of wastewater. The Metropolitan Wastewater Treatment Plant (Metro Plant) The Seneca Wastewater Treatment Plant (WWTP) is the largest wastewater treatment plant (WWTP) in Minnesota and has a capacity of 251 million gallons per day (GPD).

The Project would generate typical domestic wastewater associated with the proposed residential and commercial uses. The proposed development would be connected to the City of Dayton's existing sanitary sewer collection system. Wastewater generated by the Project would flow through Dayton/ Hassan Township extension of the Metropolitan Council Environmental Services (MCES) Elm Creek Interceptor. A meter is located off Holly Lane approximately 50 feet south of the Dayton/Maple Grove border. Wastewater from the Elm Creek Interceptor flows to the Metropolitan Wastewater Treatment Plant (Metro Plant) in the City of St. Paul where it is treated and ultimately discharged to the Mississippi River.

Table 11 provides the wastewater flow estimates for the full buildout of the Project based on the estimated building square footage for the proposed uses. It is anticipated that the Project would generate an estimated 85,000 GPD. This flow estimate equates to an average day load of 191 lbs. per day of biochemical oxygen demand (BOD) and 217 lbs. per day of total suspended solids (TSS).

Table 11. Wastewater Flow Estimates

Average Daily Flow (GPD)	Average BOD Load (lbs./day)	Average TSS Load (lbs./day)	Peak Flow (GPD)
85,000	191	217	327,000

The City of Dayton's 2040 Comprehensive Sanitary Sewer Plan describes current and anticipated future upgrades. Sewered population projects consider household and employment forecasts

[24] MDH, 2023. *Source Water Protection Web Map Viewer*. Available at: https://www.health.state.mn.us/communities/environment/water/swp/mapviewer.html. Accessed November 2024.

based on the City's Future Land Use Map, which has identified the Project area for planned residential development. Therefore, sewer capacity associated with the Project is accounted for in the City's sewer service projections. The City is currently in the process of updating the Sanitary Sewer Plan.

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.*

   Not applicable.

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.*

   Not applicable.

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

Project area currently consists of agricultural land, rural residential properties, farm buildings, and one wetland. No stormwater management features are present under existing conditions. There are approximately 4.55 acres of existing impervious cover associated with dwellings, driveways, and farm buildings. Surface water runoff primarily drains towards the southeast. Pollutants typically associated with untreated runoff from agricultural areas include pesticides, sediment, nutrients (nitrogen, phosphorus, and potassium) from fertilizers, and metals.

Operations and Construction Stormwater Management

The entire Project area's surface hydrology would be altered by grading and construction activities, and the proposed Project would create approximately 35.78 acres of impervious surfaces. The increased impervious area would result in higher runoff rates and volumes and a change in pollutants compared to existing conditions. A National Pollution Discharge Elimination System (NPDES) Construction Stormwater Permit would be required, including a Stormwater Pollution Prevention Plan (SWPPP). Permanent stormwater BMPs would be constructed to mitigate stormwater runoff rate, volumes, and pollutant loading per City of Dayton and Elm Creek Watershed Management Commission (ECWMC) requirements. At a minimum, the stormwater management system must

ensure that runoff rates do not exceed existing conditions up to the 100-year storm event. The runoff volume equal to 1.1 inches from all impervious surfaces must be infiltrated on site if soil and groundwater conditions are suitable. The stormwater design must also ensure that there is no net increase in total phosphorous or suspended solids discharge compared to existing conditions.

The Concept Site Plan in Appendix B identifies the preliminary planned locations for the six proposed stormwater features. Final BMP selection and design have not been developed. The stormwater management design must be reviewed and approved by both the City of Dayton and ECWMC.

During construction, the Project would adhere to the approved SWPPP and the City would conduct regular compliance inspections. Erosion and sediment control during construction would occur through standard BMPs such as silt fence, biorolls, inlet protection, and temporary sediment basins. Perimeter controls would be utilized to minimize the amount of sediment leaving the site. Stockpiles would be stabilized when not in use and stockpile perimeter would be controlled. Disturbed areas would be quickly mulched and seeded upon completion of grading activities. All permanent slopes 4:1 or steeper would have erosion control blankets installed.

Since the Project would disturb 50 or more acres, the SWPPP must be submitted to the MPCA 30 days prior to obtaining the NPDES Construction Stormwater permit.

Downstream Receiving Waters

Section 23 of the NPDES Construction Stormwater Permit provides guidance on additional controls and conditions required for construction sites within one mile of an impaired water. Rush Creek, within one mile downstream from the Project, is listed by MPCA as impaired for aquatic recreation and aquatic life due to low dissolved oxygen and excessive escherichia coli concentrations. Project stormwater discharge is not anticipated to contribute to Rush Creek's impairment categories. Turbidity, chloride, and excess nutrients are the primary impairments or TMDL categories directly related to stormwater runoff. The Project's stormwater management practices would incorporate BMPs to capture suspended solids and to reduce nutrient and chloride concentrations as required by the NPDES and City of Waseca permits.

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 MnDNR 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.

Two domestic water supply wells are present within the Project area. Table 10 identifies wells within the Project area and Figure 10, Appendix A shows the locations of these wells. Existing wells that are not planned to be used following the development of the Project area, would be required to be sealed by a licensed well contractor in accordance with the Minnesota Well Code.

The City of Dayton obtains its water supply from four wells and existing interconnections with the City of Maple Grove, City of Champlin, and City of Rogers. The areas located west and south of Elm Creek Park Reserve is served by an existing connection to the Maple Grove water system. Maple Grove has agreed to provide the City of Dayton with water in sufficient quantity to meet an average day demand not to exceed 2.8 million gallons per day (MGD) and a maximum daily demand of 5.0 MGD. The City is in the process of completing a Water Supply Plan Update.

It is estimated that the Project would create an average water demand of 0.10 MGD and maximum water demand of 0.31 MGD based on building square footage estimates and MCES Sewer Availability Charge (SAC) procedures for residential and commercial uses. Anticipated landscape irrigation water demanded was considered in these estimates. The Project is identified in the City's Future Land Use Plan and has been considered in the projected water supply estimates per the City's Water Supply Plan.

Construction-related water appropriations within the Project area include the potential for construction dewatering. If dewatering is necessary for construction activities, a DNR Water Appropriation Permit would be required for any dewatering of volumes that meet or exceed 10,000 gallons per day or one million gallons per year.

Climate change trends may affect surface water and groundwater interactions that may lead to long-term uncertainty regarding surface and groundwater levels, aquifer recharge, and groundwater flow. This may result in impacts to groundwater supply availability, quality, and quantity. Surface and groundwater quantity is driven by the balance of atmospheric input from precipitation (recharge) and losses due to evapotranspiration. Opportunities to utilize water efficient fixtures and equipment, along with water reuse and recycling measures could be considered to minimize water supply needs.

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.

Wetland 1 would be filled for grading and lot development (Figure 12, Appendix A). Minimization of impacts to the wetland would be evaluated as the Project design advances. Table 12 summarizes the wetlands potential impact within the Project area.

Table 12. Impacts to Wetlands within the Project area

Wetland ID*	Circular 39	Cowardin	Acres within Project area	Potential Impact (acres impacted)
Wetland 1	Type 1	PEMAf	1,090	1,090

Impacts to wetlands are regulated by the Minnesota Wetland Conservation Act (WCA) and the U.S. Army Corps of Engineers (USACE) under Section 404 of the Clean Water Act. The City of Dayton is the WCA local governmental unit (LGU). The City of Dayton must approve proposed wetland impacts and the replacement plan before any impacts occur.

The proposed 1,090 square feet of wetland impact would not require a Wetland Replacement plan or compensatory mitigation, as the Project's impact total falls below the replacement thresholds of WCA and Section 404.

The wetland impacts are expected to have minimal effect on the host watershed, as the total impact area is not large, and the existing wetland is a low-quality farmed wetland (seasonally flooded basin).

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 thewater features. Discuss how the Project will change the number or type of watercraft on any water body, including current and Projected watercraft usage.

No Surface Waters would be impacted by the Project. The stormwater management described in Item 12.b.iii would minimize the impacts of Project runoff to downstream surface waters.

13. Contamination/Hazardous Materials/Wastes

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

A review of MPCA's *What's in My Neighborhood* (WIMN) database[25] was conducted to identify documented potentially contaminated sites within or in the vicinity of the Project area. One site was identified within the Project area and eight sites were identified within one-quarter mile of the Project area. Table 13 summarizes these findings and Figure 13; Appendix A illustrates the location of WIMN site listings within, or in close proximity to the Project area.

Table 13. MPCA Potentially Contaminated Sites within One-Quarter Mile of the Project area

Site ID	Site Name	MPCA Program	Status	Location
55835	Fernbrook Farms Inc. 14800 113th Avenue N. Maple Grove, MN	Feedlots (053-65219)	Inactive (Registered in 2001, Ended 2017)	Within southern portion of Project area
192973	Culver Residence 11431 Fernbrook Lane N. Maple Grove, MN	Petroleum Remediation Program Leak Site – (LS0019497)	Regulatory Closure, January 22, 2015	Adjoining east of Project area
108128	Sundance Golf & Bowl Inc. 15240 113th Avenue N. Maple Grove, MN	• Hazardous Waste – Very small quantity generator (MNS000155606)	• Active (Registered 2010) • Active (Registered in 2002)	Adjoining southwest of Project area

[25] MPCA, 2024(b). *What's in My Neighborhood.* Available at: What's in My Neighborhood | Minnesota Pollution Control Agency (state.mn.us). Accessed November 2024

Site ID	Site Name	MPCA Program	Status	Location
		• Aboveground Storage Tanks (TS0122930)		
234662	Sundance Greens 4th Addition, Dayton, MN	Construction Stormwater (C00056776)	Active (Coverage from 2020 to 2024)	Adjoining south of Project area
260755	Sundance Greens Eleventh Addition, Dayton, MN	Construction Stormwater (C00070395)	Active (Coverage from 2024 to 2028)	Adjoining southwest of Project area
256238	Sundance Greens 9th Addition, Dayton, MN	Construction Stormwater (C00067261)	Active (Coverage from 2023 to 2024)	Adjoining southwest of Project area
236295	Sundance Greens 5th Addition, Dayton, MN	• Construction Stormwater (C00057788) • Construction Stormwater (SUB0062201) • Construction Stormwater (SUB0062468)	• Active (Coverage 2020 to 2024) • Active (Coverage 2021 to 2024) • Active (2021 to 2024)	Adjoining south of Project area
256708	Brayburn Trails II Dayton, MN	Construction Stormwater (C00067627)	Active (Coverage from 2023 to 2028)	Adjoining north of Project area
111890	Haynes S Michael 13900 114th Avenue N. Dayton, MN	Underground Storage Tanks (TS0016011)	Active (Registered in 1991)	Approx. 1,200 ft east of Project area

A review of the Minnesota Department of Agriculture (MDA) WIMN database was conducted to identify documented potentially contaminated sites within or in the vicinity of the Project area. [26] No MDA spill or release sites were identified within the Project area or within a quarter-mile radius.

A Phase I Environmental Site Assessment will be completed for the Project to further evaluate the Project area for potential contamination and determine if further site investigations are needed.

It is not anticipated that Project construction would expose or exacerbate potentially contaminated sites within the vicinity of the Project area. In the event hat potentially contaminated soils or other potentially hazardous materials are encountered during construction, plans would be developed to properly handle and treat contaminated soil and/or groundwater. Any contaminated soils or other potentially hazardous materials encountered during construction would be handled and disposed of in accordance with MPA and other applicable requirements.

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

[26] MDA, 2024. *What's in my Neighborhood? – Agricultural*. Available at: What's In My Neighborhood (arcgis.com) Accessed October 2024.

source reduction and recycling.

Construction waste

Construction wastes would be typical to the construction of new structures, infrastructure, and roadways. Construction wastes would be primarily non-hazardous and would be managed as municipal solid waste (MSW) or construction/demolition debris. Potentially hazardous wastes in the form of used oils/lubricants, waste paints, or other materials may be generated during construction. The contractor would be required to manage and dispose of all construction-generated wastes in accordance with MPCA requirements and all other applicable regulatory requirements. Construction wastes would either be recycled or stored in approved containers and disposed of in the proper facilities. Any excess soil material that is not suitable for use onsite would become the property of the contractor and would be disposed of properly. All solid waste would be managed according to MPCA and other regulatory requirements.

Fernbrook Farms (Site ID 55835), a feedlot, is within the Project area. Buildings associated with the Fernbrook Farms site would be demolished during Project construction. Hazardous waste may be generated during construction from the demolition and removal of existing farm buildings and structures. If encountered, regulated materials such as asbestos, lights, or the regulated wastes would be abated and properly disposed of at a permitted facility. A pre-demolition hazardous materials survey will be completed prior to the start of demolition activities. If regulated materials such as asbestos-containing materials, lead-based paint, or other regulated materials/waste are present, an abatement plan would be prepared to address removal and proposed disposal of regulated materials identified in the hazardous materials survey. If required, a comprehensive abatement closeout report would be prepared following abatement and demolition activities, which would document the removal, management, and disposal of regulated materials.

Operational waste

The Project would generate solid waste during operation of the development, which will include residential, commercial, and retail activities. Solid waste generated by residents and commercial facilities would primarily be managed as mixed municipal waste. The California Department of Resource Recycling and Recovery (CalRecycle) provides a list of estimated solid waste generation rates for residential, commercial and other establishments for general planning purposes.[27]

It is estimated that the waste generated by the residential and commercial development would be composed of 100 percent municipal solid waste. Based on estimated solid waste generation rates of 12.23 pounds per unit per day for residential developments, one pound per seat per day for restaurants/coffee shops, and less than one pound per square foot per day for other commercial developments, it is estimated that the Project would yield a total waste generation rate of 886 tons per year. The collection of MSW would be managed by a licensed waste hauler. The Project would adhere to all MPCA requirements and other regulation pertaining to the use, handling, and disposal of solid waste. Recycling areas would be provided in compliance with the Minnesota State Building Code.

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.

The majority of the Project consists of single family residential development, which would not include the use of aboveground or below ground storage tanks. Commercial development is proposed in the

[27] CalRecycle, 2019. *Estimated Solid Waste Generation Rates*. Available at: https://www2.calrecycle.ca.gov/WasteCharacterization/General/Rates Accessed November 2024.

southeastern portion of the Project area. The commercial development may include a convenience store/gas station. A specific end user has not been identified at this time. The proposed convenience store/gas station facility would require the installation of fuel storage tanks. The number and size of the tanks would be identified at the time that a specific end user is determined. The tank owner will be required to register with the MPCA and adhere to the design and operating regulations pursuant to Minnesota Rules Chapter 7150. The owner will be required to register the fuel storage tanks with the MPCA and comply with periodic inspection requirements and spill control and countermeasures.

Construction equipment may require the limited use of potentially hazardous materials, such as gasoline or diesel fuels, engine motor oils, hydraulic fluids, and other lubricants. Vehicles responsible for the transportation of hazardous materials would be equipped with spill kits for rapid response to any spills and refueling procedures would be implemented to eliminate leakage. Additionally, all fuels, oils, and lubricants would be stored in containment apparatuses while not in use. Construction staff would be trained to spot and appropriately respond to potential spills. In the event that a leak or spill incident occurs, the contractor would be required to respond in accordance with MPCA containment and remedial action procedures. A SPCC plan would be prepared by a Minnesota Professional Engineer pursuant to federal regulations.

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

It is not anticipated that the Project would generate or require storage of hazardous wastes during its construction or operation. Item 13.c. describes the potential storage and use of hazardous materials during construction and operation of the Project.

The MPCA allows, without sampling, disposal of demolition debris that may contain Lead Based Paint (LBP) coatings. Therefore, if a building is scheduled for demolition, suspect LBP coatings do not require sampling. In addition, the MPCA allows, without sampling, disposal of demolition debris that may contain polychlorinated biphenyl (PCB)-containing caulks, sealants and coatings. Therefore, if a building was constructed after 1979 or is scheduled for demolition, suspect PCB-containing caulks do not require sampling. A final report documenting the findings of the survey shall be completed. Based on the findings of the building survey, if a Project specification is generated, it must be written by an MDH accredited Asbestos Project Designer.

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.

The Project is located within the Eastern Broadleaf Forest Province (222), the Minnesota and Northeast Iowa Morainal Section (222M), and the Big Woods Subsection (222Mb) as defined by the Minnesota Department of Natural Resources (DNR) in the *Field Guide to Native Plant Communities of Minnesota – The Eastern Broadleaf Forest Province.*[28] Current land use within this subsection primarily consists of cropland and pasture with some remaining upland woodland, forest, non-native grassland and wetland. Historically, the subsection consisted largely of oak woodland and maple-basswood forest.[29,30]

The land cover within the Project area was reviewed and is described in Item 8 and Table 3. Figure 4, Appendix A illustrates the land cover types within the Project area based on geospatial data.

[28] Aaseng, N., 2005. Field Guide to the Native Plant Communities of Minnesota – The Eastern Broadleaf Forest Province. St. Paul: DNR.
[29] DNR, 1999. Minnesota Geospatial Commons – Ecological Sections of Minnesota. Available at: https://gisdata.mn.gov/dataset/geos-ecological-class-system. Accessed November 2024.
[30] DNR, 2000. Ecological Classification System. Available at: https://www.dnr.state.mn.us/ecs/index.html. Accessed November 2024.

Habitat for urban wildlife is anticipated to be minimal with the Project area given that cropland is the primary cover type. However, this cropland, as well as limited forested areas and wetlands, may provide nesting, foraging, and/or travel habitat for a variety of urban wildlife species, including passerine birds, raptors, squirrels, rabbits, deer, coyotes, foxes, and other small mammals. Suitable roosting habitat for bats may be present within the limited forested areas. The wetland within the Project area may also provide habitat for aquatic and/or semi-aquatic species, such as turtles, frogs, salamanders, and toads.

b. Describe rare features 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 within close proximity 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 MnDNR. Indicate if any additional habitat or species survey work has been conducted within the site and describe the results.

Under Stantec's Limited License to Use Copyrighted Material (LA 2022-023) related to Rare Features Data, the DNR Natural Heritage Information System (NHIS) was searched in October 2024 to identify species within a one-mile buffer of the Project area. The NHIS search did not identify any records of rare species with the Project area, but seven species were identified to have records within one mile of the Project area. These species are detailed below. A formal NHIS review request (MCE No. 2024-00946) was submitted to the DNR through the Minnesota Conservation Explorer (MCE) system on November 13, 2024. According to the automated letter received the same day, further review by the Natural Heritage Review Team is needed for state-listed species records in the vicinity of the Project area. Appendix F provides a copy of the initial DNR MCE response letter.

Native Plant Communities and Sites of Biodiversity Significance

Based on a review of the DNR MCE portal[31], no native plant communities, calcareous fens, Minnesota Biological Survey (MBS) sites, or lakes of biological significance are located within the Project area. Notably, the Elm Creek Park Reserve is located approximately one-quarter mile east of the Project area and contains native plant communities, including mesic hardwood forests and wet forests, as well as MBS sites with a high ranking.

State – Listed Species

Big brown bat

The big brown bat (*Eptesicus fuscus*) is a state special concern species. In the winter, this species utilizes hibernacula, such as caves and mines, as well as buildings, cellars, and tunnels. Ideal conditions for these overwintering sites include high humidity, minimal airflow, and constant temperature. Notably, this species, in comparison to other bat species in Minnesota, will hibernate in colder temperatures.[32,33] Summer roosting and foraging habitat consists of forested areas near water; hollow trees, and trees with crevices, loose bark, and/or cavities are preferred for roosting. Big brown bats will also roost in buildings and bridges.[34]

According to the DNR Karst Feature Inventory, the Project area is not within a karst area.[35] Therefore, the likelihood of a cave being within the Project area is low. However, trees and buildings are located within the Project area. The potential removal of these features may impact big brown bats and their habitat.

[31] DNR. undated-a. Minnesota Conservation Explorer. Available at: https://mce.dnr.state.mn.us/. Accessed November 2024.
[32] Fitch, J. H., and K. A. Shump, Jr. 1979. *Myotis keenii*. Mammalian Species 121:1-3.
[33] Nordquist, G. E., K. A. Lynch, and C. A. Spak. 2006. Timing and pattern of bat activity at Soudan underground mine. Final report submitted to the State Wildlife Grants Program, Minnesota Department of Natural Resources. 86 pp.
[34] Kunz, T. H. 1982. Roosting ecology of bats. Pages 1-55 in T.H. Kunz, editor. Ecology of bats. Plenum Press, New York, New York. 450 pp.
[35] DNR. undated-b. Karst Feature Inventory. Available at: https://arcgis.dnr.state.mn.us/portal/apps/webappviewer/index.html?id=9df792d8f86546f2aafc98b3e31adb62. Accessed November 2024.

Little brown bat

The little brown bat (*Myotis lucifugus*) is a state special concern species. In the winter, this species utilizes hibernacula, such as caves, mines, and other underground structures likes cellars and tunnels. Ideal conditions for these overwintering sites include high humidity, minimal airflow, and constant temperature.[36] Summer roosting and foraging habitat consists of forested areas near water. Old growth forest is generally preferred due to the higher presence of snags and decomposing trees with loose bark, crevices, and cavities that provide roosting sites. The little brown bat may also utilize bridges and buildings as roost sites.[37,38]

According to the DNR Karst Feature Inventory, the Project area is not within a karst area.[39] Therefore, the likelihood of a cave being within the Project area is low. However, trees and buildings are located within the Project area. The potential removal of these features may impact little brown bats and their habitat.

Blanding's turtle

Blanding's turtles (*Emydoidea blandingii*) are a state threatened species that require wetland complexes with adjacent sandy uplands to sustain viable populations. Calm, shallow waters, including wetlands associated with rivers and streams with rich aquatic vegetation are preferred. This turtle occurs on a variety of wetland and riverine types throughout Minnesota. The species generally prefers marshes, bottomland wetlands, deeper marshes, and backwater pools in summer and winter, and ephemeral wetlands in spring and early summer. Female Blanding's turtles prefer to nest in open sandy uplands. Although they prefer undeveloped land, they have been known to nest in agricultural fields, residential property (low density suburb housing), gardens, under power lines, and in road shoulders (especially dirt roads). Females may travel up to 1.6 kilometers (1 mile) overland from their resident marsh to their nest site at which time they are vulnerable to predators and road mortality. Hatchlings leave the nest from mid-August through early October. Because eggs are laid far from water, hatchlings are vulnerable to predators, automobiles, and desiccation while traveling from the nest to a wetland.[40]

The Project area primarily consists of agricultural land and does not contain wetland complexes to support the Blanding's turtle. However, there are wetland complexes associated with Rush Creek and the Elm Creek Park Reserve that are less than one mile from the Project area. Therefore, the Project area may provide suitable nesting habitat for this species, and impacts may occur as a result of the Project.

Trumpeter swan

The trumpeter swan (*Cygnus buccinator*) is a state special concern bird species that breeds throughout Minnesota. This species will use muskrat (*Ondatra zibethicus*) and North American beaver (*Castor canadensis*) lodges as nesting platforms in small ponds, marshes, lakes, bays, or other larger waterbodies with emergent vegetation. Additionally, 100 meters of open water are needed for take-off.[41]

Ponds, marshes, lakes, bays, or other larger waterbodies are not present within the Project area. As such, impacts on the trumpeter swan or its habitat are not anticipated as a result of the Project.

Acadian flycatcher

The Acadian flycatcher (*Empidonax virescens*) is a state special concern passerine bird species that

[36] Fitch and Shump (32)
[37] Kunz (34)
[38] Owen, S. F., M. A. Menzel, W. M. Ford, J. W. Edwards, B. R. Chapman, K. V. Miller, and P. B. Wood. 2002. Roost tree selection by maternal colonies of northern long-eared myotis in an intensively managed forest. Northeastern Forest Experiment Station, USDA Forest Service. General Technical Report NE-292, Newtown Square, Pennsylvania. 6 pp.
[39] DNR (35)
[40] DNR Division of Ecological Resources. 2008. Endangered, Threatened, and Species Concern Species of Minnesota – Blanding's Turtle (*Emydoidea blandingii*). Available at: https://files.dnr.state.mn.us/natural_resources/animals/reptiles_amphibians/turtles/blandings_turtle/factsheet.pdf. Accessed January 2024.
[41] Stucker, S.P. 2018. DNR Rare Species Guide: *Cygnus buccinator*. Available at: https://www.dnr.state.mn.us/rsg/profile.html?action=elementDetail&selectedElement=ABNJB02030. Accessed November 2024.

breeds in southeast Minnesota. This species inhabits large, mature, closed-canopy deciduous forests near streams or wetlands as well as floodplain forests.[42]

The Project area does not contain large, mature, closed-canopy deciduous forests that can support the Acadian flycatcher. As such, impacts on this species or its habitat as a result of the Project are not anticipated.

Rusty patched bumble bee

A record of a rusty patched bumble bee (*Bombus affinis*; RPBB) was identified from 2018 within one mile of the Project area. The RPBB is a watchlist species in the state of Minnesota and is not currently regulated at the state level. Further discussion of this species is available under the Federally-Listed Species section below.

Big tick trefoil

The big tick trefoil (*Desmodium cuspidatum*) is state threatened forb species found in canopy gaps of mesic hardwood forest systems. The species is frequently found in association with oaks (*Quercus* spp.), sugar maple (*Acer saccharum*), and American basswood (*Tilia americana*).[43]

Suitable habitat for the big tick trefoil, mesic hardwood forest, is not present within the Project area. As such, impacts on this species or its habitat as a result of the Project are not anticipated.

Federally – Listed Species

A review of the United States Fish and Wildlife Service (USFWS) Information for Planning and Consultation (IPaC) tool[44] was conducted in November 2024 to identify federally listed species, those species proposed for federal listing, and candidates for federal listing with the potential to occur within the Project area. Six species were identified from this review: the RPBB (endangered), the tricolored bat (*Perimyotis subflavus*; proposed endangered), the salamander mussel (*Simpsonaias ambigua*; proposed endangered), the western regal fritillary (*Argynnis idalia occidentalis*; proposed threatened), the monarch butterfly (*Danaus plexippus*; candidate), and the whooping crane (*Grus americana;* non-essential experimental population). Appendix F provides a copy of the IPaC results.

Rusty patched bumble bee

This species is known as a habitat generalist but needs vary with the various aspects of their life history.

Habitat needs of the RPBB can be broken down to include overwintering habitat, nesting habitat, spring foraging habitat, and summer and fall foraging habitat. Overwintering habitat consists of woodland edges, as well as upland forest and woodland interiors. Woodland types generally consist of even-aged maple-basswood or oak-hickory, and the overwintering queens can be found in shady areas with loose soils, little vegetation, and leaf litter. Nesting habitat (colonies) includes grasslands and shrublands, upland forest, and woodland edges extending approximately 30 meters into the woodland. Loose soil and leaf litter in these areas can provide nest building sites.[45]

Spring foraging habitat and summer and fall foraging habitats are similar and can be found in areas with nectar and pollen sources, including plants such as goldenrods (*Solidago spp.*), coneflowers (*Echinacea spp.*), and gentians (*Gentiana spp.*). These areas can include woodland edges, upland forest, upland grassland and shrubland, palustrine wetlands, flower gardens, and agricultural land.[46] Spring ephemeral

[42] DNR. 2024(a). Rare Species Guide: *Empidonax virescens*. Available at: https://www.dnr.state.mn.us/rsg/profile.html?action=elementDetail&selectedElement=ABPAE33020. Accessed November 2024.
[43] Smith, W. 2008. DNR Rare Species Guide: *Desmodium cuspidatum*. Revised 2018. Available at: https://www.dnr.state.mn.us/rsg/profile.html?action=elementDetail&selectedElement=PDFAB1D0D2. Accessed November 2024.
[44] USFWS. 2024(a). Information for Planning and Consultation. Available at: https://ipac.ecosphere.fws.gov/. Accessed November 2024.
[45] USFWS. 2021. Rusty Patched Bumble Bee (*Bombus affinis*) Endangered Species Act Section 7(a)(2) Voluntary Implementation Guidance. Version 3.1. USFWS, Bloomington, MN. 31 p.
[46] USFWS. 2017. Plants Favored By Rusty Patched Bumble Bee. Available at: https://www.fws.gov/media/plants-favored-rusty-patched-bumble-

species and upland forest and woodland interiors that contain nectar and pollen sources are also used for spring foraging.[47]

The Project area is located within a High Potential Zone (HPZ) for the RPBB.[48] Additionally, according to the NHIS review conducted in October 2024, a record of a RPBB was identified within one mile of the Project area in 2018. However, according to the wetland report prepared by Kjolhaug Environmental Services, Inc. (KES) in July 2024, the vegetation observed in the Project area included yellow nutsedge (*Cyperus esculetus*), corn (*Zea mays*), and soybean (*Gycine max*). The Project area includes few wooded areas and is primarily comprised of cropland. Therefore, limited nectar sources within the Project area to support the RPBB. Additionally, the lack of suitable wooded, upland areas and prevalence of regularly plowed cropland within the Project area would not provide suitable overwintering habitat for the RPBB. As such, impacts on the RPBB and its habitat are unlikely to occur as a result of the Project.

Tricolored bat

During the non-hibernating seasons, tricolored bats (TCB) will roost in live and dead leaf clusters of live or dead deciduous hardwood trees. TCBs have also been observed roosting among pine needles and lichen (*Usnea trichodea*), as well as in artificial structures such as barns, bridges, roofs, and other concrete structures. During the winter, TCBs hibernate in caves and mines. If mines or caves are not present, particularly within the southern region, they have been observed hibernating in road-associated culverts, tree cavities, and abandoned water wells.[49]

The USFWS interactive map for modeled TCB habitat indicates that there is potential habitat for the TCB within and in the vicinity of the Project area.[50] Additionally, trees and buildings are located within the Project area. The potential removal of these features may impact TCBs and their habitat. The TCB is proposed to be listed as federally endangered; therefore, impacts should be reassessed if and when a listing status is finalized by the USFWS.

Salamander mussel

The salamander mussel is restricted to the lower St. Croix River in Minnesota but was once also found in the Mississippi River. This species is only found under flat rocks or under ledges of rock walls, which is habitat that is also occupied by its glochidial host, the mudpuppy salamander (*Necturus masculosus*).[51]

The Project area is not in the near vicinity of the Mississippi River or the St. Croix River. As such, impacts on the salamander mussel or its habitat are not anticipated as a result of the Project. The salamander mussel is proposed to be listed as federally endangered; therefore, impacts should be reassessed if and when a listing status is finalized by the USFWS.

Western regal fritillary

The western regal fritillary is associated throughout its range in upland and wetland native prairies. Regal fritillary larvae appear to be restricted to upland prairie where they feed exclusively on the nectar of violets (*Viola* spp.), such as prairie bird's-foot violet (*Viola palmata* var*. pedatifida*) and bird's-foot violet (*V. pedata*), the latter of which is utilized in the southeast section of the state.[52]

bee. Accessed November 2024.
[47] USFWS (46).
[48] USFWS. 2024(b). Rusty Patched Bumble Bee Map. Available at: https://www.arcgis.com/home/webmap/viewer.html?webmap=2716d871f88042a2a56b8001a1f1acae&extent=-100.6667%2c29.7389%2c-48.8551%2c50.9676. Accessed November 2024.
[49] USFWS. 2022(a). Tricolored Bat (*Perimyotis subflavus*). U.S. Fish & Wildlife Service. Available: https://fws.gov/species/tricolored-bat-perimyotis-subflavus. Accessed October 2024.
[50] USFWS. undated. Tricolored Bat (*Perimyotis subflavus*) Interactive Map. Available at: https://www.fws.gov/species/tricolored-bat-perimyotis-subflavus/map. Accessed November 2024.
[51] DNR. 2024(b). Rare Species Guide: *Simpsonaias ambigua*. Available at: https://www.dnr.state.mn.us/rsg/profile.html?action=elementDetail&selectedElement=IMBIV41010. Accessed October 2024.
[52] DNR. 2018. Rare Species Guide: *Argynnis idalia.* Available at: https://www.dnr.state.mn.us/rsg/profile.html?action=elementDetail&selectedElement=IILEPJ6040. Accessed August 2024.

According to a review of the DNR MCE portal[53], there are no native prairies within the Project area. As such, impacts on the western regal fritillary or its habitat are not anticipated as a result of the Project. The western regal fritillary is proposed to be listed as federally threatened; therefore, impacts should be reassessed if and when a listing status is finalized by the USFWS.

Monarch butterfly

The monarch butterfly is a migratory butterfly that exists in two main populations within the United States divided by the Rocky Mountains: the eastern population that overwinters in the mountains of Mexico, and the western population that overwinters along the southern pacific coast of California.[54] Monarch butterflies are a widespread species found in fields, prairies, savannahs, and most places where their host plant milkweed (*Asclepias* spp.) occurs throughout the United States and southern Canada. This species generally occurs in areas with high densities of native nectar sources. During late summer and migration, adults use nectar species such as black-eyed Susan (*Rudbeckia hirta*), narrow-leaved coneflower (*Echinacea angustifolia*), and rough blazing star (*Liatris aspera*).[55] However, the presence of milkweed is required as it is the only plant on which monarch caterpillars can feed.[56]

Given the wide range of habitats the monarch butterfly can occupy, it may occur within the Project area, especially if milkweed is present. The monarch butterfly is a candidate for federal listing; therefore, impacts should be reassessed if and when a listing status is finalized by the USFWS.

Whooping crane

The whooping crane is a migratory bird species that once nested in northern prairies, but now breeds in remote northern forests in Canada as well as in an experimental population in Wisconsin, preferably within coniferous habitat containing swamps and nearby lakes or ponds. Winter habitat consists of coastal marshes (e.g., Texas, Louisiana, and Florida).[57]

The Project area does not contain prairie or coniferous forest habitat preferred by the whooping crane. Additionally, the Project area is located within the Mississippi Flyway while the wild population of whooping crane utilizes the Central Flyway located further west. Any unlikely occurrence of a whooping crane within the Project area would, therefore, likely be from the experimental population in Wisconsin that is not federally regulated. As such, impacts to this species as a result of the Project are not anticipated.

Migratory birds

Fifteen migratory bird species listed as USFWS Birds of Conservation Concern (BCC) and one eagle species have the potential to occur within the Project area according to the USFWS IPaC review (Appendix F). These species and their habitat requirements are detailed in Table 14 using data from the Cornell Lab of Ornithology.[58]

[53] DNR (31)
[54] USDA Forest Service. undated-a. Migration and Overwintering. Available at: https://www.fs.fed.us/wildflowers/pollinators/Monarch_Butterfly/migration/. Accessed November 2021.
[55] DNR. 2022. Butterfly Gardens. Available at: https://www.dnr.state.mn.us/gardens/butterfly/index.html. Accessed October 2024.
[56] National Wildlife Federation. undated. Monarch Butterfly. Available at: https://www.nwf.org/Educational-Resources/Wildlife-Guide/Invertebrates/Monarch-Butterfly. Accessed October 2024.
[57] Audubon. undated. Guide to North American Birds: Whooping Crane. Available at: https://www.audubon.org/field-guide/bird/whooping-crane. Accessed September 2022.
[58] Cornell Lab of Ornithology. 2024. All About Birds. Ithaca, New York. Available at: https://www.allaboutbirds.org/news/#. Accessed November 2024.

Table 14. Migratory Birds Listed as BCC with the Potential to Occur within the Project area

Common Name	Scientific Name	Nesting, Foraging, and/or Migration Habitat
Bald eagle*	*Haliaeetus leucocephalus*	Forested areas (conifers and deciduous trees) near large bodies of open water. Open uplands near open water in winter.
Black tern	*Chlidonias niger surinamenisis*	Large (>50 acres), dense marshes for breeding. Lagoons, river edges, lakes, marshes, and beaches during migration.
Black-billed cuckoo	*Coccyzus erythropthalmus*	Breeds in large, dense woodlands and thickets. Preferred species include aspen, poplar, birch, sugar maple, hickory, hawthorn, and willow.
Bobolink	*Dolichonyx oryzivorus*	Breeds in open areas (grasslands, tallgrass and mixed prairie, hayfields, meadows); coastal areas pre-migration.
Canada warbler	*Cardellina canadensis*	Breeds in mixed conifer and deciduous forest with mossy/shrubby understory near water. Shrubby areas in parks, woodlots, and along forest edges during migration.
Cerulean warbler	*Setophaga cerulea*	Breeds in mature deciduous forests with tall trees.
Chimney swift	*Chaetura pelagica*	Breeds in rural and urban settings in chimneys, tree cavities, and caves. Forages over open habitats, forests, ponds, and residential areas.
Eastern whip-poor-will	*Antrostomus vociferus*	Breeds in dry deciduous or evergreen-deciduous forests near open areas. Large tracts of contiguous forest with dense canopy are avoided.
Golden-winged warbler	*Vermivora chrysoptera*	Breeds in open woodlands, wet thickets, shrub, tamarack bogs, aspen or willow stands, and wetlands.
Grasshopper sparrow	*Ammodramus savannarum perpallidus*	Grasslands, prairies, hayfields, and open pastures with little scrub and some bare ground.
Henslow's sparrow	*Centronyx henslowii*	Breeds in wet meadows, weedy pastures, lowland prairie, and cultivated hayfields.
Lesser yellowlegs	*Tringa flavipes*	Breeds in open woodlands with marshes, bogs, and/or ponds; during migration found in fresh and brackish wetlands.
Red-headed woodpecker	*Melanerpes erythrocephalus*	Breeds in mature deciduous woodlands that contain dead or dying trees that can act as nest cavities. Oak, oak-hickory, maple, ash, and beech are often used in the northern portion of their range.
Ruddy turnstone	*Arenaria interpres morinella*	Coastal rocky and sandy beaches, mudflats, and shorelines of freshwater lakes.
Rusty blackbird	*Euphagus carolinus*	Breeds in wet forests, fens, bogs, muskeg, and beaver ponds.
Wood thrush	*Hylocichla mustelina*	Breeds in mature deciduous and mixed forests with trees over 50 feet tall, a moderate understory, open forest floor with moist soil and decaying leaf litter, and nearby water.
*This species is not listed as BBC but warrants special attention under the Bald and Golden Eagle Protection Act (BGEPA).		

Source: Cornell Lab of Ornithology 2024

One migratory bird species identified during the IPaC review, the bald eagle, has the potential to occur in the Project area. This species is not listed as BCC but warrants attention under the Bald and Golden Eagle Protection Act (BGEPA). Nearby forested areas and waterbodies, especially those associated with the Elm Creek Park Reserve, may provide suitable nesting and foraging sites for the bald eagle. While trees are limited in the Project area, the open land within the Project area could provide suitable wintering/foraging habitat given its proximity to higher quality forests and lakes.

The buildings located within the Project area may provide roosting sites for the chimney swift. The heavily agricultural Project area is unlikely to provide nesting, foraging, and/or migration stopover habitat for the other BCC species presented in Table 14. However, the forests and wetlands in the neighboring Elm Creek Park Reserve may provide suitable habitat for these avian species, resulting in potential flyovers over the Project area.

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.

Impacts Analysis for Native Plant Communities and Sites of Biodiversity Significance

No native plant communities, calcareous fens, MBS sites, or lakes of biological significance are located within the Project area. Native plant communities and MBS sites are located within the Elm Creek Park Reserve which is approximately one-quarter mile east of the Project area, but no impacts would occur in these areas.

Impacts Analysis for State-Listed Species

Big brown bat

Suitable roosting habitat for the big brown bat (trees and buildings) are located within the Project area. The removal of trees and/or the relocation/demolition of buildings may impact this species. Additional stressors to this species include lighting and noise that may disturb individuals roosting nearby.

Increases in extreme weather patterns caused by climate change have the potential to harm big brown bats. For instance, more widespread wildfires and severe thunderstorms can destroy roosting habitat for the species.[59]

Little brown bat

Suitable roosting habitat for the little brown bat (trees and buildings) are located within the Project area. The removal of trees and/or the relocation/demolition of buildings may impact this species. Additional stressors to this species include lighting and noise that may disturb individuals roosting nearby.

Like the big brown bat, the little brown bat's roosting habitat is at risk as a result of destruction by more common wildfires and severe thunderstorms caused by climate change. Besides leading to habitat loss and direct mortality, reproductive success is hindered as a result of decreasing the availability of maternity roost trees for the species.[60]

Blanding's turtle

While wetland complexes are not present within the Project area (only one seasonally flooded wetland was identified in the Project area in July 2024), they are present within one mile of the Project area

[59] Schmitt, Kristen. 2023. Bats feel the effects of climate change. Available at: https://www.batcon.org/bats-feel-the-effects-of-climate-change/. Accessed November 2024.
[60] Schmitt (59)

associated with the Elm Creek Park Reserve and Rush Creek. Female Blanding's turtles are known to travel up to one mile from their home wetland to lay their eggs, so the Project area may provide a potential nesting site for this species. As such, any ground disturbance or equipment/vehicle traffic within the Project area may impact this species.

Climate change is anticipated to impact Blanding's turtles in a variety of ways. Increased temperatures are likely to lead to increased physiological stress and reduced reproductive success, while more extreme precipitation events are likely to impact the availability of wetland habitats for overwintering and foraging.[61]

Trumpeter swan

Suitable habitat for the trumpeter swan (ponds, marshes, lakes, bay, or other large waterbodies) are not present within the Project area. As such, impacts this species as a result of the Project are not anticipated.

The wetlands that trumpeter swans rely on for breeding are at risk as a result of rising temperatures stemming from climate change. Additionally, the National Audubon Society has classified the trumpeter swan as "climate endangered", stating that approximately 67 percent of its current winter range could be lost by 2080.[62,63]

Acadian flycatcher

Suitable habitat for the Acadian flycatcher (large, mature, closed-canopy deciduous forest) is not present within the Project area. As such, impacts on this species as a result of the Project are not anticipated.

Deforestation is a primary threat to the Acadian flycatcher, but warming temperatures may also be a concern. Early studies have found that this species is moderately vulnerable to climate change.[64]

Rusty patched bumble bee

An impacts analysis for the RPBB can be found under the Impacts for Federally-Listed Species section below.

Big tick trefoil

Suitable habitat for the big tick trefoil, mesic hardwood forest, is not present within the Project area. As such, impacts on this species as a result of the Project are not anticipated.

One of the threats to the big tick trefoil is invasive species, such as common buckthorn (*Rhamnus cathartica*), Eurasian honeysuckle (*Lonicera* spp.), and garlic mustard (*Alliaria petiolaris*) that can reproduce quickly and choke out native plants.[65] With an increase in more intense storms and droughts in Minnesota, invasive species are likely to become more dominant and outcompete plants like the big tick trefoil.[66]

[61] Lyons, Marta P., Nikiel, Catherine A., LeDee, Olivia E., and Boyles, Ryan P. 2023. Potential effects of climate change on *Emydoidea blandingii* (Blanding's turtle). USGS Publications Warehouse. 2021-1104. doi: 10.3133/ofr20211104D.
[62] Langham, Gary M., Justin G. Schuetz, Trisha Distler, Candan U. Soykan, and Chad Wilsey. 2015. "Conservation Status of North American Birds in the Face of Future Climate Change." *PLoS One* 10: e0135350. doi: 10.1371/journal.pone.0135350
[63] National Audubon Society. 2016. *The Climate Report: Trumpeter Swan*. http://climate.audubon.org/birds/truswa/trumpeter-swan
[64] North American Bird Conservation Initiative, U.S. Committee. 2010. *The State of the Birds 2010 Report on Climate Change, United States of America*. Washington, DC: U.S. Department of the Interior. http://www.stateofthebirds.org/2010/pdf_files/State of the Birds_FINAL.pdf
[65] Smith (43)
[66] Ratcliffe, Hugh. (2020). Climate Change and Tallgrass Prairies: Exploring the Interaction of Extreme Weather and Invasion in Managed Prairie Systems. Retrieved from the University Digital Conservancy, https://hdl.handle.net/11299/261977.

Impacts Analysis for Federally-Listed Species

Rusty patched bumble bee

The Project area is within an HPZ for the RPBB, and a review of DNR NHIS data identified a record of a RPBB within one mile of the Project area in 2018. However, the Project area primarily consists of agricultural land consisting of corn, soybeans, and yellow nutsedge according to the July 2024 wetland delineation performed by KES. Nectar sources preferred by this species were not identified during this site visit. As such, impacts on the RPBB as a result of the Project are unlikely.

The RPBB is exposed to many stressors, including climate change, which act synergistically. For instance, if the higher temperatures and increased precipitation occurring in Minnesota leads to stress on flowering plants, the RPBB may experience dietary stress. When combined with exposure to insecticides and fungicides, the species has little resilience against pathogens.[67]

Tricolored bat

There is potential for tree removal and building removal within the Project area. Such actions may impact TCB roosting habitat. Additional stressors to this species include lighting and noise that may disturb individuals roosting nearby. Impacts would need to be reassessed if and when a listing status is finalized by the USFWS.

The TCB is susceptible to climate change. For instance, changes in temperature and precipitation could have impacts on habitat availability, prey availability, and reproductive success with more frequent droughts leading to decreased survival and reproduction and more extreme rain events leading to decreased foraging opportunities.[68]

Salamander mussel

Impacts on the salamander mussel are not anticipated due to the lack of suitable habitat (Mississippi River or St. Croix River) within or in the near vicinity of the Project area. Impacts would need to be reassessed if and when a listing status is finalized for this species.

Warming temperatures in Minnesota are warming the freshwater habitats that mussels need to survive. The temperature limits that mussels can withstand is largely unknown, but higher temperatures can make it more difficult for mussels to borrow, resulting in exposure to the air, being swept away to unsuitable habitats, and an inability to escape predators. Feeding, growth, breathing, and reproduction have also been found to be impacted by higher water temperatures.[69]

Western regal fritillary

Impacts on the western regal fritillary are not anticipated due to the lack of suitable habitat (native prairie) within the Project area. The western regal fritillary is proposed to be listed as federally threatened; therefore, impacts should be reassessed if and when a listing status is finalized by the USFWS.

The western regal fritillary relies on violets for their life cycle and their abundance is closely linked to violet density.[70,71] With an increase in more intense storms and droughts in Minnesota, invasive species are

[67] USFWS. 2023. Rusty Patched Bumble Bee. Available at: https://www.fws.gov/species/rusty-patched-bumble-bee-bombusaffinis. Accessed: June 2024.
[68] USFWS. 2022(b). Proposed Rule 87 FR 56381: Endangered and Threatened Wildlife and Plants; Endangered Species Status for Tricolored Bat. Available at: https://www.federalregister.gov/documents/2022/09/14/2022-18852/endangered-and-threatened-wildlife-andplants-endangered-species-status-for-tricolored-bat. Accessed June 2024.
[69] Blevins, Emilie. 2018. Are Freshwater Mussels in Hot Water? The Xerces Society. Available at: https://xerces.org/blog/are-freshwater-mussels-in-hot-water#:~:text=Higher%20water%20temperatures%20can%20stress%20freshwater%20mussels%20by,flows%20that%20can%20wash%20them%20into%20unsuitable%20habitat.. Accessed June 2024.
[70] Debinskl, D. M., & Kelly, L. 1998. Decline of Iowa populations of the regal fritillary (*Speyeria idalia*) Drury. *Journal of the Iowa Academy of Science: JIAS*, *105*(1), 16-22.
[71] Beilfuss, K. G., & Harrington, J. A. (2001). Distribution patterns of the Regal Fritillary butterfly (*Speyeria idalia* Drury) within a Wisconsin dry

likely to become more dominant and push violet numbers down, thus furthering the decline of western regal fritillary habitat.[72]

Monarch butterfly

Given the wide range of habitats the monarch butterfly can occupy, it may occur within the Project area, especially if milkweed is present. The monarch butterfly is a candidate for federal listing; therefore, impacts should be reassessed if and when a listing status is finalized by the USFWS.

As discussed in Item 7, climate change is anticipated to result in increasing temperatures in Minnesota, which may increase the number of days and the area in which monarch butterfly populations would be exposed to unsuitably high temperatures. This can result in this species using up fat stores too quickly and may result in a misjudgment of when to enter and exit states of diapause (dormancy).[73]

Whooping crane

Impacts on the whooping crane are not anticipated due to the lack of suitable habitat (coniferous forest or prairie) within the Project area. The Project area is also not within the range of the wild population of whooping crane; any unlikely occurrences of this species within the Project area would likely be from the unregulated experimental population based in Wisconsin.

Based on models that consider various climate factors, it has been predicted that climate change may impact the juvenile recruitment and population growth of the whooping crane. For instance, increased precipitation during fall migration and the breeding season indicated lower recruitment and increased atmospheric carbon dioxide indicated lower population growth rates and recruitment.[74]

Impacts Analysis for Migratory Birds

Construction activities and development within the Project area may result in impacts on migratory birds. Impacts may occur as a result of ground disturbance, vegetation removal, tree clearing, and/or other disturbances in the vicinity of a nest. Most migratory bird nesting activity in Minnesota occurs from approximately May 15 to August 1. Based on the IPaC species review (Appendix F), the fifteen migratory bird species listed as USFWS BCC and one eagle species with the potential to occur in the Project area are most likely to be breeding in Minnesota from March 15 to October 10. This comes with the exception of the bald eagle that is most likely to be present from December 1 to August 31, as well as the lesser yellowlegs, ruddy turnstone, and rusty blackbird that breed elsewhere. If construction activities occur within vegetated areas of the Project area, it may result in impacts for these and other migratory birds, eggs, young, and/or active nests if conducted during the bird nesting timeframe in Minnesota.

Impacts Analysis for Urban Wildlife

Urban wildlife may be impacted by the development of the Project area, such as through the removal of trees and wetlands. Additionally, lighting and noise associated with construction and/or operation of the Project have the potential to negatively impact wildlife. These species are generally adaptable to change and would likely relocate to other undeveloped areas.

Invasive Species

Noxious weeds and invasive species in Minnesota are managed through the Minnesota Department of Agriculture (MDA) under Minnesota Statutes Section 18.78, the DNR, and local ordinances. Best management practices (BMPs) during construction activities and operation within the Project area should

prairie remnant. In Proc N Am Prairie Conference (Vol. 17, pp. 191-196).
[72] Ratcliffe (66)
[73] Kobilinksy, Dana. 2019. Watch: Temperature Drives Internal Clock for Monarchs. The Wildlife Society. Available at: https://wildlife.org/watch-temperature-drives-internal-clock-for-monarchs/. Accessed June 2024.
[74] Butler, M. J., Metzger, K. L., & Harris, G. M. 2017. Are whooping cranes destined for extinction? Climate change imperils recruitment and population growth. *Ecology and Evolution*, *7*(8), 2821-2834.

be implemented to minimize the introduction or spread of noxious weeds and invasive species. These practices include cleaning vehicles and equipment of mud and dirt, removing seeds that attach to clothing or equipment, minimizing soil disturbance, not moving potentially contaminated materials between sites, and staying on designated roads/trails.[75, 76]

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 followings measures are required to minimize the potential for impacts to the Blanding's turtle:

- Avoid wetland and aquatic impacts during the hibernation season, between September 15 and April 15, if the area is suitable for hibernation.
- The Blanding's turtle flyer must be given to all contractors working in the Project area (Appendix F).
- Turtles which are in imminent danger should be moved from the Project area, by hand, out of harm's way. Turtles which are not in imminent danger should be left undisturbed.
- Install and maintain a temporary turtle proof barrier, such as silt fence, to keep turtles out of soil stockpiles, gravel pads, and other areas of exposed soil, sand, or sediment during the nesting season (May 15 to July 15). The turtle proof barrier must be buried a minimum of ten inches and removed once construction is complete.
- Trenches should be checked every morning before construction activities begin and immediately prior to pits/trenches being backfilled.
- Limit erosion and sediment control to wildlife-friendly erosion control devices.
- Avoid hydro-mulch products that contain materials with synthetic (plastic) fiber additives, as the fibers can re-suspend and flow into waterbodies.
- Sightings of any rare species during construction of activities should be reported to the DNR Nongame Wildlife specialist and the Proposer would follow the guidance that is received to avoid impacts.
- Culverts between wetland areas and nesting areas should be 36 inches or greater in diameter, and elliptical or flat-bottomed.
- Roads should be kept to minimum standards on widths and lanes (this reduces road kills by slowing traffic and reducing the distance turtles need to cross).
- Roads should be ditched, not curbed or below grade. If curbs must be used, install wildlife friendly curbs to allow turtles to leave the road. Gutters and stormwater inlets should be designed to prevent turtles from entering the stormwater sewer. Reference "Curb Design and Small Animals (Chapter 1, Page 24) in Best Practices for Meeting DNR General Public Waters Work Permit GP 2004-0001 (https://files.dnr.state.mn.us/waters/watermgmt_section/pwpermits/gp_2004_0001_chapter1.pdf).
- Utility access and maintenance roads should be kept to a minimum to reduce road-kill potential.

Other avoidance, minimization, and mitigation measures that should be implemented to the extent feasible include:

- It is recommended that inspections for bats be conducted prior to the demolition/relocation of buildings within the Project area.
- Tree removal should avoid the bat pup rearing season from June 1 through August 15. If feasible,

[75] USDA National Invasives Species Information Center. undated-b. Best Management Practices. Available at: https://www.invasivespeciesinfo.gov/subject/best-management-practices. Accessed September 2024.
[76] DNR. 2024(c). Terrestrial Invasive Species. Available at: https://www.dnr.state.mn.us/invasives/terrestrial/index.html. Accessed September 2024.

conduct tree removal during the bat inactive season from November 15 to March 31.

- Native seed should be considered in revegetation plans within the Project area for areas not proposed to be mowed turf grass or impervious surface in order to provide suitable habitat for pollinator species, such as the RPBB and monarch butterfly, and to prevent the spread of invasive species and noxious weeds. Utilizing native seed mixes in revegetation plans may create a net positive in pollinator habitat compared to existing conditions.
- Herbicide, fungicide, and insecticide use within the Project area should be minimized to the extent practicable. If the application of these products is necessary during construction or operation within the Project area, then application should be limited to targeted outbreaks and would be targeted toward the nuisance species.
- Invasive species prevention measures should be implemented during construction to prevent the movement of invasive species on trucks, heavy equipment, off-highway vehicles, and equipment and tools to reduce the likelihood of introducing invasive species from off site. Measures may include requiring contractors and others working on site to arrive and leave with clean equipment free of visible plants, seeds, mud, and dirt clods. Other measures may include using weed-free seed and mulch products and avoiding the re-use of the top six inches of stockpiled materials (mulch, soil, gravel) that may contain more weed seeds.

15. Historic Properties

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

To understand the archaeological context and previously conducted archaeological work within the Project area, Stantec reviewed the Minnesota State Historic Preservation Office (MnSHPO) previous survey report data as well as the Office of the State Archaeologist (OSA) Portal and the Minnesota State Historic Inventory Portal in November 2024. The literature search focused on previously identified cultural resources (archaeological sites and architectural properties) within or adjacent to the Project area. In addition, Stantec reviewed archival resources including General Land Office (GLO) maps, county atlases, the University of Minnesota Borchert Map Library, Trygg maps, and historical aerial imagery to identify potential cultural features in the Project area. The results of the literature review are provided in the associated survey report titled *An Archaeological Reconnaissance Survey of the DCM Farms Project* (Witt 2025) and summarized in relation to anticipated Project effects below.

The MnModel, available on the OSA online portal, shows that the Project is located largely within a well surveyed area with low site potential; however, smaller sections are mapped within a poorly surveyed area with unknown site potential and a well surveyed area with high site potential.

No previously conducted archaeological surveys overlap with the Project area. No previously recorded archaeological sites are located within or adjacent to the Project area. No previously identified burial sites/cemeteries are recorded within or adjacent to the Project area. No previously identified above-ground historic resources are recorded within or adjacent to the Project area.

As portions of the Project area yielded a high potential for archaeological sites, Stantec conducted an archaeological reconnaissance survey of the entire Project area on November 7, 2024. While an occupied residence and a farmstead with extant structures were identified in the Project area, the structures were not recorded as archaeological sites as no cultural materials were found in association.

No previously identified above ground historic resources within 1-mile of the Project area are listed on or eligible for the National Register of Historic Places (NRHP) based on the desktop review. During the Phase I Archaeological Survey, previously uninventoried structures, including an occupied residence and a farmstead with extant buildings, were identified within the Project area. No Project work is proposed to the occupied

residence, which lacks sufficient age for NRHP consideration. The farmstead and extant buildings are proposed to be demolished for the Project. Stantec recommends that the farmstead and extant buildings lacks sufficient integrity and significance to be listed in the NRHP.

Stantec recommends that no properties listed in the National or State Registers of Historic Places and no known or suspected archaeological properties in the area that will be affected by the Project. The survey report and Project review request was submitted to the MnSHPO for review on December 10, 2024. No further work is recommended should the Project proceed as planned. MnSHPO provided a response letter on January 3, 2024 concurring with a determination of no properties listed in the National or State Registers of Historic Places, or within the Historic Sties Network, will be affected by the Project. MnSHPO also determined that there are no known or suspected archaeological resources in the area that will be affected by the Project. Appendix G provides the MnSHPO concurrence letter.

Item 15 Mitigation Strategies

Archaeology

- Should archaeological materials be encountered during the construction of the Project, a professional archaeologist will be consulted. Similarly, if human remains are encountered during development, all work will stop and local law enforcement will be notified.
- Should the Project require federal financial assistance, or requires a federal permit or license, a Section 106 review would be required along with consultation with the MnSHPO.

Architectural

- Based on the preliminary desktop review, a historic architectural property survey was not recommended at this time. Should the Project require federal financial assistance, or requires a federal permit or license, a Section 106 review would be required along with consultation with the MnSHPO.

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 current land use in the Project area and adjacent properties consist primarily of agricultural and single family and attached residential homes, as well as a golf course, a retail area, and some undeveloped land. The Project area currently consists of an agricultural field with a farmstead along the southern border and a single-family home in the far northwest corner. The existing single family home in the northwest corner would remain post-construction of the Project. No designated scenic views or vistas are present in the vicinity of the Project area. The landscape immediately surrounding the Project area is currently being developed as low density and medium density residential uses. The primary visual impact would be the transition of views from agriculture to a primarily residential development with stormwater ponds and a few commercial, and retail facilities in the southeast. The Project would not include industries that would emit vapor plumes.

The Project would be required to adhere to the City of Dayton's ordinance requirements including building height and form, landscape screening, and lighting. The proposed Project would be consistent with the surrounding residential and commercial buildings and with the planned land uses in the area.

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 does not propose heavy or light industrial uses that would have the potential to generate significant air emissions. The Project includes some potential commercial uses. These facilities may utilize natural gas and electric-powered equipment, which would emit low levels of greenhouse gas emissions (GHG) as well as hazardous air pollutants (HAPs) and criteria pollutants, such as nitrogen oxides (NOx), carbon monoxide (CO), sulfur dioxide (SO2), and particulate matter (PM). An inventory of potential electric and natural gas equipment to be installed as part of future development within the Project area is not known at this time. Generally, air emissions associated with commercial uses are relatively insignificant. It is not anticipated that the Project would require an air permit. However, future tenants would be responsible for confirming air permit applicability or exemption determinations based on the equipment to be installed with the facility prior to initiating construction.

The Project includes a gas station/convenience store with fuel pumps and would require the installation of underground fuel storage tanks. Gasoline and diesel fuel storage tanks generate low quantities of working and evaporative losses of volatile organic compounds (VOCs) and HAPS, typical of all retail fuel stations. Emissions primarily occur during vehicle fueling. Gasoline dispensing facilities are required to install vapor recovery systems to minimize emissions during tanker unloading.

A detailed quantitative analysis of stationary source emissions is not possible at this time. However, general estimates of potential emissions arising from the gas station operations and natural gas heating for the planned square footage of the development can be estimated. Table 15 presents estimated maximum potential emissions from the Project.

Table 15: Maximum Potential Emissions from Gas Station Fueling and Heating the Proposed Development

Pollutant	Emissions (tpy)		
	Gas Station	Heating	Total
PM	0.00	0.01	0.01
PM_{10}	0.00	0.01	0.01
$PM_{2.5}$	0.00	0.01	0.01
SO_2	0.00	9.28E-04	9.28E-04
NO_x	0.00	0.15	0.15
VOC	17.67	0.01	17.67
CO	0.00	0.13	0.13
Lead	0.00	7.73E-07	7.73E-07
Mercury	0.00	4.02E-07	4.02E-07
HAPS	Unknown	2.92E-03	2.92E-03

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.

Motorized vehicles affect air quality by emitting air borne pollutants. The changes in traffic volumes, travel patterns, and roadway access could affect air quality by changing the number of vehicles and the congestion levels in the Project area. Criteria pollutants identified by the U.S. Environmental Protection Agency (EPA) are ozone (O3), particulate matter (PM), carbon monoxide (CO), nitrogen dioxide (NO2), lead (Pb), and sulfur dioxide (SO2). The Project area is not located in an area of nonattainment or maintenance area for any of the criteria pollutants. The Project area is in attainment for all criteria pollutants. The Project would not include transportation improvement projects that would be considered regionally significant per 40 CFR Part 93. Therefore, no further air quality analysis is warranted.

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 dust or odors during operation but may generate temporary dust and odors during construction. Sensitive receptors would include residential developments to the west and south of the Project area, as well as a few single family residences to the north and east of the Project area.

Potential odors would likely be associated with exhaust from diesel engines and fuel storage. Dust generated during construction would be minimized through standard dust control measures such as applying water to exposed soils and limiting the duration of exposed soils to the extent possible. Construction contractors would be required to comply with the City's Ordinance requirements including but not limited to Title XV, Chapter 151 Land Disturbance and Erosion and Sediment Control[77] requirements. Dust levels, after construction is complete, would be minimal as all surfaces will be paved or revegetated. With these mitigation measures in place, the quality of life for nearby residences is not anticipated to be affected.

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 Greenhouse Gas (GHG) emissions for the Project were calculated using the Simplified Greenhouse Gas Emissions Calculator (SGEC) tool and are based on the methodologies for developing a carbon footprint described in Minnesota Environmental Quality Board's (EQB's) EAW Guidance (June 2024).

Table 15 shows the emission categories for the proposed Project's carbon footprint calculations, as provided in the EQB Guidance.

Table 16. Emission Categories for Carbon Footprint

Category	Scope	Project Phase	Type of Emissions
Direct Emissions	Scope 1	Construction	Combustion (Mobile Sources)
	Scope 1	Operations	Combustion (Mobile Sources)
	Scope 1	Operations	Combustion (Stationary Sources)
Indirect Emissions	Scope 2	Operations	Off-site Electricity
	Scope 3	Operations	Off-site Waste Management

A description of the carbon footprint associated with the proposed Project is provided below.

Construction Emissions

GHG emissions from construction of the Project are associated with fuel combustion in the mobile construction equipment and on-road vehicles. For on-road vehicles (commuting construction workers, dump trucks and semi-trucks), emissions are calculated by estimating the number of vehicles, miles

[77] American Legal Publishing eCode ALP, 2024. *CHAPTER 151: LAND DISTURBANCE AND EROSION AND SEDIMENT CONTROL.* Available at: https://codelibrary.amlegal.com/codes/daytonmn/latest/dayton_mn_code/0-0-0-3829. Accessed December 2024.

traveled (estimated to be 20 miles per day for workers, 60 miles per day for heavy duty trucks), gallons of fuel used (using default mileage rates), and emission factors from the EPA's Emission Factors Hub[78].

For off-road vehicles, the quantity and horsepower of cranes, backhoes, loaders, bulldozers, excavators, and skid steers was estimated based on other similar development projects. The default fuel consumption rate of 0.05 gallons per horsepower-hour[79] is used to determine the fuel usage for all equipment. Similar to the on-road vehicles, emission factors from the Emission Factors Hub are used to calculate GHG emissions.

Per EQB's Revised EAW Guidance, total construction emissions are divided by the lifetime of the Project, estimated to be 50 years.

Operational Emissions – Mobile Sources

Average daily trips associated with each scenario are provided in Table 16.

Table 17. Average Trips per Day

Project Vehicle Types[1]	Trips /Day
Residential	2,518
Retail/Office/Daycare/Food Services	6,698
Delivery Vehicles	1,674

[1] Estimated based on traffic study in Item 21. Assumed 20% of non-residential vehicles are delivery vehicles.

For the Project, it is conservatively estimated that daily trips take place for 365 days a year for residential and 260 days per year (5 days per week, 52 weeks per year) for all other building types. The daily commute for workers is estimated to be 30 miles round trip. The same distance is assumed for heavy duty shipping trucks, 30 miles per trip.

Gas mileage for light duty vehicles (residents and workers) is estimated based on the U.S. Department of Transportation's Bureau of Transportation Average Fuel Efficiency for Light Duty Vehicles. Delivery trucks are assumed to be heavy-duty diesel trucks. Gas mileage for the diesel trucks is based on U.S. Department of Transportation, Federal Highway Administration data from 2022. GHG emissions associated with these trips are calculated using the Emission Factors Hub.

Operational Emissions – Stationary Combustion

The projected natural gas usage for the buildings associated with the Project is estimated using the U.S. Energy Information Administration's Commercial Buildings Energy Consumption Survey (CBECS, 2018). The CBECS provides natural gas intensities in standard cubic feet per square foot per year for several different building activity categories. Natural gas combustion GHG emissions are calculated using emission factors from the Emission Factors Hub.

Operational Emissions – Offsite Electricity Production

Similar to natural gas usage, electricity needs for the proposed buildings are estimated using the CBECS, which provides electricity usage intensity in kilowatt-hours per square foot of building space per year. GHG emissions occur offsite (Scope 2) when the electricity is generated. The SGEC tool calculates GHG emissions from electricity generation on a regional basis (defined by EPA using data from the EIA and the North American Electric Reliability Corporation (NERC)), using average emission factors based on the mix of fuels used to generate the electricity in each region. For the Project, the Midwest Reliability Organization West (MROW) region is used. The electricity generation in MROW is comprised of approximately 50 percent fossil fuels (coal and natural gas), 9 percent nuclear and approximately 40

[78] EPA, Emission Factors Hub. Accessed November 2024. https://www.epa.gov/climateleadership/ghg-emission-factors-hub
[79] CEQA. Based on South Coast Air Quality Management District CEQA Air Quality Handbook, Table A9-3E.

percent renewables (hydro, wind, and solar).

Operational Emissions - Waste Management

GHG emissions from waste management for the Project are associated with the waste generation estimates and how that waste is handled. For the Project, waste generation rates were used based on the CalRecycle's Estimated Solid Waste Generation Rates[80]. Table 18 below details the rates and total waste yields for each type of development. The Project yields a total of 886 tons of waste per year.

Table 18. Project Waste Estimations

Project Development Types	Waste Generation Factor	Annual Waste
Residential	12.23 pounds/unit/day	596 tons/year
Retail	0.046 pounds/square foot of building/day	100 tons/year
Convenience Store	0.046 pounds/square foot of building/day	84 tons/year
Corporate Offices/Bank	0.006 pounds/square foot of building/day	9 tons/year
Daycare	0.007 pounds/square foot of building/day	7 tons/year
Restaurant	1 pound/seat/day	63 tons/year
Coffee Shop	1 pound/seat/day	27 tons/year

GHG emissions for each waste management type are estimated based on emission factors from the EPA's Waste Reduction Model (WARM).

Summary

A summary of GHG emissions is provided in Table 18. Emissions are presented in tons per year of carbon dioxide equivalent, which takes into account each GHG's global warming potential (GWP). Detailed emission calculations are provided in Appendix H.

Table 19. GHG Emissions Summary (CO2e in short tons per year)

Scope	Source	Project Emissions
Direct Emissions		
Scope 1	Construction – Mobile Sources[1]	474
Scope 1	Operations – Mobile Sources	51,246
Scope 1	Operations – Stationary Combustion	1,612
Indirect Emissions		
Scope 2	Operations – Purchased Electricity	4,684
Scope 3	Off-Site Waste Management	461
Atmospheric Removals of GHGs		
Scope 1 - Sinks	Land Use (CO2 Removals to Terrestrial Storage)	96
Total		**58,477**

[1]*Note that construction emissions are annualized over the life of the project, estimated to be 50 years.*

[80] CalRecycle (27)

b. GHG Assessment

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

The following possible activities may be considered to help mitigate the Project's GHG emissions:

- Maintaining as many existing trees as possible.
- Energy-efficient lighting in buildings and parking lots.
- Use of energy-efficient building materials.
- Installation of energy-efficient appliances, windows and heating, ventilation, and air conditioning (HVAC) units.
- Use of programmable thermostats.
- Use of renewable energy sources and electric/hybrid vehicles.
- The City would work with Proposer during the Project planning and permitting processes to encourage opportunities to incorporate renewable energy when feasible.

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

Use of energy-efficient building materials and lighting was selected as opportunities to reduce GHG emissions. These options allow for flexibility in planning.

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 lifetime for the Project is estimated at 50 years. Thus, the conservative estimate of lifetime emissions associated with the Project is approximately 2,923,830 tons. The Project's GHG emissions would have minimal effect on the State of Minnesota's or the local area's GHG reduction goals.

The City would work with the Proposer during the project planning and permitting processes to encourage opportunities to incorporate renewable energy when feasible.

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.

1) Existing noise levels/sources in the area

Existing noise sources include vehicle traffic along County Road 202, Fernbrook Lane, 113th Avenue North, and other connecting local roadways. Other existing noise sources would include noise generated by agricultural operations and equipment to the north and east of the Project area.

2) Nearby sensitive receptors

The majority of the Project area consists of agricultural land. Nearby sensitive receptors would include residential developments to the north, west, and south of the Project area.

3) Conformance to State noise standards

The State of Minnesota's noise rules (Minn. Rules Ch. 7030)[81] establish noise limits by noise area

[81] More information on Minnesota Noise rules, Minn. Rules Ch. 7030, may be found at: https://www.pca.state.mn.us/sites/default/files/p-gen6-01.pdf

classifications (NACs) based on land use at the location of the person that hears noise. Table 19 identified state noise standards for each NAC.

The L10 calculation is the noise level that is exceeded for 10 percent, or 6 minutes, of the hour, and the L50 calculation is the noise level exceeded for 50 percent, or 30 minutes, of the hour. There is no limit on maximum noise.

The statutory limits for a residential location are L10 = 65 dBA and L50 = 60 dBA during the daytime (7:00 a.m. – 10:00 p.m.) and L10 = 55 dBA and L50 = 50 dBA during the nighttime (10:00 p.m. – 7:00 a.m.). This means that during the one-hour period of monitoring, daytime noise levels cannot exceed 65 dBA for more than 10 percent of the time or 60 dBA more than 50 percent of the time.

Table 20. Noise Area Classifications

NAC	Common land use associated with the Noise Area Classification	Daytime (dBA)		Nighttime (dBA)	
		L_{10}	L_{50}	L_{10}	L_{50}
1	Residential housing, religious activities, camping and picnicking areas, health services, hotels, educational services	65	60	55	50
2	Retail, business and government services, recreational activities, transit passenger terminals	70	65	70	65
3	Manufacturing, fairgrounds and amusement parks, agricultural and forestry activities	80	75	80	75

NACs are based on the land use at the location of the person who hears the noise, which does not always correspond with the zoning of an area. Therefore, noise from an industrial facility near a residential area is held to the NAC 1 standards if it can be heard on a residential property.

Given that the Project proposes residential and commercial uses, it is not anticipated that the Project would generate operational noise that would exceed state noise standards.

4) Quality of life

Varying degrees of noise can be expected during the construction period. Anticipated noise sources are primarily construction equipment and normal construction activities. Table 21 below highlights the estimated noise levels for typical construction equipment.

Table 21. Estimated Noise for Typical Construction Equipment

Equipment	Impact Device (Yes/No)	Spec 721.560[1] Lmax dBA[2]	Actual Lmax dBA[2]	No. of Actual Data Samples
Backhoe	No	80	78	372
Front loader	No	80	79	96
Dozer	No	85	82	55
Dump truck	No	84	76	31
Excavator	No	85	81	170
Grader	No	85	N/A	0
Scraper	No	85	84	12
Impact Pile driver	Yes	95	101	11

[1]Construction Noise Control Specification 721.560, Central Artery/Tunnel Project, Massachusetts Turnpike Authority, Boston, MA, 2002.
[2]Noise levels listed represent the A-weighted maximum sound level (Lmax), measured at a distance of 50 feet from the construction equipment.

High impact noise, such as pile driving, may be required during construction. Pile driving equipment results in the highest peak noise level. High impact noise construction activities would be limited in duration to the greatest extent possible and avoided during night-time hours. Mitigative measures would include standard mufflers on engine driven equipment and possible ear protection as necessary for workers engaged in demolition or other short-term noise intensive activities.

A minimal increase in noise is expected during operation of the commercial development, however, given that the proposed use is office/retail/food services/daycare, operational noise is anticipated to be minimal. Traffic generated by the Project is not expected to generate noise to a degree with would exceed noise standards or diminish quality of life for individuals living or working in the surrounding area.

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.

1) Existing and proposed parking spaces

Currently, there are no formal parking areas within the Project area. Future commercial uses would be required to comply with parking requirements pursuant to Section 1001.19 of the City of Dayton's Zoning and Subdivision Ordinance.

2) Estimated total average daily traffic generated

Total average daily traffic generated by the Project is estimated to be 10,890 trips per day.

3) Estimated maximum peak hour traffic generated and time of occurrence

The estimated maximum peak hour traffic generated by the Project is estimated to be 1,123 trips during the a.m. peak hour (7:30 a.m. to 8:30 a.m.).

4) Source of trip generation rates

Trip Generation, Eleventh Edition, published by the Institute of Transportation Engineers was used to develop trip generation estimates.

5) Availability of transit and/or other alternative transportation modes

No transit routes are present in the vicinity of the Project area. A multi-use trail exists on the south side of Rush Creek Parkway.

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.

A complete Traffic Impact Study with existing and future volumes is included in the Appendix. This appendix includes relevant figures including existing traffic volumes, future peak traffic volumes, proposed development layout, and access locations.

The study examined weekday a.m. and p.m. peak hour traffic impacts of the proposed project at the

following intersections:

- Fernbrook Lane/117th Avenue
- Fernbrook Lane/114th Avenue
- Fernbrook Lane/Rush Creek Parkway
- 117th Avenue/E. French Lake Road
- Territorial Road/Rush Creek Parkway

Capacity analysis results are presented in terms of level of service (LOS), which is defined in terms of traffic delay at the intersection. LOS ranges from A to F. LOS A represents the best intersection operation, with little delay for each vehicle using the intersection. LOS F represents the worst intersection operation with excessive delay. In accordance with MnDOT traffic study guidelines, this analysis used the LOS D/E boundary as an indicator of acceptable traffic operations. Table 22 and Table 23 summarize the results of the intersection operations analysis for the year 2030 and 2040 conditions, respectively.

Table 22.Year 2030 No Build and Build Intersection Operations Analysis

Intersection	Traffic Control	2030 No Build LOS		2030 Build LOS	
		AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
Fernbrook Ln/117th Ave	EB/WB stop	A/C	A/F	A/C	A/F
Fernbrook Ln/114th Ave	Roundabout	A/A	A/B	A/B	A/B
Fernbrook Ln/Rush Creek Pkwy	EB/WB stop	B/F	E/F	F/F	F/F
117th Ave/E. French Lake Rd	All-way stop	A/A	A/A	A/A	A/A
Territorial Rd/Rush Creek Pkwy	WB stop	A/A	A/A	A/A	A/B

Note: Level of service results presented with overall intersection LOS followed by worst movement LOS.

2030 No-Build

All intersections operate at LOS B or better during the a.m. peak hour. At Fernbrook Lane/Rush Creek Parkway, the westbound movements operate at LOS F. All other movements operate at LOS D or better.

During the p.m. peak hour, all intersections except Fernbrook Lane/Rush Creek Parkway operate at LOS A. Fernbrook Lane/Rush Creek Parkway operates at LOS E. At Fernbrook Lane/Rush Creek Parkway, the eastbound left turn/through and westbound movements operate at LOS F. At Fernbrook Lane/117th Avenue, the eastbound left turn/through operate at LOS F and westbound movements operate at LOS E. All other movements operate at LOS B or better.

2030 Build

All intersections except Fernbrook Lane/Rush Creek Parkway operate at LOS A during the a.m. peak hour. Fernbrook Lane/Rush Creek Parkway operates at LOS F. At Fernbrook Lane/Rush Creek Parkway, the eastbound left turn/through and westbound movements operate at LOS F. All other movements operate at LOS C or better.

During the p.m. peak hour, all intersections except Fernbrook Lane/Rush Creek Parkway operate at LOS A. Fernbrook Lane/Rush Creek Parkway operates at LOS F. At Fernbrook Lane/Rush Creek Parkway, the eastbound left turn/through and westbound movements operate at LOS F. At Fernbrook Lane/117th Avenue, the eastbound left turn/through movements operate at LOS F and westbound movements operate at LOS E. All other movements operate at LOS C or better.

Table 23. Year 2040 No Build and Build Intersection Operations Analysis

Intersection	Traffic Control	2040 No Build LOS		2040 Build LOS	
		AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
Fernbrook Ln/ 117th Ave	EB/WB stop	A/C	A/**F**	A/D	A/**F**
Fernbrook Ln/ 114th Ave	Roundabout	A/A	A/B	A/B	A/B
Fernbrook Ln/Rush Creek Pkwy	EB/WB stop	C/**F**	**F/F**	**F/F**	**F/F**
117th Ave/E. French Lake Rd	All-way stop	A/A	A/A	A/A	A/A
Territorial Rd/Rush Creek Pkwy	WB stop	A/A	A/A	A/A	A/B

Note: Level of service results presented with overall intersection LOS followed by worst movement LOS.

2040 No-Build

All intersections operate at LOS C or better during the a.m. peak hour. At Fernbrook Lane/Rush Creek Parkway, the eastbound left turn/through movements operate at LOS E and the westbound movements operate at LOS F. All other movements operate at LOS C or better.

During the p.m. peak hour, all intersections except Fernbrook Lane/Rush Creek Parkway operate at LOS A. Fernbrook Lane/Rush Creek Parkway operates at LOS F. At Fernbrook Lane/Rush Creek Parkway, the eastbound left turn/through and westbound movements operate at LOS F. At Fernbrook Lane/117th Avenue, the eastbound left turn/through movements operate at LOS F and westbound movements operate at LOS E. All other movements operate at LOS B or better.

2040 Build

All intersections except Fernbrook Lane/Rush Creek Parkway operate at LOS A during the a.m. peak hour. Fernbrook Lane/Rush Creek Parkway operates at LOS F. At Fernbrook Lane/Rush Creek Parkway, the eastbound left turn/through and westbound movements operate at LOS F. All other movements operate at LOS D or better.

During the p.m. peak hour, all intersections except Fernbrook Lane/Rush Creek Parkway operate at LOS A. Fernbrook Lane/Rush Creek Parkway operates at LOS F. At Fernbrook Lane/Rush Creek Parkway, the eastbound left turn/through and westbound movements operate at LOS F. At Fernbrook Lane/117th Avenue, the eastbound left turn/through and westbound movements operate at LOS F. All other movements operate at LOS C or better.

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

Based on the traffic forecasts and operations analysis for each intersection, the following mitigation measures are recommended:

- Fernbrook Lane/117th Avenue - Monitor intersection operations as additional development occurs to determine if intersection control changes are needed.
- Fernbrook Lane/114th Avenue - Construct intersection with roundabout control.
- Fernbrook Lane/Rush Creek Parkway – Install traffic signal control or roundabout control.
- 117th Avenue/E. French Lake Road – No improvements needed.
- Territorial Road/Rush Creek Parkway – No improvements needed.

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.

Construction of the Project is anticipated to begin in the summer of 2025 and be completed by the summer of 2027. The construction timeline is subject to change and would ultimately be driven by market demand.

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 following resources were used to complete review of any reasonably foreseeable future projects near the Project area, and the interaction of potential environmental effects:

- Minnesota EQB Environmental Review Projects Database[82] (accessed November 19, 2024)
- City of Dayton Development Map[83] (accessed November 19, 2024)
- City of Dayton Current EAWs[84] (accessed November 19, 2024)
- City of Dayton City Park Improvements[85] (accessed November 19, 2024)
- City of Maple Grove Development Projects Map[86] (accessed November 19, 2024)
- Hennepin County Transportation Studies and Future Projects[87] (accessed November 19, 2024)

EQB Projects Database

A review of the EQB's project database identified one project currently completing the State environmental review processes in the City of Dayton.

The Parkway Neighborhood

- *Development Location:* The project is located southwest of I-94 and Dayton Parkway in the City of Dayton, approximately two miles southwest from the DCM Farms Project area.
- *Project Description:* The Parkway Neighborhood is a residential development proposed on approximately 67.29 acres. The project will include 650 medium/high-density residential units and a commercial parcel with a convenience store, gas station/car wash, and service retail building(s). The project would include a connection to the Rush Creek Regional Trail, a recreational area, internal roads, parks, and stormwater features.
- *Schedule:* Project construction is anticipated to be completed in several phases beginning in the fall of 2024 and lasting approximately 5 years.

City of Dayton Developments

Brayburn Trails

- *Development Location:* The project is located south of 117th Avenue N and east of E French Lake Rd in the City of Dayton. The southeast corner of the Brayburn Trails neighborhood touches the

[82] EQB, undated. *Environmental Review Projects Interactive Map*. Available at: https://pca-gis02.pca.state.mn.us/EQB/. Accessed November 2024.
[83] City of Dayton, 2022(b). *Development Map*. Available at: https://cityofdayton.wpenginepowered.com/wp-content/uploads/2019/07/Developments-Map-2022.pdf. Accessed November 2024.
[84] City of Dayton, undated. *EAW Page*. Available at: https://cityofdaytonmn.com/resources/eaw/ Accessed November 2024.
[85] City of Dayton, 2024(b). *Park Improvement Projects*. Available at: https://cityofdaytonmn.com/city-projects/park-improvement-projects/. Accessed November 2024.
[86] City of Maple Grove, 2024. *Development Projects Interactive Map*. Available at: https://storymaps.arcgis.com/stories/beb22deee5ee41e0b6b249b79b465e6d Accessed November 2024.
[87] Hennepin County, undated. *Studies and Future Projects*. Available at: https://www.hennepin.us/residents/transportation/studies-future-projects. Accessed November 2024.

northwest corner of the DCM Farms Project area.

- *Project Description:* The project is a residential development consisting of 256 single-family homes.
- *Schedule:* Under construction

Sundance Greens

- *Development Location:* The project is located south of 113th Ave N and west of Fernbrook Lane N in the City of Dayton. It borders the southern boundary of the DCM Farms Project area.
- *Project Description:* The project is a residential development.
- *Schedule:* Under construction

Brayburn East

- *Development Location:* The project is located south of 117th Ave N and east of the Brayburn Trails neighborhood in the City of Dayton. It borders the northern boundary of the DCM Farms Project area.
- *Project Description:* The project is a residential development.
- *Schedule:* Under construction

Area 21 Park

- *Development Location:* The project is located south of 117th Ave N and is an assemblage of lots from 4 developments including Brayburn Trails, Brayburn East, Sundance Greens, and the DCM Farms proposed Project.
- *Project Description:* The proposed project is the development of a neighborhood park including features such as a play area, sport courts, a ball field, trails, and native prairie open space.
- *Schedule:* Construction is anticipated to begin in April 2025 with completion anticipated by October 2025.

Dayton Mixed-Use

- *Development Location:* The project is located north of County Road 81 near the future intersection of French Lake Road W and Dayton Parkway, in the City of Dayton, approximately one and a quarter mile west from the DCM Farms Project area.
- *Project Description:* The project includes development of five commercial buildings totaling 130,00 square feet and one 200,000 square foot industrial building on approximately 28.81 acres. The project would include access road improvements, parking areas, and stormwater improvements.
- *Schedule:* Construction is anticipated to begin in 2024 and last several years.

City of Maple Grove Developments

Rush Hollow

- *Development Location:* The project is located north of County Road 81 and west of Fernbrook Lane N, in the City of Maple Grove, approximately three quarters of a mile south of the DCM Farms proposed Project.
- *Project Description:* The project includes development of 234 detached homes, 230 townhomes, and 110 senior living apartments on 148 acres of land. The development will also include new roads, trails, stormwater management, and connection to city utilities.
- *Schedule:* The project is currently under construction.

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.

Agricultural Land

The Project would convert existing agricultural land to a primarily residential development with a small commercial development. Planned developments in surrounding areas may also convert agricultural land to other land uses. The City of Dayton guides development through the City's land use plan and zoning codes. The Project is mostly consistent with the City's 2040 Comprehensive Plan, which identifies the Project area and adjacent properties for future residential development. An amendment to the 2040 Comprehensive Plan would be made to include the commercial area proposed in the southeastern corner of the Project area. The Project area would also be rezoned from agricultural district to single family and attached residential. The City of Dayton through their land use policies and zoning requirements, regulates future development and can protect agricultural land from future development as appropriate. Therefore, adverse cumulative impacts to agricultural land are not anticipated.

Wetlands

As described in Item 12, it is anticipated that the Project would impact an approximately 1,090 square foot wetland. The proposed wetland impact would not require a Wetland Replacement plan or compensatory mitigation, as the Project's impact total falls below the replacement thresholds of WCA and Section 404. Potential wetland impacts would be confirmed during final design and permitting of the Project. Planned development in the vicinity of the Project may also impact wetlands in the surrounding area. Wetlands are protected by state and federal laws, Section 404 of the Clean Water Act and WCA, which require avoidance of wetland impacts when possible, and when avoidance is not possible, impacts must be minimized and mitigated. Adverse cumulative impacts to wetlands are not anticipated given the federal and state regulations that mandate avoidance, minimization, and mitigation requirements for wetland impacts.

Stormwater

The Project would convert agricultural land into a residential development, which would increase impervious surfaces compared to existing conditions. As discussed in Item 12, the proposed additional impervious surface area is expected to result in higher runoff rates and volumes, compared to the existing conditions, and there may also be a change in pollutants in the runoff. Other proposed developments in the area resulting in the conversion of agricultural and rural residential land to residential, commercial and industrial developments would result in similar changes. These future developments would be required to implement stormwater BMPs to mitigate stormwater runoff impacts in accordance with all City, ECWMC, and MPCA approval and permitting requirements. Therefore, adverse cumulative impacts to water quality and quantity are not anticipated.

Public Infrastructure

As discussed in Item 12, water supply for the Project would be provided through an agreement with the City of Maple Grove. The Project proposes residential and commercial developments has been planned for in the City's Water Supply and Sewer Plans.

As discussed in Item 12, sewer and watermain improvement would be required to provide services to the Project. The City of Dayton regulates future development through its land use policies and zoning requirements. Therefore, adverse cumulative impacts related to public infrastructure are not anticipated.

Transportation/Traffic

A Traffic Impact Study for the Project was completed that incorporate future traffic growth and recommended mitigation measure to address traffic Impacts (Appendix I). Future developments in the surrounding area that are anticipated to increase traffic congestion, would be required to complete a traffic impact study and identify mitigation measures to address these impacts. Therefore, adverse cumulative impacts related to traffic congestion are not anticipated.

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 other potential environmental effects are anticipated that are not addressed by Items 1 through 21.

RGU CERTIFICATION

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

I hereby certify that:

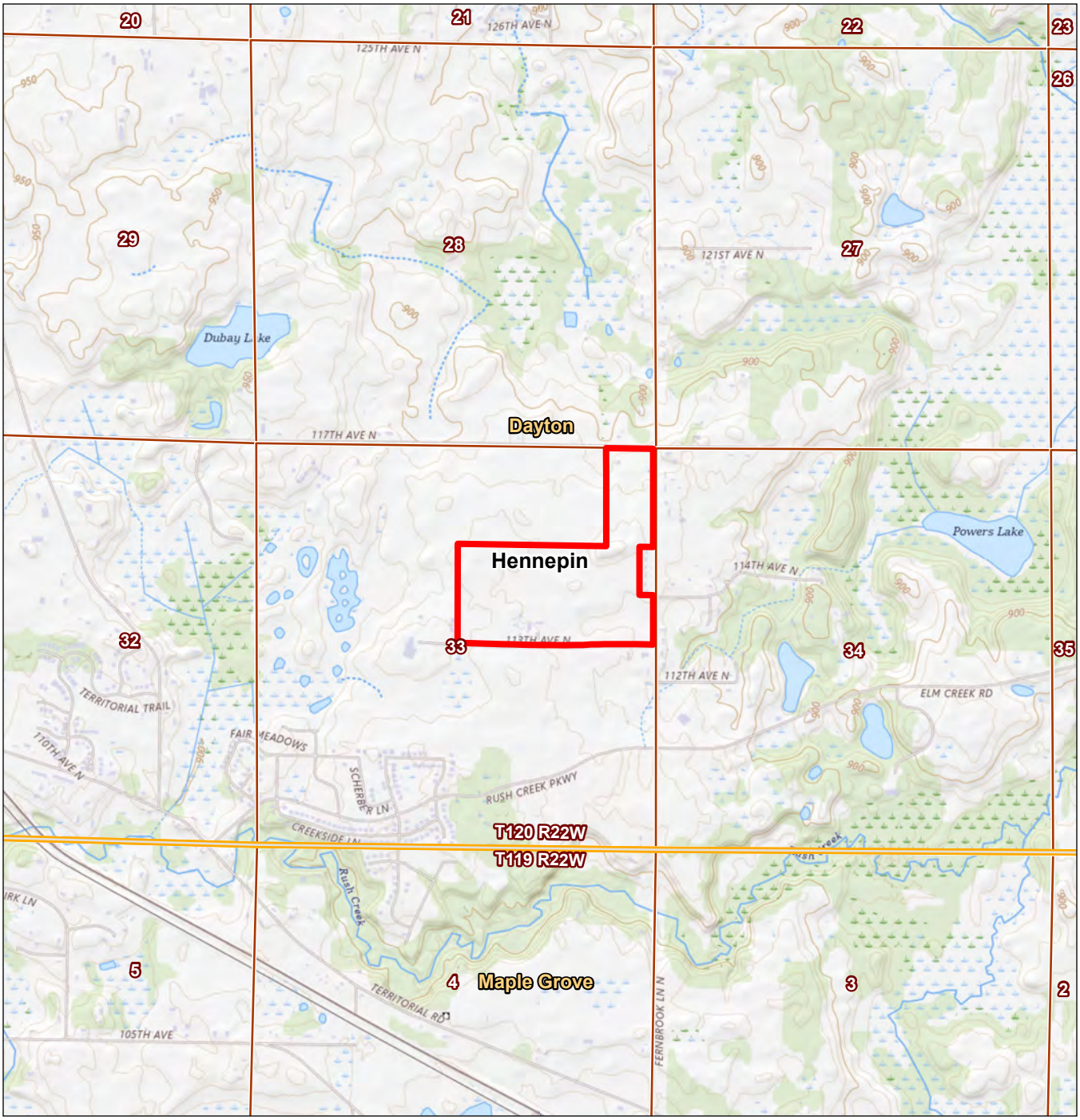
- The information contained in this document is accurate and complete to the best of my knowledge.
- The EAW describes the complete Project; there are no other Projects, stages or components other than those described in this document, which are related to the Project as connected actions or phased actions, 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.

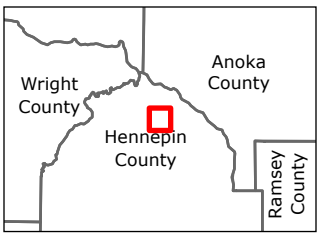
Signature  Date January 2, 2025

Title Community Development Director

Appendix A

Figures





Legend

- Project Area
- County Subdivision
- Township/Range & Section
- Sections

0 1,000 2,000 Feet

(At original document size of 8.5x11)
1:24,000

N

Stantec

Project Location
T120N, R22W, S33
Dayton, Hennepin Co., MN

Prepared by LAH on 2024-11-12

Client/Project
City of Dayton
DCM Farms
EAW

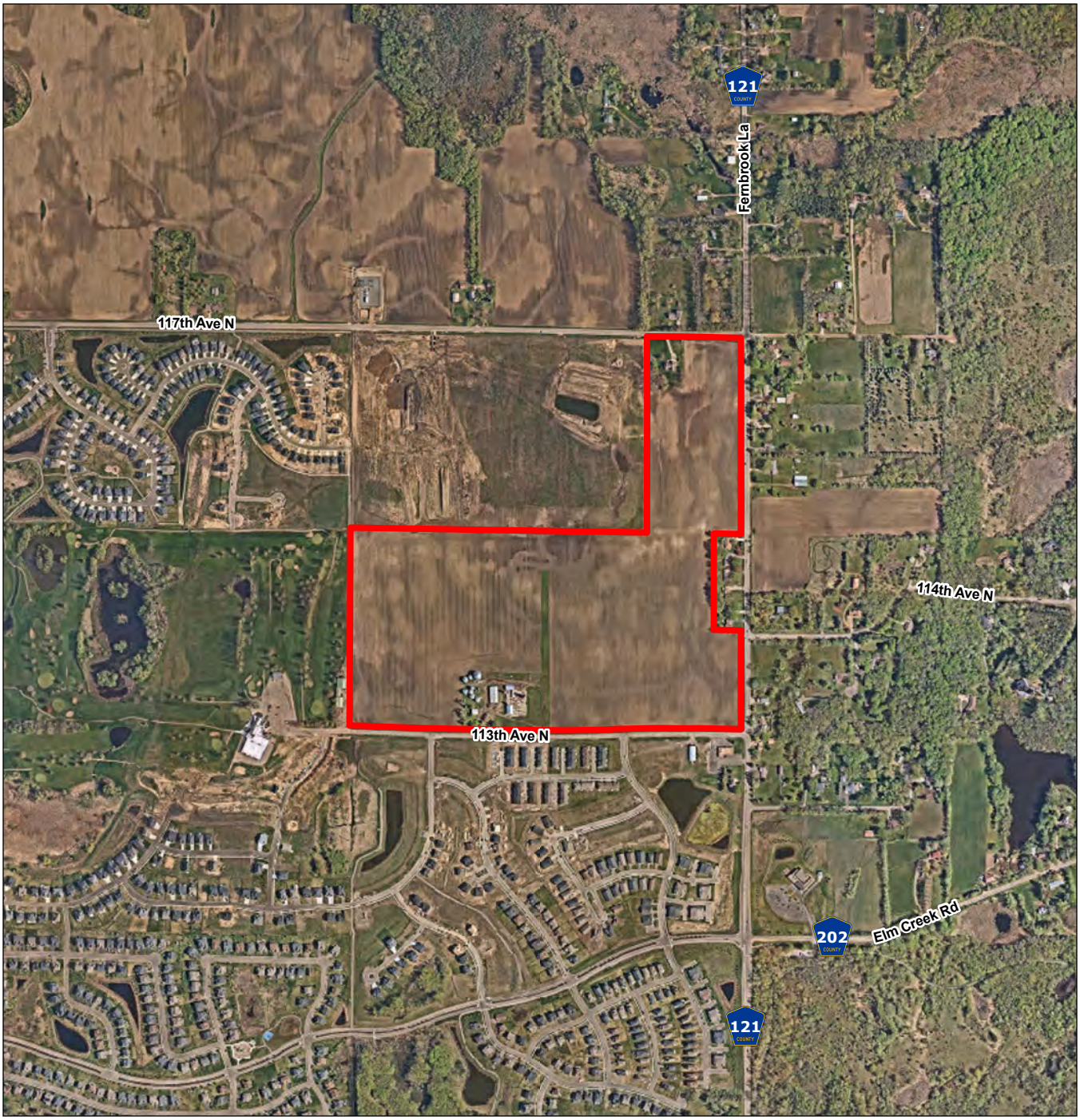
227704103

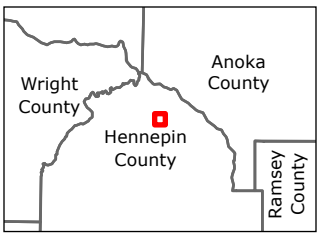
Figure No.
1

Title
USGS Project Location

Notes
1. Coordinate System: NAD 1983 UTM Zone 15N
2. Data Sources: USGS, Stantec
3. Background: USGS 7.5 Minute Quadrangle

U:\227\227704103\03_data\gis_cad\gis\ArcPro\EAW\EAW.aprx Revised: 2024-11-12 By: lhershley





Legend

Project Area

0 500 1,000 Feet

(At original document size of 8.5x11)
1:12,000

N

Stantec

Notes

1. Coordinate System: NAD 1983 UTM Zone 15N
2. Data Sources: Hennepin County, Stantec
3. Background: Hennepin County Aerial, 2024

Project Location
T120N, R22W, S33
Dayton, Hennepin Co., MN

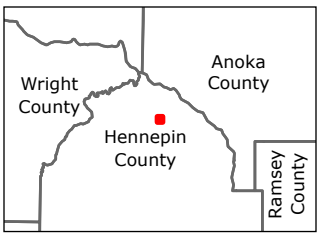
Prepared by LAH on 2024-11-12

Client/Project
City of Dayton
DCM Farms
EAW

227704103

Figure No.
2

Title
Aerial Project Location



Notes
1. Coordinate System: NAD 1983 UTM Zone 15N
2. Data Sources: UMN, Stantec
3. Background: TCMA 1-Meter Land Cover

Legend
- Project Area

TCMA Land Cover 2016
- Grass/Shrub
- Buildings
- Roads/Paved Surfaces
- Lakes/Ponds
- Deciduous Tree Canopy
- Coniferous Tree Canopy
- Agriculture
- Emergent Wetlands
- Forest/Shrub Wetland

0 250 500 Feet
(At original document size of 8.5x11)
1:6,000

N

Stantec

Project Location
T120N, R22W, S33
Dayton, Hennepin Co., MN

Prepared by LAH on 2024-11-12

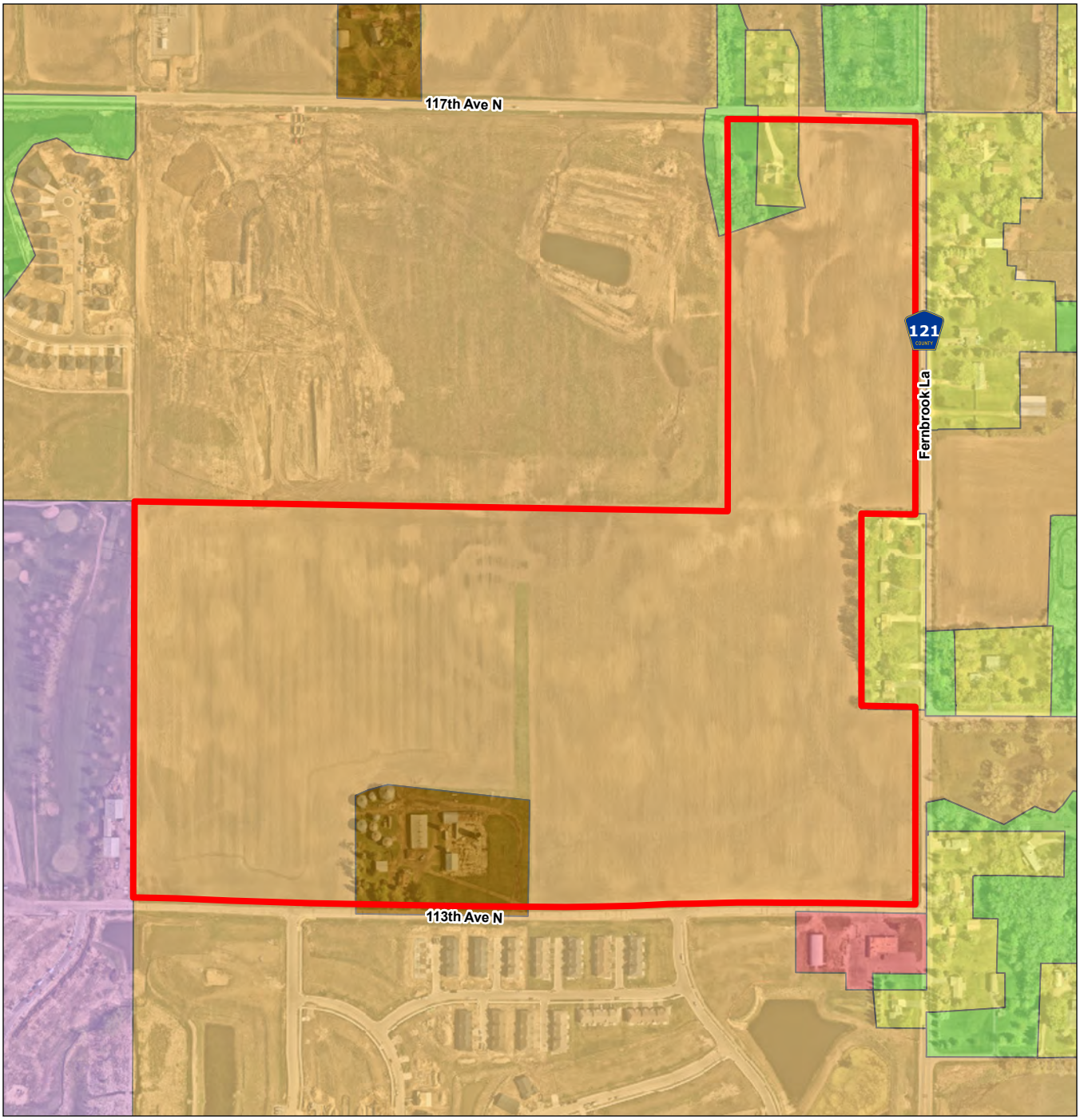
Client/Project
City of Dayton
DCM Farms
EAW

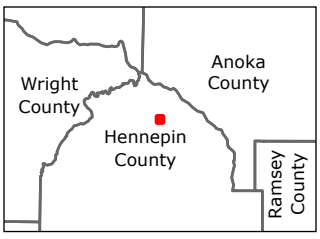
227704103

Figure No.
3

Title
Existing Land Cover

U:\227\227704103\03_data\gis_cad\gis\ArcPro\EAW\EAW.aprx Revised: 2024-11-12 By: lhershley





Notes
1. Coordinate System: NAD 1983 UTM Zone 15N
2. Data Sources: Met. Council, Stantec
3. Background: Hennepin County Aerial, 2024

Legend
- Project Area

Generalized Land Use 2020
- Agricultural
- Farmstead
- Golf Course
- Retail and Other Commercial
- Single Family Detached
- Undeveloped

0 250 500 Feet
(At original document size of 8.5x11)
1:6,000

N

Stantec

Project Location
T120N, R22W, S33
Dayton, Hennepin Co., MN

Prepared by LAH on 2024-11-12

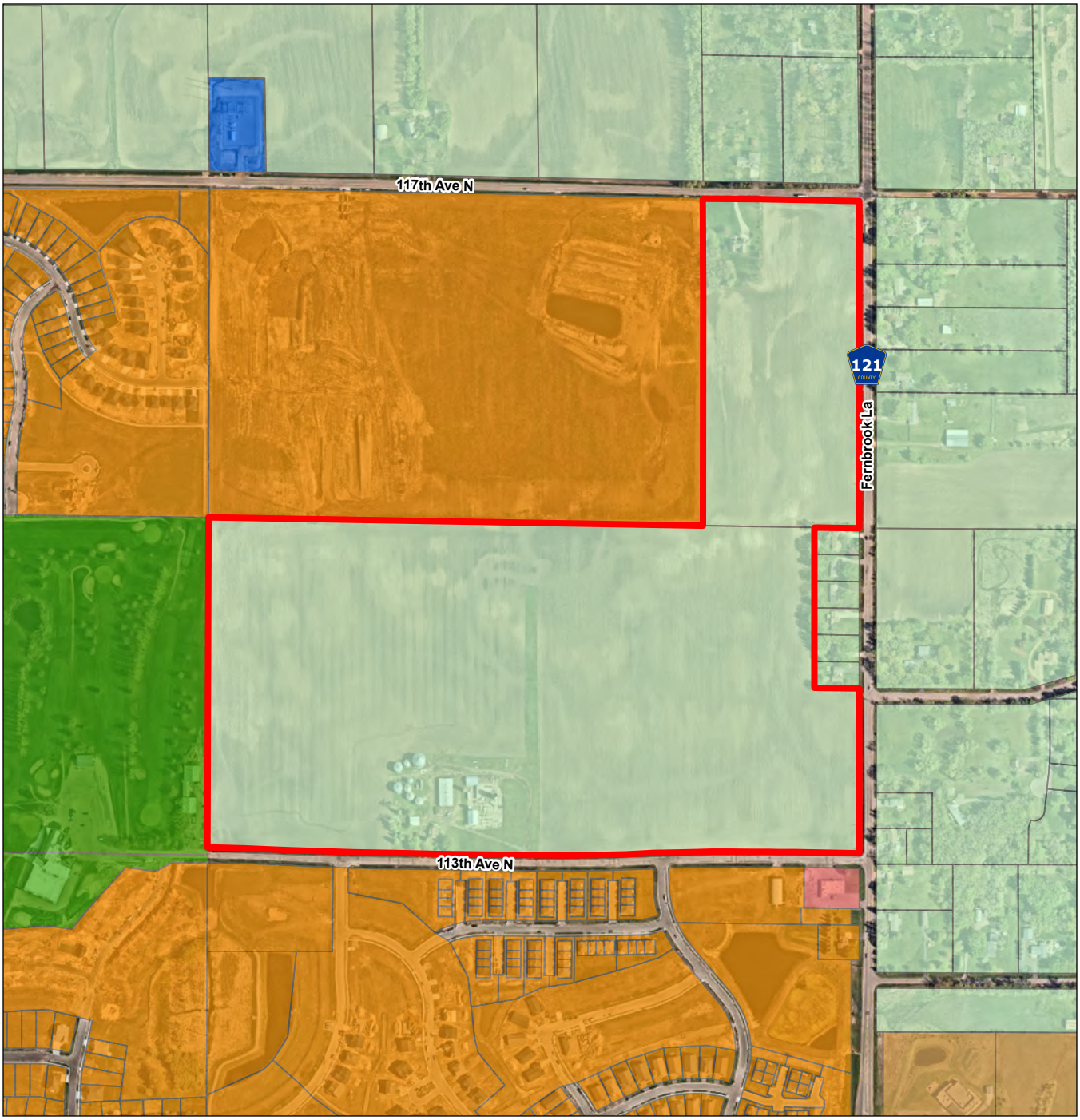
Client/Project
City of Dayton
DCM Farms
EAW

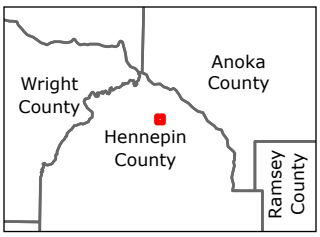
227704103

Figure No.
4

Title
Existing Land Use

U:\227\227704103\03_data\gis_cad\gis\ArcPro\EAW\EAW.aprx Revised: 2024-11-12 By: lhershley





Notes
1. Coordinate System: NAD 1983 UTM Zone 15N
2. Data Sources: City of Dayton, Stantec
3. Background: Hennepin County Aerial, 2024

Legend
- Project Area

City of Dayton Zoning Districts
- A-1 Agricultural District
- B-2 Neighborhood Business District
- ES Essential Service District
- P-R Public Recreation District
- R-1 Single Family District
- R-3 Single Family and Attached Residential

0 250 500 Feet
(At original document size of 8.5x11)
1:7,200

N

Stantec

Project Location
T120N, R22W, S33
Dayton, Hennepin Co., MN

Prepared by LAH on 2024-11-12

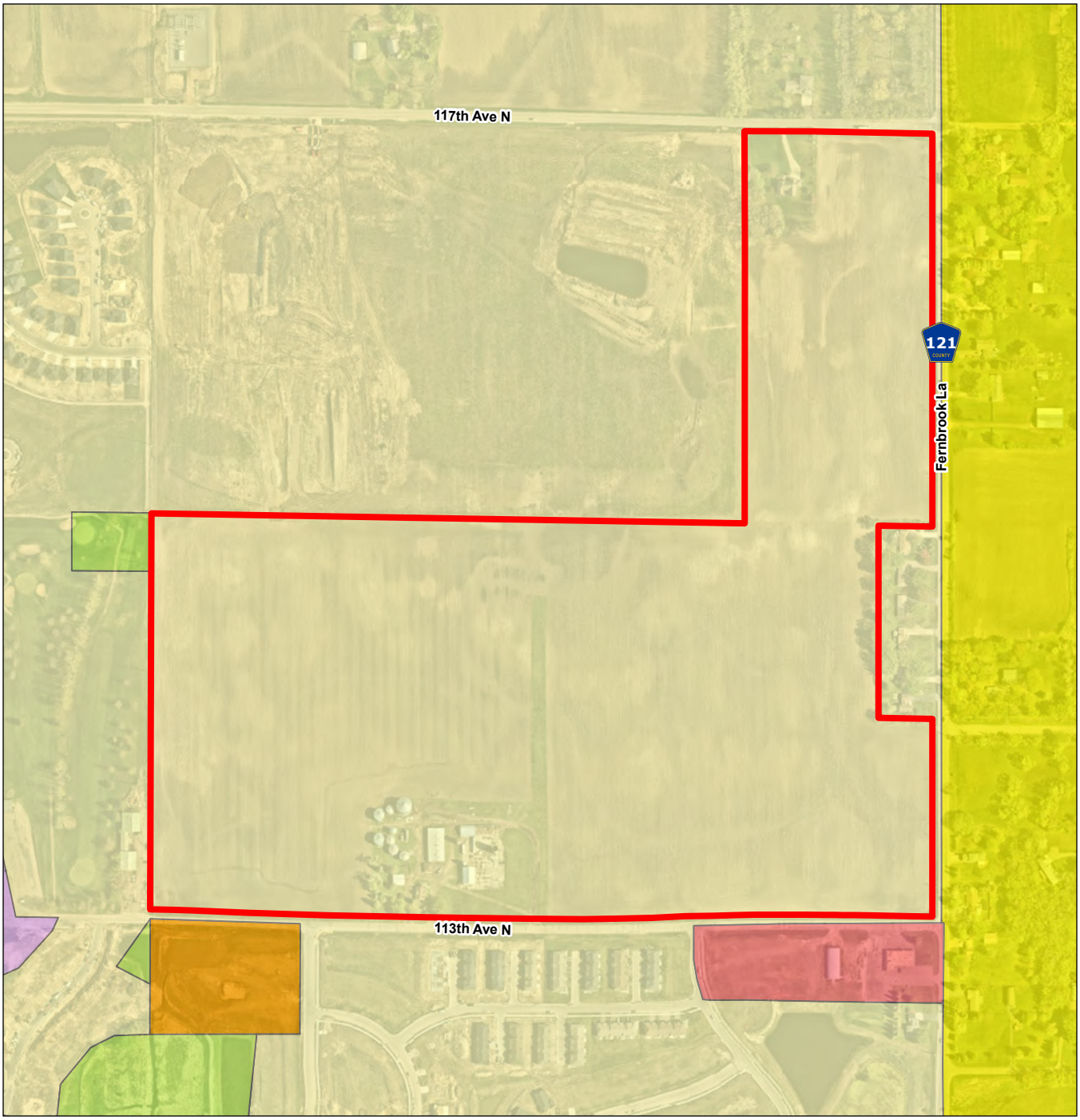
Client/Project
City of Dayton
DCM Farms
EAW

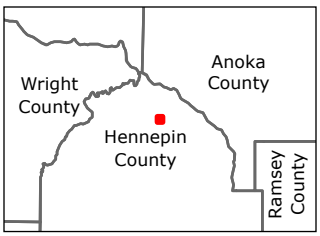
227704103

Figure No.
5

Title
Zoning

U:\227\227704103\03_data\gis_cad\gis\ArcPro\EAW\EAW.aprx Revised: 2024-11-12 By: lhershley





Notes
1. Coordinate System: NAD 1983 UTM Zone 15N
2. Data Sources: Met. Council, Stantec
3. Background: Hennepin County Aerial, 2024

Legend

- Project Area

Planned Land Use

- High Density Residential
- Medium Density Residential
- Low Density Residential
- Golf Course
- Neighborhood Commercial
- Park and Open Space

0 250 500 Feet

(At original document size of 8.5x11)
1:6,000

N

Stantec

Project Location
T120N, R22W, S33
Dayton, Hennepin Co., MN

Prepared by LAH on 2024-11-12

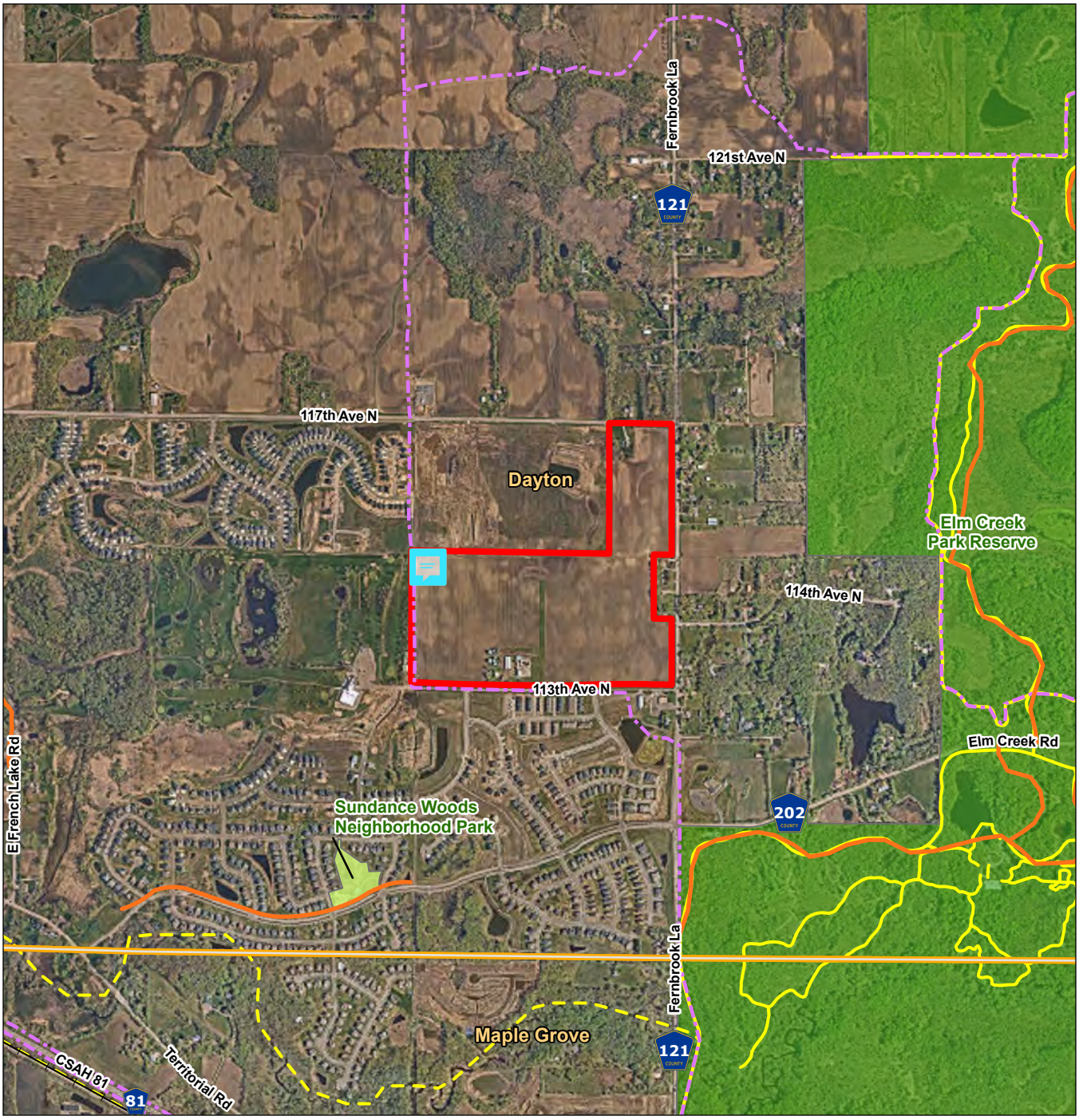
Client/Project
City of Dayton
DCM Farms
EAW

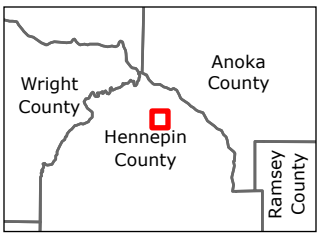
227704103

Figure No.
6

Title
Planned Land Use

U:\227\227704103\03_data\gis_cad\gis\ArcPro\EAW\EAW.aprx Revised: 2024-11-12 By: lhershley





Notes
1. Coordinate System: NAD 1983 UTM Zone 15N
2. Data Sources: City of Dayton, MnDNR, MnDOT, Met. Council, MetroGIS, Stantec
3. Background: Hennepin County Aerial, 2024

Legend
- Project Area
- Municipal Boundary
- City of Dayton Parks
- Metro Region Parks
- Railroads
- Snowmobile Trails
- City of Dayton Trails

Metro Region Trails/Bikeways
- Planned
- Existing

0 750 1,500 Feet
(At original document size of 8.5x11)
1:18,000

N

Stantec

Project Location
T120N, R22W, S33
Dayton, Hennepin Co., MN

Prepared by LAH on 2024-11-12

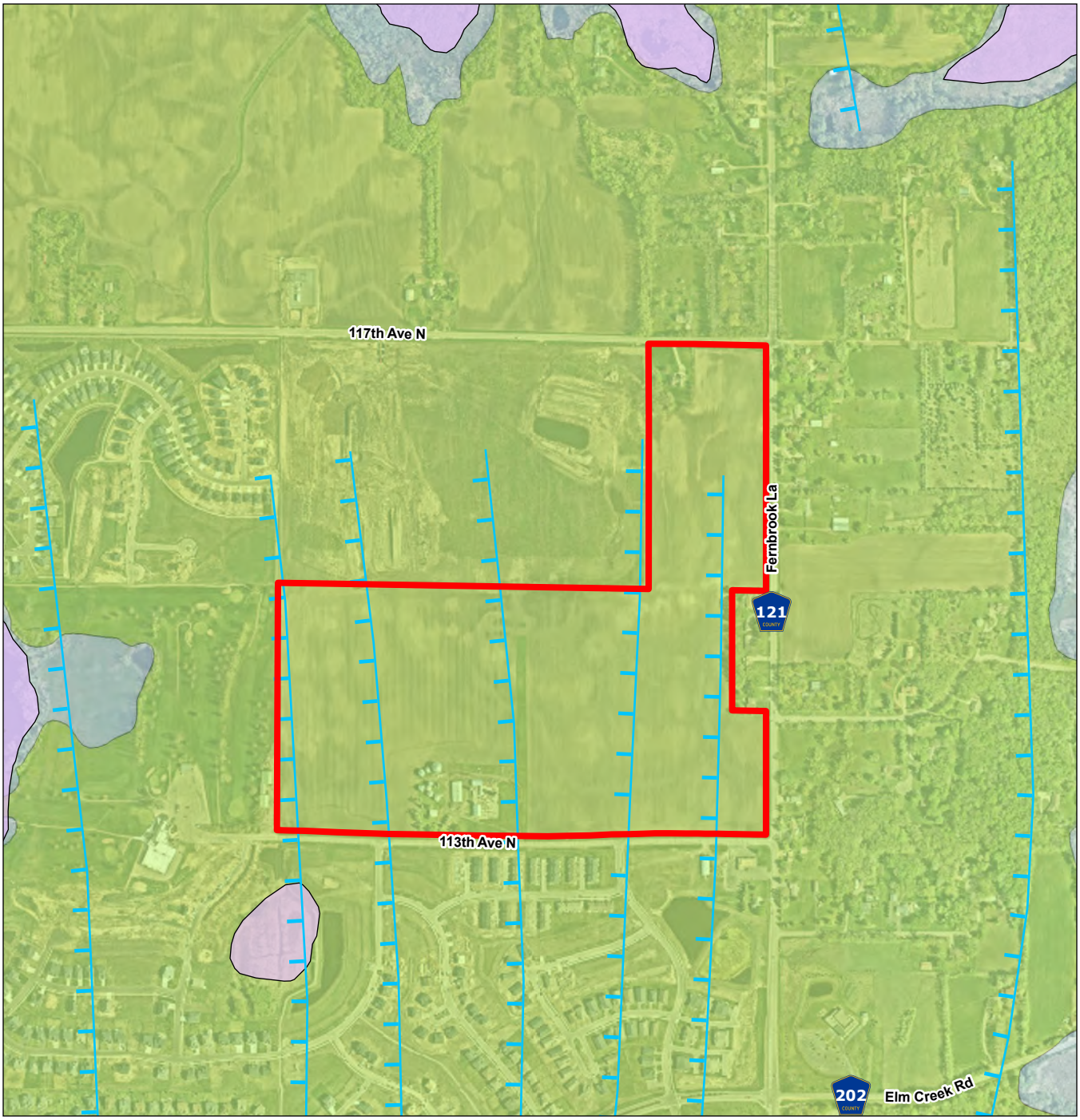
Client/Project
City of Dayton
DCM Farms
EAW

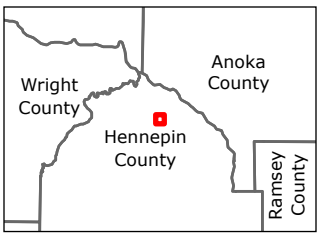
227704103

Figure No.
7

Title
Parks and Trails

U:\227\227704103\03_data\gis_cad\gisArcPro\EAW\EAW.aprx Revised: 2024-11-12 By: lhershley





Legend

- Project Area

Hennepin Co. Surficial Geology

- QI, Organic clayey silt to sand
- Qht - New Ulm Fm, Heiberg till
- Peat
- Ice Margin

0 400 800 Feet

(At original document size of 8.5x11)
1:9,600

N

Notes

1. Coordinate System: NAD 1983 UTM Zone 15N
2. Data Sources: MGS, Stantec,
3. Background: Hennepin County Aerial, 2024

Stantec

Project Location
T120N, R22W, S33
Dayton, Hennepin Co., MN

Prepared by LAH on 2024-11-12

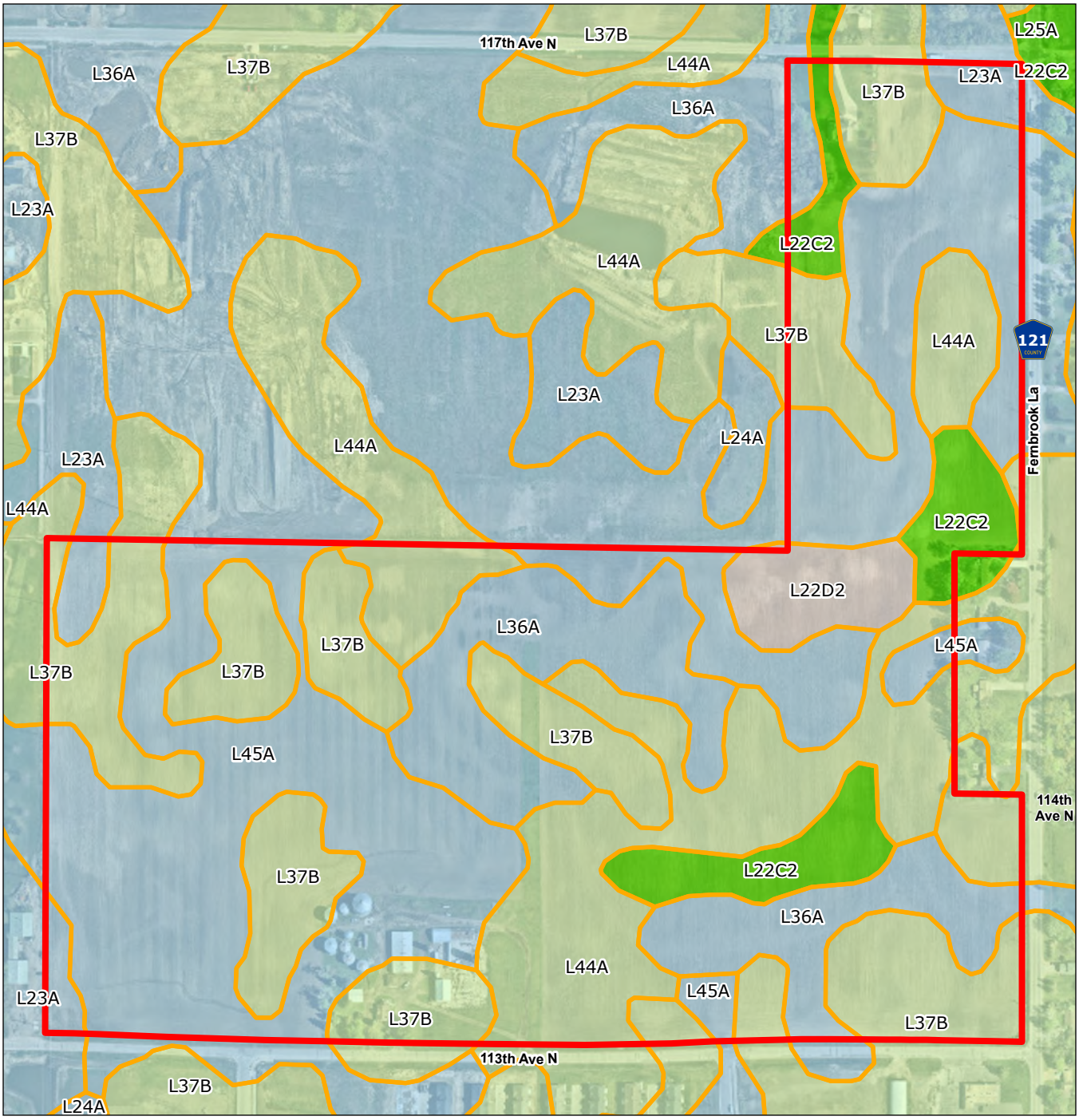
Client/Project
City of Dayton
DCM Farms
EAW

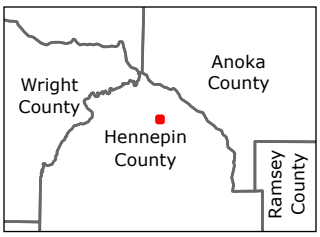
227704103

Figure No.
8

Title
Surficial Geology

U:\227\227704103\03_data\gis_cad\gis\ArcPro\EAW\EAW.aprx Revised: 2024-11-12 By: lhershley





Notes
1. Coordinate System: NAD 1983 UTM Zone 15N
2. Data Sources: NRCS, Stantec
3. Background: Hennepin County Aerial, 2024

Legend

- Project Area
- Soil Map Unit

Farmland Classification

- All areas are prime farmland
- Farmland of statewide importance
- Not prime farmland
- Prime farmland if drained

0 200 400 Feet
(At original document size of 8.5x11)
1:4,800

N

Stantec

Project Location
T120N, R22W, S33
Dayton, Hennepin Co., MN

Prepared by LAH on 2024-11-12

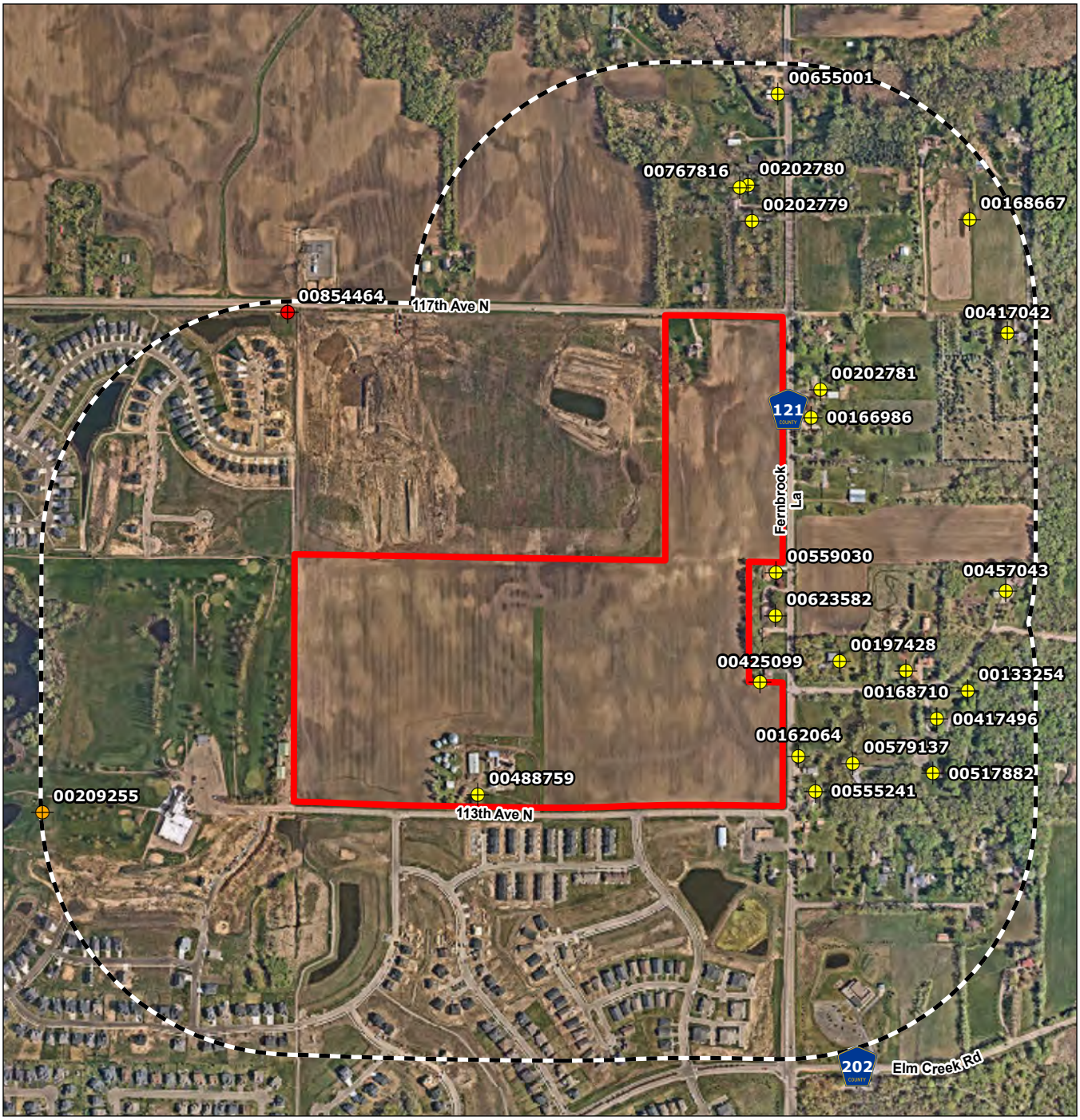
Client/Project
City of Dayton
DCM Farms
EAW

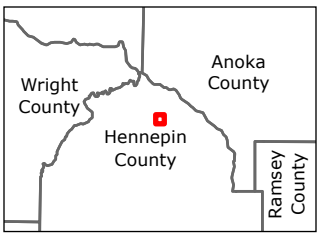
227704103

Figure No.
9

Title
Soil and Farmland Classification

U:\227\227704103\03_data\gis_cad\gis\ArcPro\EAW\EAW.aprx Revised: 2024-11-12 By: lhershley





Legend

- Project Area
- 1/4 Mile Buffer

Minnesota Well Index

- Domestic Well
- Irrigation Well
- Thermometer Well

0 400 800 Feet

(At original document size of 8.5x11)
1:9,600

N

Notes

1. Coordinate System: NAD 1983 UTM Zone 15N
2. Data Sources: MDH MWI, Stantec
3. Background: Hennepin County Aerial, 2024

Stantec

Project Location
T120N, R22W, S33
Dayton, Hennepin Co., MN

Prepared by LAH on 2024-11-12

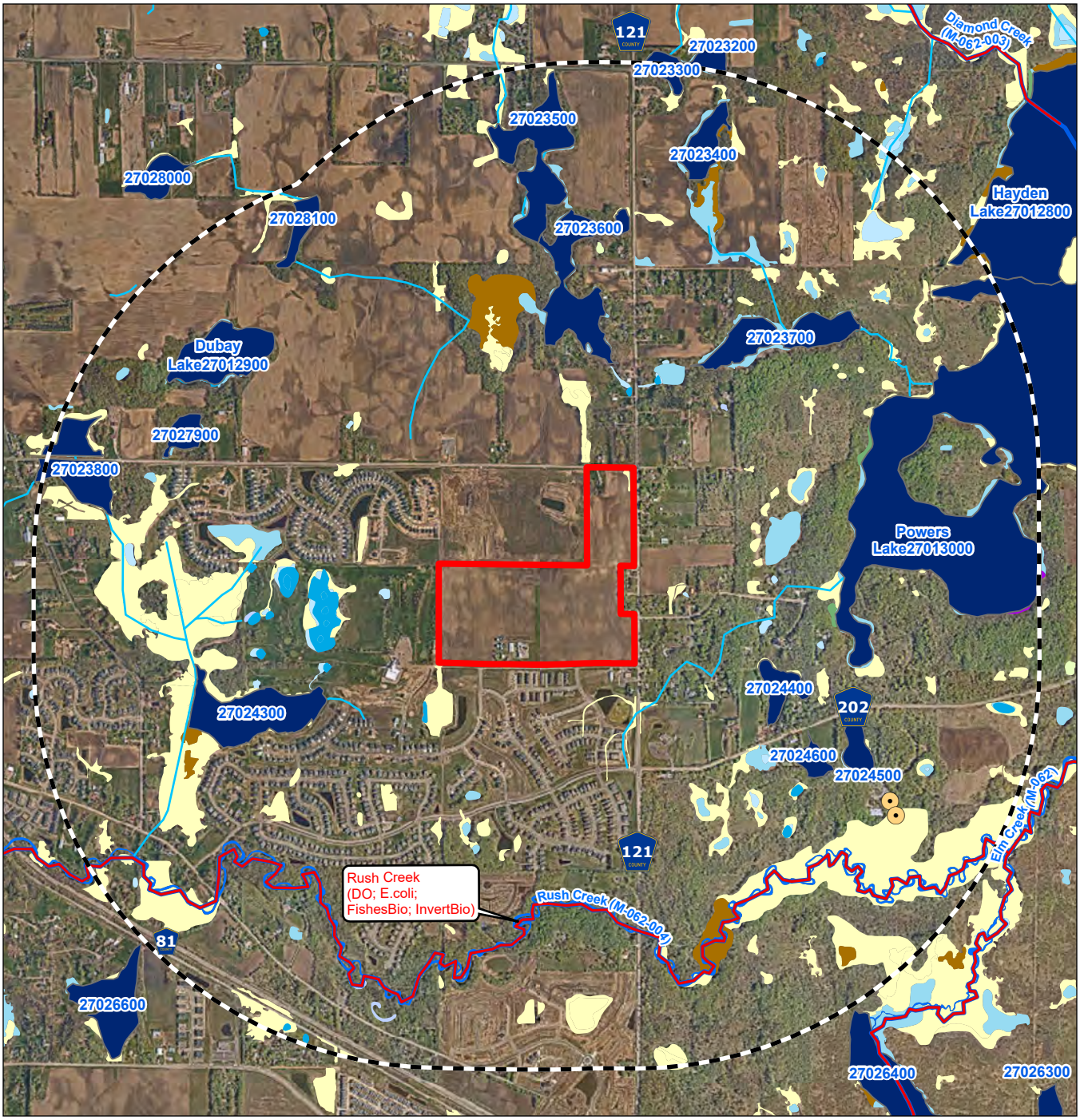
Client/Project
City of Dayton
DCM Farms
EAW

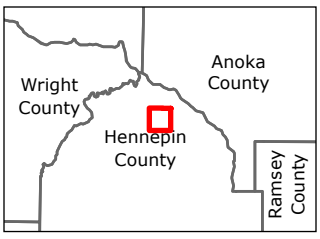
227704103

Figure No.
10

Title
Minnesota Well Index

U:\227\227704103\03_data\gis_cad\gis\ArcPro\EAW\EAW.aprx Revised: 2024-11-12 By: lhershley





Notes
1. Coordinate System: NAD 1983 HARN Adj MN Hennepin Feet
2. Data Sources: MnDNR, MPCA, NWI, Kjolhaug Environmental Services, Stantec
3. Background: Hennepin County Aerial, 2024

Legend
- Project Area
- 1 Mile Buffer
- springs
- 2024 MPCA Impaired Streams (Draft)
- Public Waters Watercourse
- Public Waters Basin
- DNR Rivers and Streams
- DNR Waters Basin

National Wetland Inventory
- 1 - Seasonally Flooded Basin or Flat
- 2 - Wet Meadow
- 3 - Shallow Marsh
- 4 - Deep Marsh
- 5 - Shallow Open Water
- 6 - Shrub Swamp
- 7 - Wooded Swamp
- 8 - Bog
- Riverine Systems

0 1,000 2,000 Feet
(At original document size of 8.5x11)
1:24,000

N

Stantec

Project Location
T120N, R22W, S33
Dayton, Hennepin Co., MN

Prepared by LAH on 2024-11-12

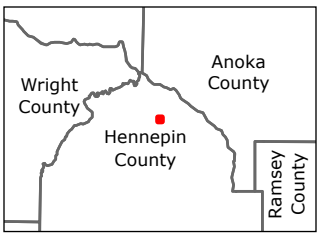
Client/Project
City of Dayton
DCM Farms
EAW

227704103

Figure No.
11

Title
Water Resources

U:\227\227704103\03_data\gis_cad\gis\ArcPro\EAW\EAW.aprx Revised: 2024-11-12 By: lhershley



Legend

- Project Area
- Field Delineated Wetland (1,090 sq.ft.)
- Potential Wetland Impact (1,090 sq.ft.)

0 200 400 Feet

(At original document size of 8.5x11)
1:4,800

N

Notes

1. Coordinate System: NAD 1983 HARN Adj MN Hennepin Feet
2. Data Sources: Kjoulhaug Environmental Services, Sathre-Berquist Inc., Stantec
3. Background: Hennepin County Aerial, 2024

Stantec

Project Location
T120N, R22W, S33
Dayton, Hennepin Co., MN

Prepared by LAH on 2024-11-12

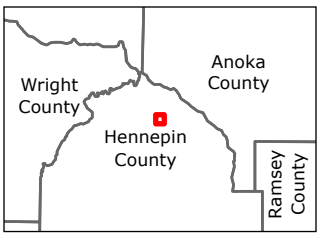
Client/Project
City of Dayton
DCM Farms
EAW

227704103

Figure No.
12

Title
Potential Wetland Impacts

U:\227\227704103\03_data\gis_cad\gis\ArcPro\EAW\EAW.aprx Revised: 2024-11-12 By: lhershley



Notes
1. Coordinate System: NAD 1983 UTM Zone 15N
2. Data Sources: MPCA WIMN, Stantec
3. Background: Hennepin County Aerial, 2024

Legend
- Project Area
- 1/4 Mile Buffer

MPCA Potentially Contaminated Sites
- Multiple Programs
- Feedlots
- Investigation and Cleanup
- Stormwater
- Tanks

0 400 800 Feet
(At original document size of 8.5x11)
1:9,600

N

Stantec

Project Location
T120N, R22W, S33
Dayton, Hennepin Co., MN

Prepared by LAH on 2024-11-12

Client/Project
City of Dayton
DCM Farms
EAW

227704103

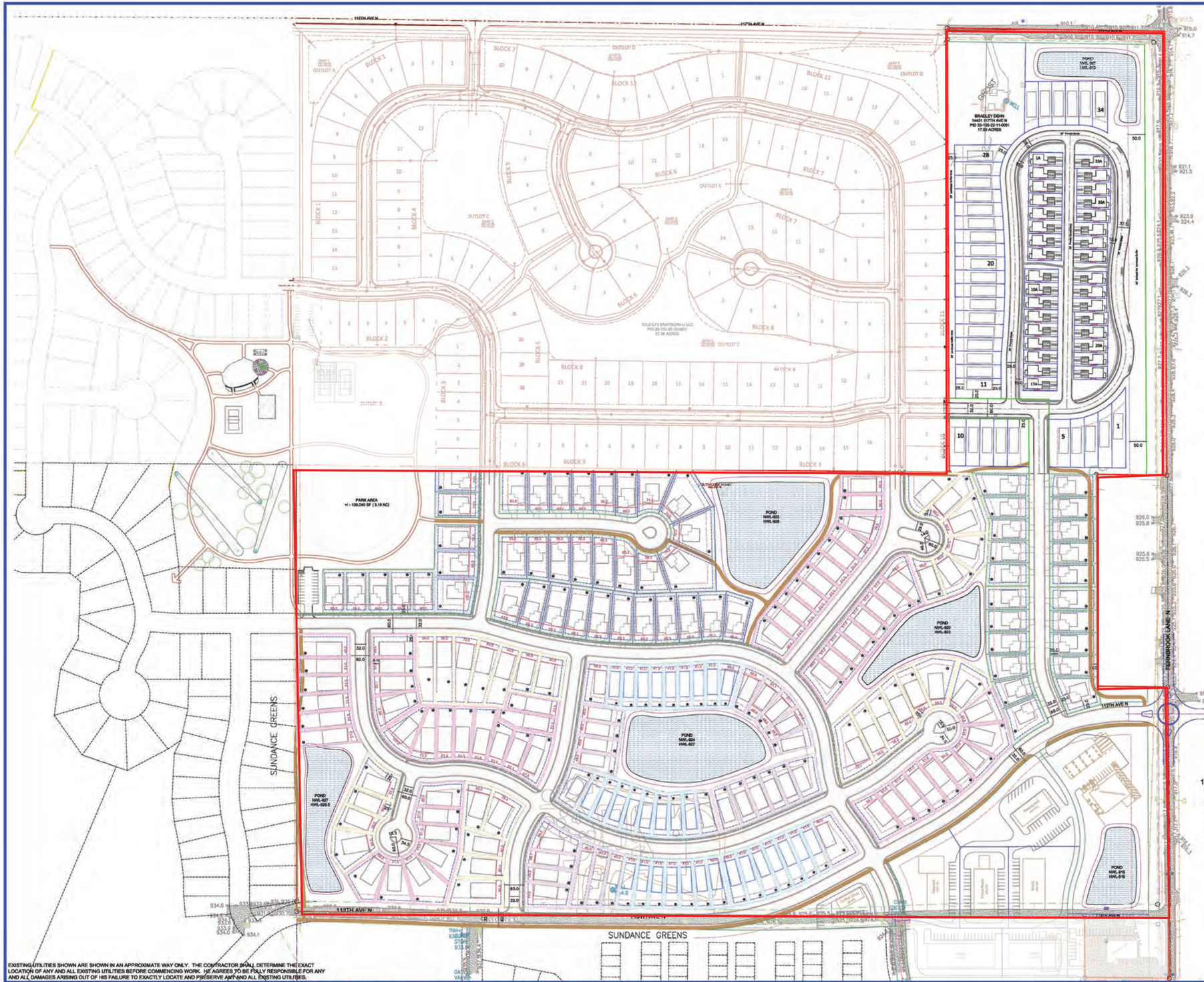
Figure No.
13

Title
MPCA Potentially Contaiminated Sites

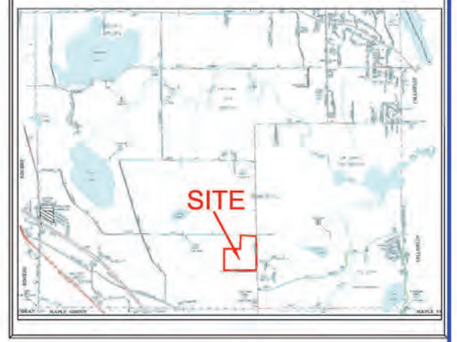
U:\227\227704103\03_data\gis_cad\gis\ArcPro\EAW\EAW.aprx Revised: 2024-11-12 By: lhershley

Appendix B

Concept Plan



LOCATION MAP



DEVELOPMENT DATA

Proposed Zoning - PUD

Total Lots - 267

Street: 60' ROW - 32' B-B
CDS - 60' R

Commercial/Retail Area - +/- 11.2 Acres

Villa Lots
Side yard Setback: 5'/5'

- 40' Villa Lots - 31
- 45' Villa Lots - 26
- 50' Villa Lots -55
- 55' Villa Lots - 29

Single Family Lots
Side yard Setback: 7.5'/7.5'

- 65' SF Lots - 54
- 75' SF Lots - 5

Brad Dehn Parcel
Perimeter 40' Lots - 34

Alley Lots - 33

Setbacks:
Front yard Setback: 25'
Corner Setback: 25'
Rear yard Setback: 25'

EXISTING UTILITIES SHOWN ARE SHOWN IN AN APPROXIMATE WAY ONLY. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ANY AND ALL EXISTING UTILITIES BEFORE COMMENCING WORK. HE AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES ARISING OUT OF HIS FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL EXISTING UTILITIES.

DRAWING NAME	NO.	BY	DATE	REVISION
Layout-Dehn CM & 113th	1			
DRAWN				
XXX				
CHECKED				
XXX				
DATE				
XX/XX/XX				

I HEREBY CERTIFY THAT THIS PLAN OR SPECIFICATION WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY REGISTERED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

Name, P.E.
Date: _____ Lic. No. _____

SATHRE-BERGQUIST, INC.
14000 25TH AVE N #120 PLYMOUTH, MN. 55447 (952) 476-6000

CITY PROJECT NO.

DAYTON, MINNESOTA

CONCEPT PLAN 7/12/24

DCM FARMS

SUNDANCE WOODS, LLC.

FILE NO.
19214-006

C1-O

Appendix C

FEMA FIRMette

National Flood Hazard Layer FIRMette

93°28'7"W 45°10'9"N

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

1:6,000

93°27'30"W 45°9'44"N

Basemap Imagery Source: USGS National Map 2023

Legend

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

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

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

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

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

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

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

N

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

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

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 11/8/2024 at 3:20 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

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

National Flood Hazard Layer FIRMette

FEMA

93°28'23"W 45°9'58"N

93°27'46"W 45°9'33"N

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

1:6,000

Basemap Imagery Source: USGS National Map 2023

Legend

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

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

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

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

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

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

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

N

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

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

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 11/8/2024 at 3:18 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

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

Appendix D

MDH Well Log Reports

Minnesota Unique Well No.

162064

County Hennepin
Quad Anoka
Quad ID 120B

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING RECORD

Minnesota Statutes Chapter 1031

Entry Date 08/24/1991
Update
Received Date 09/01/2015

Well Name	Township	Range	Dir	Section	Subsection	Use	Status	Well Depth	Depth Completed	Date Well Completed	Lic/Reg. No.
CUTTER, ROBERT	120	22	W	34	BCCCBB	domestic	A	215 ft.	215 ft.	12/20/1979	27056

Elevation 914 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet) **Aquifer** Jordan-Tunnel City **Depth to Bedrock** 125 ft **Open Hole** 179 - 215 ft **Static Water Level** 50 ft

Field Located By Minnesota Geological Survey
Unique No. Verified Address verification
Geological Interpretation Andrew Retzler
Agency (Interpretation)

Locate Method Digitized - scale 1:24,000 or larger (Digitizing
Input Source Minnesota Geological Survey
Input Date 01/01/1990

Universal Transverse Mercator (UTM) - NAD83 - Zone 15 -
UTM Easting (X) 463706
UTM Northing (Y) 500086
Interpretaion Method Geologic study 1:24k to 1:100k

Geological Material	Color	Hardness	Depth (ft.) From	Depth (ft.) To	Thickness	Elevation (ft.) From	Elevation (ft.) To	Stratigraphy	Primary Lithology	Secondary	Minor Lithology
CLAY			0	50	50	914	864	clay	clay		
GRAVEL			50	100	50	864	814	gravel (+larger)	gravel		
CLAY			100	125	25	814	789	clay	clay		
SHALE & SOFT SANDROCK		SOFT	125	215	90	789	699	Jordan-Tunnel City	shale	dolomite	sandstone

Minnesota Unique Well No.

166986

County Hennepin
Quad Anoka
Quad ID 120B

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING RECORD

Minnesota Statutes Chapter 1031

Entry Date 08/24/1991
Update
Received Date 08/18/2014

Well Name	Township	Range	Dir	Section	Subsection	Use	Status	Well Depth	Depth Completed	Date Well Completed	Lic/Reg. No.
DERALD KRENTZ	120	22	W	34	BBBCCA	domestic	A	310 ft.	310 ft.	09/25/1978	86270

Elevation 924 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet) **Aquifer** Tunnel City Group **Depth to Bedrock** 185 ft **Open Hole** 257 - 310 ft **Static Water Level** 65 ft

Field Located By Minnesota Geological Survey
Unique No. Verified Address verification
Geological Interpretation John Mossler
Agency (Interpretation)

Locate Method Digitized - scale 1:24,000 or larger (Digitizing
Input Source Minnesota Geological Survey
Input Date 01/01/1990

Universal Transverse Mercator (UTM) - NAD83 - Zone 15 -
UTM Easting (X) 463726
UTM Northing (Y) 500140
Interpretaion Method Geologic study 1:24k to 1:100k

			Depth (ft.)			Elevation (ft.)					
Geological Material	**Color**	**Hardness**	**From**	**To**	**Thickness**	**From**	**To**	**Stratigraphy**	**Primary Lithology**	**Secondary**	**Minor Lithology**
CLAY	BROWN	SOFT	0	3	3	924	921	clay-brown	clay		
GRAVEL	BROWN	SOFT	3	34	31	921	890	gravel (+larger)-	gravel		
CLAY	GRAY	HARD	34	80	46	890	844	clay-gray	clay		
GRAVEL	GRAY	SOFT	80	120	40	844	804	gravel (+larger)-gray	gravel		
CLAY	RED/BRN	HARD	120	185	65	804	739	clay	clay		
SHALE	GREEN	HARD	185	257	72	739	667	St.Lawrence-Tunnel	shale	dolomite	sandstone
SANDROCK	WHITE	HARD	257	310	53	667	614	Tunnel City Group	sandstone		

Minnesota Unique Well No.

209255

County Hennepin
Quad Anoka
Quad ID 120B

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING RECORD

Minnesota Statutes Chapter 1031

Entry Date 08/24/1991
Update
Received Date 05/01/2015

Well Name	Township	Range	Dir	Section	Subsection	Use	Status	Well Depth	Depth Completed	Date Well Completed	Lic/Reg. No.
SUNDANCE GOLF	120	22	W	33	CBAAAA	irrigation	A	626 ft.	626 ft.	10/00/1970	62012

Elevation 910 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet) **Aquifer** Tunnel City-Mt. **Depth to Bedrock** 245 ft **Open Hole** 265 - 626 ft **Static Water Level** 26.2 ft

Field Located By Minnesota Geological Survey
Unique No. Verified Information from owner-site
Geological Interpretation Agency (Interpretation) Bruce Bloomgren

Locate Method Digitized - scale 1:24,000 or larger (Digitizing
Input Source Minnesota Geological Survey
Input Date 01/01/1990

Universal Transverse Mercator (UTM) - NAD83 - Zone 15 -
UTM Easting (X) 462504
UTM Northing (Y) 500077
Interpretaion Method Cuttings + geophysical log

Geological Material	Color	Hardness	Depth (ft.) From	Depth (ft.) To	Thickness	Elevation (ft.) From	Elevation (ft.) To	Stratigraphy	Primary Lithology	Secondary	Minor Lithology
DRIFT (SAND, GRAVEL,			0	225	225	910	685	sand +larger	sand	gravel	
SANDROCK			225	245	20	685	665	Quaternary deposit	drift		
SANDROCK			245	273	28	665	637	Tunnel City Group	sandstone	shale	dolomite
SHALE			273	323	50	637	587	Tunnel City Group	shale	sandstone	dolomite
SANDROCK & SHALE			323	325	2	587	585	Tunnel City Group	sandstone	shale	dolomite
SANDROCK & SHALE			325	342	17	585	568	Wonewoc Sandstone	sandstone		
SANDROCK			342	373	31	568	537	Wonewoc Sandstone	sandstone		
SANDROCK			373	395	22	537	515	Eau Claire Formation	shale	sandstone	
SHALE			395	465	70	515	445	Eau Claire Formation	shale		
SHALE			465	471	6	445	439	Mt.Simon Sandstone	sandstone	shale	
SANDROCK			471	626	155	439	284	Mt.Simon Sandstone	sandstone		

Minnesota Unique Well Number

133254

County Hennepin
Quad Anoka
Quad ID 120B

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 08/24/1991
Update Date 02/14/2014
Received Date

Well Name	Township	Range	Dir	Section	Subsection
WILLIAMS, JOHN	120	22	W	34	BCDABB

Elevation 909 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

Well 14011 114TH AV N DAYTON MN 55327

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
CLAY	0	5	BROWN	
CLAY	5	83	GRAY	
CLAY & GRAVEL	83	98	GRAY	
GRAVEL & CLAY	98	114	RED	
GRAVEL & SAND	114	120		
GRAVEL	120	137		

Remarks

Well Depth	Depth Completed	Date Well Completed
137 ft.	137 ft.	07/11/1977

Drill Method Non-specified Rotary **Drill Fluid**

Use domestic **Status** Active

Well Hydrofractured? Yes ☐ No ☐ **From** **To**

Casing Type Single casing **Joint** Threaded
Drive Shoe? Yes ☐ No ☒ **Above/Below** 1 ft.

Casing Diameter		Weight	
4	in. To 131 ft.	10.7	lbs./ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** stainless **Make** JOHNSON

Diameter	Slot/Gauze	Length	Set	
4 in.	20	4 ft.	131 ft.	137 ft.

Static Water Level

24 ft. land surface Measure 07/11/1977

Pumping Level (below land surface)

ft. 3 hrs. Pumping at 25 g.p.m.

Wellhead Completion

Pitless adapter manufacturer Model

☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
bentonite		ft.	ft.

Nearest Known Source of Contamination

feet Direction Type

Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 08/18/1977

Manufacturer's name JACUZZI

Model Number 754M HP 0.75 Volt 230

Length of drop pipe 54 ft Capacity 12 g.p. Typ Submersible

Abandoned

Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance

Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous

First Bedrock Aquifer Quat. buried
Last Strat gravel (+larger) Depth to Bedrock ft
Located by Minnesota Geological Survey
Locate Method Digitized - scale 1:24,000 or larger (Digitizing Table)
System UTM - NAD83, Zone 15, Meters X 463975 Y 5000973
Unique Number Verification Address verification Input Date 01/01/1990

Angled Drill Hole

Well Contractor

Renner E.H. & Sons	27015	BLACK, D.
Licensee Business	Lic. or Reg. No.	Name of Driller

Minnesota Unique Well Number

162064

County Hennepin
Quad Anoka
Quad ID 120B

MINNESOTA DEPARTMENT OF HEALTH
WELL AND BORING REPORT
Minnesota Statutes Chapter 1031

Entry Date 08/24/1991
Update Date 09/01/2015
Received Date

Well Name	Township	Range	Dir	Section	Subsection
CUTTER,	120	22	W	34	BCCCBB

Elevation 914 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

C/W 11330 FERNBROOK LA N DAYTON MN 55327

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
CLAY	0	50		
GRAVEL	50	100		
CLAY	100	125		
SHALE & SOFT	125	215		SOFT

Remarks

Well Depth	Depth Completed	Date Well Completed
215 ft.	215 ft.	12/20/1979

Drill Method Non-specified Rotary **Drill Fluid**

Use domestic **Status** Active

Well Hydrofractured? Yes ☐ No ☐ **From** **To**

Casing Type Single casing **Joint** Threaded
Drive Shoe? Yes ☐ No ☐ **Above/Below**

Casing Diameter	Weight	Hole Diameter
4 in. To 179 ft.	lbs./ft.	4 in. To 215 ft.

Open Hole From 179 ft. To 215 ft.

Screen? ☐ **Type** **Make**

Static Water Level
50 ft. land surface Measure 12/20/1979

Pumping Level (below land surface)

Wellhead Completion
Pitless adapter manufacturer Model
☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
well grouted, type unknown		ft.	ft.

Nearest Known Source of Contamination
feet Direction Type
Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 12/21/1979
Manufacturer's name AERMOTOR
Model Number HP 0.75 Volt
Length of drop pipe 72 ft Capacity 50 g.p. Typ Submersible

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous
First Bedrock Jordan-Tunnel City Aquifer Jordan-Tunnel
Last Strat Jordan-Tunnel City Depth to Bedrock 125 ft
Located by Minnesota Geological Survey
Locate Method Digitized - scale 1:24,000 or larger (Digitizing Table)
System UTM - NAD83, Zone 15, Meters X 463706 Y 5000869
Unique Number Verification Address verification Input Date 01/01/1990

Angled Drill Hole

Well Contractor

Licensee Business	Lic. or Reg. No.	Name of Driller
Torgerson Well Co.	27056	HAFFTEN, G.

Minnesota Unique Well Number

166986

County Hennepin
Quad Anoka
Quad ID 120B

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 08/24/1991
Update Date 08/18/2014
Received Date

Well Name	Township	Range	Dir	Section	Subsection
DERALD	120	22	W	34	BBBCCA

Elevation 924 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

C/W 11620 FERNBROOK LA DAYTON MN 55327

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
CLAY	0	3	BROWN	SOFT
GRAVEL	3	34	BROWN	SOFT
CLAY	34	80	GRAY	HARD
GRAVEL	80	120	GRAY	SOFT
CLAY	120	185	RED/BRN	HARD
SHALE	185	257	GREEN	HARD
SANDROCK	257	310	WHITE	HARD

Remarks

Well Depth 310 ft. **Depth Completed** 310 ft. **Date Well Completed** 09/25/1978

Drill Method Non-specified Rotary **Drill Fluid**

Use domestic **Status** Active

Well Hydrofractured? Yes ☐ No ☐ **From** **To**

Casing Type Single casing **Joint** Threaded

Drive Shoe? Yes ☒ No ☐ **Above/Below** 1 ft.

Casing Diameter	Weight	Hole Diameter
4 in. To 257 ft.	11 lbs./ft.	4 in. To 310 ft.

Open Hole From 257 ft. To 310 ft.

Screen? ☐ **Type** **Make**

Static Water Level

65 ft. land surface Measure 09/25/1978

Pumping Level (below land surface)

120 ft. 1 hrs. Pumping at 60 g.p.m.

Wellhead Completion

Pitless adapter manufacturer Model

☐ Casing Protection ☒ 12 in. above grade

☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
bentonite	2.5 Cubic yards	0 ft.	257 ft.

Nearest Known Source of Contamination

60 feet North Direction Septic tank/drain field Type

Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 10/03/1978

Manufacturer's name STA-RITE

Model Number HP 0.5 Volt 230

Length of drop pipe 84 ft Capacity 10 g.p. Typ Submersible

Abandoned

Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance

Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous

First Bedrock St.Lawrence Formation Aquifer Tunnel City

Last Strat Tunnel City Group Depth to Bedrock 185 ft

Located by Minnesota Geological Survey

Locate Method Digitized - scale 1:24,000 or larger (Digitizing Table)

System UTM - NAD83, Zone 15, Meters X 463726 Y 5001407

Unique Number Verification Address verification Input Date 01/01/1990

Angled Drill Hole

Well Contractor

Licensee Business	Lic. or Reg. No.	Name of Driller
Mc Alpine Brothers	86270	BACH, P.

Minnesota Unique Well Number

168667

County Hennepin
Quad Anoka
Quad ID 120B

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 08/24/1991
Update Date 08/18/2014
Received Date

Well Name	Township	Range	Dir	Section	Subsection
JOE KLINE	120	22	W	27	CCDACB

Elevation 917 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

C/W 14100 117TH AV N DAYTON MN 55327

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
CLAY	0	46	YELLOW	MEDIUM
SANDY CLAY	46	70	YELLOW	SOFT
SAND	70	78	GRAY	SOFT
CLAY & ROCK	78	150	BROWN	HARD
CLAY	150	215	GRAY	HARD
CLAY & GRAVEL &	215	230	YELLOW	HARD
SANDROCK	230	285	WHITE	HARD

Remarks

Well Depth 285 ft. **Depth Completed** 285 ft. **Date Well Completed** 10/26/1979

Drill Method Non-specified Rotary **Drill Fluid**

Use domestic **Status** Active

Well Hydrofractured? Yes ☐ No ☐ **From** **To**

Casing Type Single casing **Joint** Threaded
Drive Shoe? Yes ☒ No ☐ **Above/Below** 1 ft.

Casing Diameter	Weight	Hole Diameter
4 in. To 230 ft.	12 lbs./ft.	6 in. To 230 ft.
		4 in. To 285 ft.

Open Hole From 230 ft. To 285 ft.

Screen? ☐ **Type** **Make**

Static Water Level
50 ft. land surface Measure 10/26/1979

Pumping Level (below land surface)
50 ft. 3 hrs. Pumping at 20 g.p.m.

Wellhead Completion
Pitless adapter manufacturer Model
☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
bentonite		0 ft.	230 ft.

Nearest Known Source of Contamination
50 feet Direction Septic tank/drain field Type
Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 10/29/1979
Manufacturer's name A.Y. MCDONALD
Model Number 8075K3 HP 0.75 Volt 230
Length of drop pipe 84 ft Capacity 20 g.p. Typ Submersible

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous
First Bedrock Tunnel City Group Aquifer Tunnel City
Last Strat Tunnel City Group Depth to Bedrock 230 ft
Located by Minnesota Geological Survey
Locate Method Digitized - scale 1:24,000 or larger (Digitizing Table)
System UTM - NAD83, Zone 15, Meters X 463978 Y 5001722
Unique Number Verification Address verification Input Date 01/01/1990

Angled Drill Hole

Well Contractor

Licensee Business	Lic. or Reg. No.	Name of Driller
Mc Alpine's Well Co.	27186	MCALPINE, G.

Minnesota Well Index Report | **168667** | Printed on 11/14/2024 HE-01205-15

Minnesota Unique Well Number

168710

County Hennepin
Quad Anoka
Quad ID 120B

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 08/24/1991
Update Date 02/08/2016
Received Date

Well Name	Township	Range	Dir	Section	Subsection
HYNES,	120	22	W	34	BCACCB

Elevation 913 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

Well 13900 114TH AV N DAYTON MN 55327

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
CLAY	0	21	BROWN	
CLAY	21	62	GRAY	
CLAY & GRAVEL	62	78	GRAY	
GRAVEL & CLAY	78	103	GRAY	
GRAVEL & CLAY	103	106	RED	
GRAVEL	106	113	RED	
GRAVEL & CLAY	113	117	GRAY	
GRAVEL & SAND	117	139	VARIED	
CLAY	139	139	GRAY	

Remarks

Well Depth 139 ft. **Depth Completed** 139 ft. **Date Well Completed** 11/13/1979

Drill Method Non-specified Rotary **Drill Fluid**

Use domestic **Status** Active

Well Hydrofractured? Yes ☐ No ☐ **From** **To**

Casing Type Single casing **Joint** Threaded
Drive Shoe? Yes ☐ No ☒ **Above/Below** 1 ft.

Casing Diameter		Weight	
4	in. To 138 ft.	10.7	lbs./ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** stainless **Make** JOHNSON

Diameter	Slot/Gauze	Length	Set	
4 in.	20	3 ft.	133 ft.	136 ft.

Static Water Level

41 ft. land surface Measure 11/13/1979

Pumping Level (below land surface)

ft. 3 hrs. Pumping at 36 g.p.m.

Wellhead Completion

Pitless adapter manufacturer Model

☐ Casing Protection ☒ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
bentonite		ft.	ft.

Nearest Known Source of Contamination

feet Direction Type

Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 03/20/1980

Manufacturer's name RED JACKET

Model Number BVC 751 HP 0.75 Volt 230

Length of drop pipe ft Capacity 12 g.p. Typ Submersible

Abandoned

Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance

Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous

First Bedrock Aquifer Quat. buried

Last Strat clay-gray Depth to Bedrock ft

Located by Minnesota Geological Survey

Locate Method Digitized - scale 1:24,000 or larger (Digitizing Table)

System UTM - NAD83, Zone 15, Meters X 463877 Y 5001004

Unique Number Verification Address verification Input Date 01/01/1990

Angled Drill Hole

Well Contractor

Renner E.H. & Sons 02015 RENNER, R.
Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well Number

197428

County Hennepin
Quad Anoka
Quad ID 120B

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 07/05/1991
Update Date 02/14/2014
Received Date 10/24/1983

Well Name	Township	Range	Dir	Section	Subsection
BRUNN,	120	22	W	34	BCBCDA

Elevation 915 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

Well 14250 114TH AV N DAYTON MN 55327

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
CLAY	0	20	YELLOW	HARD
CLAY	20	40	GRAY	HARD
GRAVEL	40	62	BROWN	SOFT
CLAY	62	80	GRAY	HARD
GRAVEL	80	92	BROWN	SOFT
CLAY	92	92	BROWN	SOFT

Remarks

BLUE HERION ESTATES BLK 1 LOT 1.

Well Depth 92 ft. **Depth Completed** 92 ft. **Date Well Completed** 09/08/1983

Drill Method Non-specified Rotary **Drill Fluid**

Use domestic **Status** Active

Well Hydrofractured? Yes ☐ No ☐ **From** **To**

Casing Type Single casing **Joint** Threaded
Drive Shoe? Yes ☐ No ☒ **Above/Below** 1 ft.

Casing Diameter	Weight	Hole Diameter
4 in. To 87 ft.	11 lbs./ft.	6.2 in. To 92 ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** stainless **Make** JOHNSON 948

Diameter	Slot/Gauze	Length	Set	
2 in.	18	5 ft.	87 ft.	92 ft.

Static Water Level

40 ft. land surface Measure 09/08/1983

Pumping Level (below land surface)

87 ft. 2 hrs. Pumping at 50 g.p.m.

Wellhead Completion

Pitless adapter manufacturer MERRILL Model SPK

☐ Casing Protection ☒ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
bentonite		ft.	70 ft.

Nearest Known Source of Contamination

100 feet Northwes Direction Sewer Type

Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 09/19/1983

Manufacturer's name AERMOTOR
Model Number HP 0.5 Volt 230
Length of drop pipe 60 ft Capacity 10 g.p. Typ Submersible

Abandoned

Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance

Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous

First Bedrock Aquifer Quat. buried
Last Strat clay-brown Depth to Bedrock ft
Located by Minnesota Geological Survey
Locate Method Digitization (Screen) - Map (1:24,000) (15 meters or
System UTM - NAD83, Zone 15, Meters X 463771 Y 5001020
Unique Number Verification Address verification Input Date 07/25/2008

Angled Drill Hole

Well Contractor

Licensee Business	Lic. or Reg. No.	Name of Driller
Mc Alpine Brothers	86270	MCALPINE, B.

Minnesota Unique Well Number

202779

County Hennepin
Quad Anoka
Quad ID 120B

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 08/24/1991
Update Date 11/03/2015
Received Date

Well Name	Township	Range	Dir	Section	Subsection
KURR, EDWARD	120	22	W	28	DDDA

Elevation 905 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

Well DAYTON MN 55316

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
CLAY	0	18	BROWN	
CLAY & GRAVEL	18	38	BLUE	
CLAY & GRAVEL	38	50	BROWN	
SAND & GRAVEL	50	66	BROWN	
SILT & GRAVEL	66	70	BROWN	
MUDDY SAND	70	75	BROWN	
MUDDY GRAVEL	75	110	BROWN	
SAND & GRAVEL	110	119	BROWN	

Remarks

Well Depth 119 ft. **Depth Completed** 119 ft. **Date Well Completed** 01/16/1973

Drill Method Cable Tool **Drill Fluid**

Use domestic **Status** Active

Well Hydrofractured? Yes ☐ No ☐ **From** **To**

Casing Type Single casing **Joint** Threaded

Drive Shoe? Yes ☐ No ☐ **Above/Below**

Casing Diameter **Weight**

4 in. To 115 ft. lbs./ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** stainless **Make** JOHNSON

Diameter	Slot/Gauze	Length	Set
4 in.	25	4 ft.	0 ft. ft.

Static Water Level

22 ft. land surface Measure 01/16/1973

Pumping Level (below land surface)

22 ft. hrs. Pumping at 20 g.p.m.

Wellhead Completion

Pitless adapter manufacturer BAKER Model

☐ Casing Protection ☐ 12 in. above grade

☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☐ Yes ☐ No ☐ Not Specified

Nearest Known Source of Contamination

feet Direction Type

Well disinfected upon completion? ☐ Yes ☐ No

Pump ☐ Not Installed Date Installed

Manufacturer's name DEMPSTER

Model Number HP 0.75 Volt

Length of drop pipe 44 ft Capacity 15 g.p. Typ Submersible

Abandoned

Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance

Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous

First Bedrock Aquifer Quat. buried

Last Strat sand +larger-brown Depth to Bedrock ft

Located by Minnesota Geological Survey

Locate Method Digitized - scale 1:24,000 or larger (Digitizing Table)

System UTM - NAD83, Zone 15, Meters X 463632 Y 5001719

Unique Number Verification Input Date 01/01/1990

Angled Drill Hole

Well Contractor

Licensee Business	Lic. or Reg. No.	Name of Driller
Renner E.H. & Sons	27015	PAUL/BUD/ED

Minnesota Unique Well Number

202780

County Hennepin
Quad Anoka
Quad ID 120B

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 08/24/1991
Update Date 11/03/2015
Received Date

Well Name	Township	Range	Dir	Section	Subsection
BRAUN,	120	22	W	28	DDDABA

Elevation 900 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

Well DAYTON MN 55316

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
CLAY	0	20	BROWN	
SAND	20	31	BROWN	
SAND AND CLAY	31	68	GRAY	
WATER SAND	68	83	GRAY	
CEMENTED SAND	83	88	BROWN	
CLAY AND GRAVEL	88	96	GRAY	
CLAY AND GRAVEL	96	130	BROWN	
GRAVEL DIRTY	130	144	BROWN	
SAND	144	154		

Remarks

Well Depth 154 ft. **Depth Completed** 154 ft. **Date Well Completed** 08/17/1971

Drill Method **Drill Fluid**

Use domestic **Status** Active

Well Hydrofractured? Yes ☐ No ☐ **From** **To**

Casing Type Single casing **Joint** Welded
Drive Shoe? Yes ☐ No ☐ **Above/Below**

Casing Diameter **Weight**
4 in. To 150 ft. lbs./ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** **Make** JOHNSON

Diameter	Slot/Gauze	Length	Set
4 in.	18	4 ft.	0 ft. ft.

Static Water Level
46 ft. land surface Measure 08/17/1971

Pumping Level (below land surface)
48 ft. hrs. Pumping at 20 g.p.m.

Wellhead Completion
Pitless adapter manufacturer BAKER Model
☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☐ Yes ☐ No ☐ Not Specified

Nearest Known Source of Contamination
feet Direction Type
Well disinfected upon completion? ☐ Yes ☐ No

Pump ☐ Not Installed Date Installed 08/23/1971
Manufacturer's name RED JACKET
Model Number HP 0.75 Volt
Length of drop pipe 63 ft Capacity g.p. Typ Submersible

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous
First Bedrock Aquifer Quat. buried
Last Strat sand Depth to Bedrock ft
Located by Minnesota Geological Survey
Locate Method Digitized - scale 1:24,000 or larger (Digitizing Table)
System UTM - NAD83, Zone 15, Meters X 463626 Y 5001777
Unique Number Verification Input Date 01/01/1990

Angled Drill Hole

Well Contractor
Renner E.H. & Sons 27015
Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well Number

202781

County Hennepin
Quad Anoka
Quad ID 120B

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 08/24/1991
Update Date 11/03/2015
Received Date

Well Name	Township	Range	Dir	Section	Subsection
COOK, LEE	120	22	W	34	BBBCBA

Elevation 925 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

Well DAYTON MN 55327

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
CLAY	0	15	BROWN	
CLAY	15	73	GRAY	
SAND, GRAVEL	73	92	GRAY	
SAND AND GRAVEL-	92	102	GRAY	

Remarks

Well Depth 102 ft. **Depth Completed** 102 ft. **Date Well Completed** 11/29/1971

Drill Method **Drill Fluid**

Use domestic **Status** Active

Well Hydrofractured? Yes ☐ No ☐ **From** **To**

Casing Type Single casing **Joint** Welded

Drive Shoe? Yes ☐ No ☐ **Above/Below**

Casing Diameter **Weight**

4 in. To 98 ft. lbs./ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** stainless **Make** JOHNSON

Diameter	Slot/Gauze	Length	Set
4 in.	15	4 ft.	0 ft. ft.

Static Water Level

30 ft. land surface Measure 11/29/1971

Pumping Level (below land surface)

30 ft. hrs. Pumping at 17 g.p.m.

Wellhead Completion

Pitless adapter manufacturer BAKER Model

☐ Casing Protection ☐ 12 in. above grade

☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☐ Yes ☐ No ☐ Not Specified

Nearest Known Source of Contamination

feet Direction Type

Well disinfected upon completion? ☐ Yes ☐ No

Pump ☐ Not Installed Date Installed 11/00/1971

Manufacturer's name AERMOTOR

Model Number 75M HP 0.75 Volt

Length of drop pipe 42 ft Capacity g.p. Typ Submersible

Abandoned

Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance

Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous

First Bedrock Aquifer Quat. buried

Last Strat sand +larger-gray Depth to Bedrock ft

Located by Minnesota Geological Survey

Locate Method Digitized - scale 1:24,000 or larger (Digitizing Table)

System UTM - NAD83, Zone 15, Meters X 463741 Y 5001451

Unique Number Verification Input Date 01/01/1990

Angled Drill Hole

Well Contractor

Renner E.H. & Sons 27015

Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well Number

209255

County Hennepin
Quad Anoka
Quad ID 120B

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 08/24/1991
Update Date 05/01/2015
Received Date

Well Name	Township	Range	Dir	Section	Subsection
SUNDANCE	120	22	W	33	CBAAAA

Elevation 910 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

Contact 15240 113TH AV N DAYTON MN 55327

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
DRIFT (SAND, GRAVEL,	0	225		
SANDROCK	225	245		
SANDROCK	245	273		
SHALE	273	323		
SANDROCK & SHALE	323	325		
SANDROCK & SHALE	325	342		
SANDROCK	342	373		
SANDROCK	373	395		
SHALE	395	465		
SHALE	465	471		
SANDROCK	471	626		

Remarks

GAMMA LOGGED 5-5-1994. M.G.S. NO.578.

Well Depth 626 ft. **Depth Completed** 626 ft. **Date Well Completed** 10/00/1970

Drill Method Cable Tool **Drill Fluid**

Use irrigation **Status** Active

Well Hydrofractured? Yes ☐ No ☐ **From** **To**

Casing Type Single casing **Joint**

Drive Shoe? Yes ☐ No ☐ **Above/Below** 0 ft.

Casing Diameter	Weight	Hole Diameter
12 in. To 265 ft.	lbs./ft.	12 in. To 626 ft.

Open Hole From 265 ft. To 626 ft.

Screen? ☐ **Type** **Make**

Static Water Level

26.2 ft. land surface Measure 10/00/1970

Pumping Level (below land surface)

58.6 ft. hrs. Pumping at 754 g.p.m.

Wellhead Completion

Pitless adapter manufacturer Model

☐ Casing Protection ☒ 12 in. above grade

☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☐ Yes ☐ No ☐ Not Specified

Nearest Known Source of Contamination

feet Direction Type

Well disinfected upon completion? ☐ Yes ☐ No

Pump ☐ Not Installed Date Installed 00/00/1970

Manufacturer's name PEERLESS

Model Number HP 0 Volt

Length of drop pipe 100 ft Capacity 700 g.p. Typ Turbine

Abandoned

Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance

Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous

First Bedrock Tunnel City Group Aquifer Tunnel City-Mt.

Last Strat Mt.Simon Sandstone Depth to Bedrock 245 ft

Located by Minnesota Geological Survey

Locate Method Digitized - scale 1:24,000 or larger (Digitizing Table)

System UTM - NAD83, Zone 15, Meters X 462504 Y 5000779

Unique Number Verification Information from Input Date 01/01/1990

Angled Drill Hole

Well Contractor

Keys Well Co. 62012 GIBSON, E.

Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well Number

417042

County Hennepin
Quad Anoka
Quad ID 120B

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 08/24/1991
Update Date 02/14/2014
Received Date

Well Name	Township	Range	Dir	Section	Subsection
BEUCHLER,	120	22	W	34	BBAABA

Elevation 920 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

Well 13921 117TH AV N DAYTON MN 55327

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
CLAY	0	43	YEL/BLK	MEDIUM
SANDY CLAY	43	55	YELLOW	MEDIUM
SAND	55	71	GRAY	SOFT

Remarks

Well Depth 71 ft. **Depth Completed** 71 ft. **Date Well Completed** 06/25/1985

Drill Method Non-specified Rotary **Drill Fluid**

Use domestic **Status** Active

Well Hydrofractured? Yes ☐ No ☐ **From** **To**

Casing Type Single casing **Joint**

Drive Shoe? Yes ☒ No ☐ **Above/Below** 1 ft.

Casing Diameter		Weight
4	in. To 66 ft.	lbs./ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** stainless **Make** JOHNSON

Diameter	Slot/Gauze	Length	Set	
2 in.	12	5 ft.	66 ft.	71 ft.

Static Water Level

50 ft. land surface Measure 06/25/1985

Pumping Level (below land surface)

50 ft. 2 hrs. Pumping at 30 g.p.m.

Wellhead Completion

Pitless adapter manufacturer WHITEWATER Model SU5.5

☐ Casing Protection ☒ 12 in. above grade

☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
neat cement		0 ft.	43 ft.
bentonite		43 ft.	66 ft.

Nearest Known Source of Contamination

50 feet Southwes Direction Septic tank/drain field Type

Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 06/26/1985

Manufacturer's name MCDONALD

Model Number 18050K HP 0.5 Volt 230

Length of drop pipe 54 ft Capacity 12 g.p. Typ Submersible

Abandoned

Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance

Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous

First Bedrock Aquifer Quat. buried

Last Strat sand-gray Depth to Bedrock ft

Located by Minnesota Geological Survey

Locate Method Digitized - scale 1:24,000 or larger (Digitizing Table)

System UTM - NAD83, Zone 15, Meters X 464038 Y 5001541

Unique Number Verification Information from Input Date 01/01/1990

Angled Drill Hole

Well Contractor

Mc Alpine's Well Co.	27186	MCALPINE, G.
Licensee Business	Lic. or Reg. No.	Name of Driller

Minnesota Unique Well Number

417496

County Hennepin
Quad Anoka
Quad ID 120B

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 08/24/1991
Update Date 02/10/2016
Received Date

Well Name	Township	Range	Dir	Section	Subsection
GARBARINI,	120	22	W	34	BCDBBD

Elevation 912 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

C/W 11370 DALLAS LA DAYTON MN 55327

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
CLAY	0	20	BLACK	HARD
CLAY	20	90	BROWN	HARD
HARD PAN	90	105	GRAY	HARD
SAND	105	110	BROWN	SOFT
HARD PAN	110	150	GRAY	HARD
CLAY	150	175	GRAY	HARD
SHALE	175	200	GREEN	HARD
HARD SAND ROCK	200	243	WHITE	HARD

Remarks

Well Depth 243 ft. **Depth Completed** 243 ft. **Date Well Completed** 08/12/1985

Drill Method Non-specified Rotary **Drill Fluid**

Use domestic **Status** Active

Well Hydrofractured? Yes ☐ No ☐ **From** **To**

Casing Type Single casing **Joint** Threaded
Drive Shoe? Yes ☒ No ☐ **Above/Below** 1 ft.

Casing Diameter	Weight	Hole Diameter
0 in. To 200 ft.	lbs./ft.	4 in. To 243 ft.

Open Hole From 200 ft. To 243 ft.

Screen? ☐ **Type** **Make**

Static Water Level
40 ft. land surface Measure 08/12/1985

Pumping Level (below land surface)
140 ft. 4 hrs. Pumping at 45 g.p.m.

Wellhead Completion
Pitless adapter manufacturer MONITOR Model SNAPPY
☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
bentonite		ft.	ft.

Nearest Known Source of Contamination
140 feet East Direction Septic tank/drain field Type
Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 09/14/1985
Manufacturer's name AERMOTOR
Model Number SD1250 HP 0.5 Volt 230
Length of drop pipe 60 ft Capacity 10 g.p. Typ Submersible

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous
First Bedrock St.Lawrence Formation Aquifer Tunnel City
Last Strat Tunnel City Group Depth to Bedrock 175 ft
Located by Minnesota Geological Survey
Locate Method Digitized - scale 1:24,000 or larger (Digitizing Table)
System UTM - NAD83, Zone 15, Meters X 463926 Y 5000928
Unique Number Verification Address verification Input Date 01/01/1990

Angled Drill Hole

Well Contractor
Mork Well Co. 02133 TORGERSON, R.
Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well Number

425099

County Hennepin
Quad Anoka
Quad ID 120B

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 08/24/1991
Update Date 02/14/2014
Received Date

Well Name	Township	Range	Dir	Section	Subsection
SCHMITZ	120	22	W	33	ADADDC

Elevation 920 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

Well 11421 FERNBROOK LA DAYTON MN 55327

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
CLAY	0	15	YELLOW	MEDIUM
CLAY	15	42	BLUE	MEDIUM
SAND	42	75	GRY/BRN	SOFT
CLAY	75	82	BLUE	MEDIUM
SAND	82	94	TAN	SOFT

Remarks

Well Depth	Depth Completed	Date Well Completed
94 ft.	94 ft.	01/08/1987

Drill Method Non-specified Rotary **Drill Fluid** Bentonite

Use domestic **Status** Active

Well Hydrofractured? Yes ☐ No ☐ **From** **To**

Casing Type Single casing **Joint** Threaded
Drive Shoe? Yes ☒ No ☐ **Above/Below** 1 ft.

Casing Diameter	Weight	Hole Diameter
4 in. To 90 ft.	11 lbs./ft.	6.2 in. To 90 ft.
		4 in. To 94 ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** stainless **Make** JOHNSON

Diameter	Slot/Gauze	Length	Set
4 in.	12	4 ft.	90 ft. 94 ft.

Static Water Level
50 ft. land surface Measure 01/08/1987

Pumping Level (below land surface)

Wellhead Completion
Pitless adapter manufacturer WHITEWATER Model
☐ Casing Protection ☒ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
other		0 ft.	90 ft.
bentonite		0 ft.	90 ft.

Nearest Known Source of Contamination
feet Direction Septic tank/drain field Type
Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 01/22/1987
Manufacturer's name RED JACKET
Model Number 50V19BC HP 0.5 Volt 230
Length of drop pipe 68 ft Capacity 10 g.p. Typ Submersible

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☒ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous
First Bedrock Aquifer Quat. buried
Last Strat sand-brown Depth to Bedrock ft
Located by Minnesota Geological Survey
Locate Method Digitized - scale 1:24,000 or larger (Digitizing Table)
System UTM - NAD83, Zone 15, Meters X 463645 Y 5000986
Unique Number Verification Address verification Input Date 01/01/1990

Angled Drill Hole

Well Contractor
Ruppert & Son 27086 RUPPERT, G.
Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well Number

457043

County Hennepin
Quad Anoka
Quad ID 120B

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 12/04/1991
Update Date 02/14/2014
Received Date

Well Name	Township	Range	Dir	Section	Subsection
	120	22	W	34	BCAABD

Elevation 907 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

Well 13920 114TH AV NE DAYTON MN 55369

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
CLAY & GRAVEL	0	8	BROWN	MEDIUM
CLAY	8	18	TAN	SOFT
CLAY & GRAVEL	18	96	GRAY	SOFT
SAND	96	116	GRAY	SOFT

Remarks

Well Depth 116 ft. **Depth Completed** 116 ft. **Date Well Completed** 01/20/1989

Drill Method Non-specified Rotary **Drill Fluid** Bentonite

Use domestic **Status** Active

Well Hydrofractured? Yes ☐ No ☐ **From** **To**

Casing Type Single casing **Joint**
Drive Shoe? Yes ☐ No ☒ **Above/Below** 1 ft.

Casing Diameter	Weight	Hole Diameter
4 in. To 102 ft.	lbs./ft.	6.2 in. To 116 ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** stainless **Make** JOHNSON

Diameter	Slot/Gauze	Length	Set
2 in.	10	16.7 ft.	102 ft. 116 ft.

Static Water Level

27 ft. land surface Measure 01/20/1989

Pumping Level (below land surface)

99 ft. 1 hrs. Pumping at 40 g.p.m.

Wellhead Completion

Pitless adapter manufacturer MONITOR Model 8PL41UC1

☐ Casing Protection ☒ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
neat cement	3 Sacks	ft.	30 ft.

Nearest Known Source of Contamination

feet Direction Type

Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 02/18/1989

Manufacturer's name MYERS

Model Number SJ72 HP 0.75 Volt 230

Length of drop pipe 60 ft Capacity 15 g.p. Typ Submersible

Abandoned

Does property have any not in use and not sealed well(s)? ☐ Yes ☒ No

Variance

Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous

First Bedrock Aquifer Quat. buried
Last Strat sand-gray Depth to Bedrock ft
Located by Minnesota Geological Survey
Locate Method Digitization (Screen) - Map (1:24,000) (15 meters or
System UTM - NAD83, Zone 15, Meters X 464036 Y 5001131
Unique Number Verification Address verification Input Date 07/25/2008

Angled Drill Hole

Well Contractor

Mork Well Co. 02133 LAWRENCE, R.
Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well Number

488759

County Hennepin
Quad Anoka
Quad ID 120B

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 12/31/1993
Update Date 02/14/2014
Received Date 04/01/1992

Well Name	Township	Range	Dir	Section	Subsection
DEHN, WILLARD	120	22	W	33	ACDDCB

Elevation 933 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

Well 14800 113TH AV N DAYTON MN 55327

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
CLAY	0	25	YELLOW	MEDIUM
SAND & CLAY	25	42	YEL/BRN	MEDIUM
CLAY	42	55	BLUE	MEDIUM
SAND	55	79	BRN/GRY	M.SOFT

Remarks

Well Depth	Depth Completed	Date Well Completed
79 ft.	79 ft.	03/10/1992

Drill Method Non-specified Rotary **Drill Fluid** Qwik gel

Use domestic **Status** Active

Well Hydrofractured? Yes ☐ No ☐ **From** **To**

Casing Type Single casing **Joint**
Drive Shoe? Yes ☐ No ☐ **Above/Below** 1 ft.

Casing Diameter	Weight	Hole Diameter
4 in. To 74 ft.	lbs./ft.	8.5 in. To 30 ft.
		6.5 in. To 79 ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** stainless **Make** JOHNSON

Diameter	Slot/Gauze	Length	Set	
2 in.	12	5 ft.	74 ft.	79 ft.

Static Water Level

58 ft. land surface Measure 03/10/1992

Pumping Level (below land surface)

70 ft. 3 hrs. Pumping at 30 g.p.m.

Wellhead Completion

Pitless adapter manufacturer WHITEWATER Model AU5.5

☐ Casing Protection ☒ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
bentonite		30 ft.	74 ft.
neat cement		ft.	30 ft.

Nearest Known Source of Contamination

75 feet Northwes Direction Septic tank/drain field Type

Well disinfected upon completion? ☐ Yes ☐ No

Pump ☐ Not Installed Date Installed 03/11/1992

Manufacturer's name AERMOTER (OWNERS)

Model Number SD1275 HP 0.75 Volt 230

Length of drop pipe 63 ft Capacity 15 g.p. Typ Submersible

Abandoned

Does property have any not in use and not sealed well(s)? ☐ Yes ☒ No

Variance

Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous

First Bedrock Aquifer Quat. buried
Last Strat sand Depth to Bedrock ft
Located by Minnesota Geological Survey
Locate Method Digitization (Screen) - Map (1:24,000) (15 meters or
System UTM - NAD83, Zone 15, Meters X 463196 Y 5000808
Unique Number Verification Address verification Input Date 07/25/2008

Angled Drill Hole

Well Contractor

Licensee Business	Lic. or Reg. No.	Name of Driller
Mc Alpine's Well Co.	27186	MCALPINE, G.

Minnesota Unique Well Number

517882

County Hennepin
Quad Anoka
Quad ID 120B

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 12/31/1993
Update Date 02/14/2014
Received Date 05/24/1993

Well Name	Township	Range	Dir	Section	Subsection
BOGLE, PETE &	120	22	W	34	BCDCBD

Elevation 905 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

Well 11350 DALLAS LA DAYTON MN 55369

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
CLAY	0	18	YELLOW	MEDIUM
CLAY	18	60	BLUE	MEDIUM
GRAVEL	60	67	TAN	M.SOFT
CLAY	67	83	BLUE	MEDIUM
SAND & GRAVEL	83	93	BROWN	M.SOFT

Remarks

Well Depth 93 ft. **Depth Completed** 93 ft. **Date Well Completed** 01/23/1993

Drill Method Non-specified Rotary **Drill Fluid** Bentonite

Use domestic **Status** Active

Well Hydrofractured? Yes ☐ No ☐ **From** **To**

Casing Type **Joint**
Drive Shoe? Yes ☐ No ☒ **Above/Below**

Casing Diameter	Weight	Hole Diameter
4 in. To 83 ft.	lbs./ft.	6.7 in. To 93 ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** plastic **Make** CRESTLINE

Diameter	Slot/Gauze	Length	Set
4 in.	12	4 ft.	83 ft. 93 ft.

Static Water Level

30 ft. land surface Measure 12/22/1992

Pumping Level (below land surface)

50 ft. 3.5 hrs. Pumping at 30 g.p.m.

Wellhead Completion

Pitless adapter manufacturer WHITEWATER Model

☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
cuttings		40 ft.	83 ft.
neat cement		ft.	40 ft.

Nearest Known Source of Contamination

50 feet Southeas Direction Septic tank/drain field Type

Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 01/23/1993

Manufacturer's name AERMOTER

Model Number SD1275 HP 0.75 Volt 230

Length of drop pipe 72 ft Capacity 14 g.p. Typ Submersible

Abandoned

Does property have any not in use and not sealed well(s)? ☐ Yes ☒ No

Variance

Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous

First Bedrock Aquifer Quat. buried

Last Strat sand +larger-brown Depth to Bedrock ft

Located by Minnesota Geological Survey

Locate Method Digitization (Screen) - Map (1:24,000) (15 meters or

System UTM - NAD83, Zone 15, Meters X 463920 Y 5000841

Unique Number Verification Address verification Input Date 07/25/2008

Angled Drill Hole

Well Contractor

Licensee Business	Lic. or Reg. No.	Name of Driller
Ruppert & Son	27086	RUPPERT, C.

Minnesota Unique Well Number

555241

County Hennepin
Quad Anoka
Quad ID 120B

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 12/16/1996
Update Date 02/14/2014
Received Date 11/17/1994

Well Name	Township	Range	Dir	Section	Subsection
GROVER, KEITH	120	22	W	34	BCCCCA

Elevation 913 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

Well 11320 FERNBROOK LA DAYTON MN 55327

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
CLAY	0	14	YELLOW	SOFT
CLAY	14	53	GRAY	MEDIUM
SAND	53	82	BRN/GRY	SOFT

Remarks

Well Depth	Depth Completed	Date Well Completed
82 ft.	82 ft.	10/27/1994

Drill Method Non-specified Rotary **Drill Fluid** Qwik gel

Use domestic **Status** Active

Well Hydrofractured? **Yes** ☐ **No** ☐ **From** **To**

Casing Type Single casing **Joint** Solvent Welded
Drive Shoe? **Yes** ☒ **No** ☐ **Above/Below**

Casing Diameter	Weight	Hole Diameter
4 in. To 77 ft.	lbs./ft.	6.5 in. To 77 ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** stainless **Make** JOHNSON

Diameter	Slot/Gauze	Length	Set	
2 in.	12	5 ft.	77 ft.	82 ft.

Static Water Level

40 ft. land surface Measure 10/27/1994

Pumping Level (below land surface)

60 ft. 3 hrs. Pumping at 30 g.p.m.

Wellhead Completion

Pitless adapter manufacturer MONITOR Model 4AO5.5
☐ Casing Protection ☒ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
cuttings		30 ft.	77 ft.
bentonite	2 Sacks	ft.	30 ft.

Nearest Known Source of Contamination

50 feet East Direction Septic tank/drain field Type
Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 10/28/1994
Manufacturer's name AERMOTER
Model Number 12T50 HP 0.5 Volt 230
Length of drop pipe 60 ft Capacity 12 g.p. Typ Submersible

Abandoned

Does property have any not in use and not sealed well(s)? ☐ Yes ☒ No

Variance

Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous

First Bedrock Aquifer Quat. buried
Last Strat sand Depth to Bedrock ft
Located by Minnesota Geological Survey
Locate Method Digitization (Screen) - Map (1:24,000) (15 meters or
System UTM - NAD83, Zone 15, Meters X 463733 Y 5000813
Unique Number Verification Address verification Input Date 07/25/2008

Angled Drill Hole

Well Contractor

Mc Alpine's Well Co. 27186 MCALPINE, S.
Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well Number

559030

County Hennepin
Quad Anoka
Quad ID 120B

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 12/16/1996
Update Date 02/14/2014
Received Date 05/10/1995

Well Name	Township	Range	Dir	Section	Subsection
HALLQUIST, LEE	120	22	W	33	ADAAAA

Elevation 928 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

Well 11471 FERNBROOK LA DAYTON MN 55369

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
SAND & CLAY	0	31	BRN/YEL	SOFT
CLAY	31	42	GRAY	MEDIUM
SAND & CLAY	42	49	GRY/BRN	MEDIUM
SAND	49	78	BRN/YEL	SOFT

Remarks

Well Depth 78 ft. **Depth Completed** 78 ft. **Date Well Completed** 04/11/1995

Drill Method Non-specified Rotary **Drill Fluid** Qwik gel

Use domestic **Status** Active

Well Hydrofractured? Yes ☐ No ☐ **From** **To**

Casing Type Single casing **Joint** Solvent Welded
Drive Shoe? Yes ☒ No ☐ **Above/Below**

Casing Diameter	Weight	Hole Diameter
4 in. To 73 ft.	lbs./ft.	6.5 in. To 73 ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** stainless **Make** JOHNSON

Diameter	Slot/Gauze	Length	Set	
2 in.	12	5 ft.	73 ft.	78 ft.

Static Water Level

15 ft. land surface Measure 04/11/1995

Pumping Level (below land surface)

40 ft. 3 hrs. Pumping at 30 g.p.m.

Wellhead Completion

Pitless adapter manufacturer MONITOR Model 4AO5.5
☒ Casing Protection ☒ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
cuttings		30 ft.	73 ft.
bentonite	2 Sacks	ft.	30 ft.

Nearest Known Source of Contamination

50 feet South Direction Septic tank/drain field Type
Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 04/12/1995
Manufacturer's name AERMOTER
Model Number 12T50 HP 0.5 Volt 230
Length of drop pipe 40 ft Capacity 12 g.p. Typ Submersible

Abandoned

Does property have any not in use and not sealed well(s)? ☐ Yes ☒ No

Variance

Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous

First Bedrock Aquifer Quat. buried
Last Strat sand Depth to Bedrock ft
Located by Minnesota Geological Survey
Locate Method Digitization (Screen) - Map (1:24,000) (15 meters or
System UTM - NAD83, Zone 15, Meters X 463670 Y 5001161
Unique Number Verification Address verification Input Date 07/25/2008

Angled Drill Hole

Well Contractor

Mc Alpine's Well Co. 27186 MCALPINE, S.
Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well Number

579137

County Hennepin
Quad Anoka
Quad ID 120B

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 08/08/1997
Update Date 07/30/2008
Received Date 08/25/1997

Well Name	Township	Range	Dir	Section	Subsection
BOLLE, PETER	120	22	W	34	BCCDBB

Elevation 909 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

Well 11351 DALLAS LA DAYTON MN 55369

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
CLAY	0	65	BROWN	MEDIUM
SAND & GRAVEL	65	92	BROWN	SOFT

Remarks

Well Depth	Depth Completed	Date Well Completed
92 ft.	92 ft.	10/15/1996

Drill Method Non-specified Rotary **Drill Fluid** Bentonite

Use domestic **Status** Active

Well Hydrofractured? **Yes** ☐ **No** ☐ **From** **To**

Casing Type Single casing **Joint**
Drive Shoe? **Yes** ☐ **No** ☒ **Above/Below**

Casing Diameter	Weight	Hole Diameter
4 in. To 82 ft.	lbs./ft.	6.7 in. To 92 ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** plastic **Make** CRESLINE

Diameter	Slot/Gauze	Length	Set	
4 in.	10	10 ft.	82 ft.	92 ft.

Static Water Level

35 ft. land surface Measure 10/04/1996

Pumping Level (below land surface)

58 ft. 2.5 hrs. Pumping at 30 g.p.m.

Wellhead Completion

Pitless adapter manufacturer MAASS Model 4J1

☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
high solids bentonite		ft.	82 ft.

Nearest Known Source of Contamination

50 feet Southwes Direction Septic tank/drain field Type

Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 10/15/1996

Manufacturer's name MYERS

Model Number HP 0.75 Volt 230

Length of drop pipe 80 ft Capacity 14 g.p. Typ Submersible

Abandoned

Does property have any not in use and not sealed well(s)? ☐ Yes ☒ No

Variance

Was a variance granted from the MDH for this well? ☐ Yes ☒ No

Miscellaneous

First Bedrock Aquifer Quat. buried

Last Strat sand +larger-brown Depth to Bedrock ft

Located by Minnesota Geological Survey

Locate Method Digitization (Screen) - Map (1:24,000) (15 meters or

System UTM - NAD83, Zone 15, Meters X 463792 Y 5000857

Unique Number Verification Address verification Input Date 07/25/2008

Angled Drill Hole

Well Contractor

Licensee Business	Lic. or Reg. No.	Name of Driller
Ruppert & Son	27086	RUPPERT, A.

Minnesota Unique Well Number

623582

County Hennepin
Quad Anoka
Quad ID 120B

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 04/28/1999
Update Date 02/10/2016
Received Date 02/25/1999

Well Name	Township	Range	Dir	Section	Subsection
HANSON,	120	22	W	33	ADAADD

Elevation 925 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

Well 11451 FERNBROOK LA DAYTON MN 55369

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
TOPSOIL/CLAY	0	10	BLK/BRN	SOFT
SAND	10	20	BROWN	SOFT
CLAY	20	50	GRAY	SOFT
GRAVEL	50	75	VARIED	MEDIUM
CLAY & ROCKS	75	100	BROWN	MEDIUM
SAND	100	120	BROWN	SOFT

Remarks

Well Depth 120 ft. **Depth Completed** 120 ft. **Date Well Completed** 01/19/1999

Drill Method Non-specified Rotary **Drill Fluid** Bentonite

Use domestic **Status** Active

Well Hydrofractured? Yes ☐ No ☒ **From** **To**

Casing Type Single casing **Joint**
Drive Shoe? Yes ☐ No ☐ **Above/Below**

Casing Diameter	Weight	Hole Diameter
4 in. To 113 ft.	1.9 lbs./ft.	8 in. To 30 ft.
		6.2 in. To 120 ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** stainless **Make** JOHNSON

Diameter	Slot/Gauze	Length	Set	
2 in.	10	8 ft.	112 ft.	120 ft.

Static Water Level

65 ft. land surface Measure 01/19/1999

Pumping Level (below land surface)

105 ft. 2 hrs. Pumping at 30 g.p.m.

Wellhead Completion

Pitless adapter manufacturer WHITEWATER Model

☐ Casing Protection ☒ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
high solids bentonite	2.5 Sacks	0 ft.	30 ft.
cuttings		30 ft.	113 ft.

Nearest Known Source of Contamination

60 feet West Direction Septic tank/drain field Type

Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 01/21/1999

Manufacturer's name RED JACKET

Model Number HP 0.5 Volt 115

Length of drop pipe 84 ft Capacity 2 g.p. Typ Submersible

Abandoned

Does property have any not in use and not sealed well(s)? ☐ Yes ☒ No

Variance

Was a variance granted from the MDH for this well? ☐ Yes ☒ No

Miscellaneous

First Bedrock Aquifer Quat. buried

Last Strat sand-brown Depth to Bedrock ft

Located by Minnesota Geological Survey

Locate Method Digitization (Screen) - Map (1:24,000) (15 meters or

System UTM - NAD83, Zone 15, Meters X 463669 Y 5001092

Unique Number Verification Address verification Input Date 07/25/2008

Angled Drill Hole

Well Contractor

Stodola Don Well Co. 27172 MOORE, C.

Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well Number

655001

County Hennepin
Quad Anoka
Quad ID 120B

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 10/12/2001
Update Date 07/29/2008
Received Date

Well Name	Township	Range	Dir	Section	Subsection
ROBERSON,	120	22	W	28	DDAAAD

Elevation 878 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

Well 11881 FERNBROOK LA N DAYTON MN 55327

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
CLAY	0	16	YELLOW	SOFT
CLAY	16	80	GRAY	MEDIUM
WATER SAND	80	96	GRAY	SOFT

Remarks

Well Depth 96 ft. **Depth Completed** 96 ft. **Date Well Completed** 09/12/2000

Drill Method Non-specified Rotary **Drill Fluid** Water

Use domestic **Status** Active

Well Hydrofractured? Yes ☐ No ☒ **From** **To**

Casing Type Single casing **Joint** Glued

Drive Shoe? Yes ☐ No ☒ **Above/Below**

Casing Diameter	Weight	Hole Diameter
4 in. To 88 ft.	2.05 lbs./ft.	8 in. To 30 ft.
		6.2 in. To 96 ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** stainless **Make** JOHNSON

Diameter	Slot/Gauze	Length	Set	
2 in.	10	8 ft.	88 ft.	96 ft.

Static Water Level

30 ft. land surface Measure 09/12/2000

Pumping Level (below land surface)

86 ft. 2 hrs. Pumping at 40 g.p.m.

Wellhead Completion

Pitless adapter manufacturer WHITEWATER Model

☐ Casing Protection ☒ 12 in. above grade

☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
high solids bentonite	2.5 Sacks	0 ft.	30 ft.

Nearest Known Source of Contamination

80 feet South Direction Septic tank/drain field Type

Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 10/18/2000

Manufacturer's name GOULDS

Model Number HP 1 Volt 230

Length of drop pipe 42 ft Capacity g.p. Typ Submersible

Abandoned

Does property have any not in use and not sealed well(s)? ☐ Yes ☒ No

Variance

Was a variance granted from the MDH for this well? ☐ Yes ☒ No

Miscellaneous

First Bedrock Aquifer Quat. buried

Last Strat sand-gray Depth to Bedrock ft

Located by Minnesota Geological Survey

Locate Method Digitization (Screen) - Map (1:24,000) (15 meters or

System UTM - NAD83, Zone 15, Meters X 463673 Y 5001922

Unique Number Verification Address verification Input Date 07/23/2008

Angled Drill Hole

Well Contractor

Stodola Don Well Co. 27172 MOORE, C.

Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well Number

767816

County Hennepin
Quad Anoka
Quad ID 120B

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 04/06/2009
Update Date 08/06/2014
Received Date 06/22/2009

Well Name	Township	Range	Dir	Section	Subsection
BRANDT, BILL	120	22	W	28	DDADCC

Elevation 901 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

C/W 11801 FERNBROOK LA DAYTON MN 55327

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
CLAY	0	8	BROWN	MEDIUM
CLAY	8	27	YELLOW	MEDIUM
CLAY	27	40	GRAY	MEDIUM
CLAY & SAND	40	45	GRY/BRN	SOFT
SAND	45	63	BRN/BLK	SOFT
CLAY	63	69	GRAY	MEDIUM
SAND	69	80	BRN/BLK	SOFT

Remarks

Well Depth 80 ft. **Depth Completed** 80 ft. **Date Well Completed** 12/05/2008

Drill Method Non-specified Rotary **Drill Fluid** Qwik gel

Use domestic **Status** Active

Well Hydrofractured? Yes ☐ No ☒ **From** **To**

Casing Type Single casing **Joint** Welded
Drive Shoe? Yes ☐ No ☐ **Above/Below**

Casing Diameter		Weight
4	in. To 76 ft.	lbs./ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** stainless **Make** JOHNSON

Diameter	Slot/Gauze	Length	Set	
2 in.	12	4 ft.	76 ft.	80 ft.

Static Water Level
30 ft. land surface Measure 12/05/2008

Pumping Level (below land surface)
30 ft. 2 hrs. Pumping at 50 g.p.m.

Wellhead Completion
Pitless adapter manufacturer MERRILL Model MCK6
☐ Casing Protection ☒ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
cuttings		50 ft.	76 ft.
bentonite	3 Sacks	ft.	50 ft.

Nearest Known Source of Contamination
75 feet South Direction Septic tank/drain field Type
Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 12/05/2008
Manufacturer's name SCHAEFER
Model Number 7L4Y12 HP 0.75 Volt 230
Length of drop pipe 60 ft Capacity 12 g.p. Typ Submersible

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☒ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☒ No

Miscellaneous
First Bedrock Aquifer Quat. buried
Last Strat sand Depth to Bedrock ft
Located by Minnesota Geological Survey
Locate Method Digitization (Screen) - Map (1:24,000) (15 meters or
System UTM - NAD83, Zone 15, Meters X 463613 Y 5001773
Unique Number Verification Info/GPS from data Input Date 03/17/2009

Angled Drill Hole

Well Contractor
McAlpines Well Drilling of 1477 MCALPINE, T.
Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well Number

854464

County Hennepin
Quad Anoka
Quad ID 120B

MINNESOTA DEPARTMENT OF HEALTH
WELL AND BORING REPORT
Minnesota Statutes Chapter 1031

Entry Date 12/21/2020
Update Date 02/16/2021
Received Date

Well Name	Township	Range	Dir	Section	Subsection
DAYTON TW 1	120	22	W	33	BAAAAA

Elevation 909 ft. **Elev. Method** LiDAR 1m DEM (MNDNR)

Address

Contact 12260 DIAMOND LAKE RD S DAYTON MN 55327

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
TOPSOIL	0	1	BROWN	SOFT
CLAY	1	17	BROWN	MEDIUM
CLAY	17	29	GRAY	MEDIUM
SAND	29	66	GRAY	SOFT
CLAY	66	70	GRAY	MEDIUM
SAND	70	76	GRAY	SOFT
CLAY	76	84	BROWN	MEDIUM
CLAY	84	95	GRAY	MEDIUM
SAND	95	107	GRAY	SOFT
CLAY	107	139	BROWN	MEDIUM
SAND	139	145	BROWN	SOFT
CLAY	145	149	GRAY	MEDIUM
SAND	149	158	BROWN	SOFT
CLAY	158	185	BROWN	MEDIUM
SAND & GRAVEL	185	204	BROWN	SOFT
SHALE & SANDSTONE	204	220	BLU/TAN	SOFT
SHALE & SANDSTONE	220	305	BLU/TAN	HARD
SANDSTONE	305	360	TAN	HARD
SANDSTONE	360	380	TAN	HARD
SHALE	377	380	RED	HARD

Remarks

M.G.S. # 5931
DRILLERS: ROBBIE, JASON, NICK , ROY
GAMMA LOGGED ON 2-5-2021 BY TRAUT COMPANIES

Well Depth 380 ft. **Depth Completed** 380 ft. **Date Well Completed** 12/02/2020

Drill Method Non-specified Rotary **Drill Fluid** Bentonite

Use test well **Status** Active

Well Hydrofractured? Yes ☐ No ☒ **From** **To**

Casing Type Single casing **Joint**
Drive Shoe? Yes ☐ No ☒ **Above/Below**

Casing Diameter	Weight	Hole Diameter
6 in. To 240 ft.	18.9 lbs./ft.	10 in. To 240 ft.
		6 in. To 380 ft.

Open Hole From 240 ft. To 380 ft.

Screen? ☐ **Type** **Make**

Static Water Level
33 ft. land surface Measure 12/02/2020

Pumping Level (below land surface)
380 ft. 0.8 hrs. Pumping at 100 g.p.m.

Wellhead Completion
Pitless adapter manufacturer Model
☒ Casing Protection ☒ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
neat cement	3.5 Cubic yards	ft.	240 ft.

Nearest Known Source of Contamination
90 feet East Direction Body of water Type
Well disinfected upon completion? ☒ Yes ☐ No

Pump ☒ Not Installed Date Installed
Manufacturer's name
Model Number HP Volt
Length of drop pipe ft Capacity g.p. Typ

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☒ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☒ No

Miscellaneous
First Bedrock Tunnel City Group Aquifer Wonewoc-Eau
Last Strat Eau Claire Formation Depth to Bedrock 204 ft
Located by Minnesota Geological Survey
Locate Method Digitization (Screen) - Map (1:24,000) (15 meters or
System UTM - NAD83, Zone 15, Meters X 462894 Y 5001574
Unique Number Verification Info/GPS from data Input Date 12/21/2020

Angled Drill Hole

Well Contractor
Mark J Traut Wells, Inc. 1404 SEE REMARKS
Licensee Business Lic. or Reg. No. Name of Driller

Appendix E

Wetland Delineation Report and WCA Notice of Decision

BOARD OF WATER AND SOIL RESOURCES

Minnesota Wetland Conservation Act
Notice of Decision

Local Government Unit: City of Dayton	**County:** Hennepin
Applicant Name: Tom Dehn **Applicant Representative:** Kjolhaug Environmental – Melissa Barrett	
Project Name: 14800 113th Ave N	**LGU Project No. (if any):**
Date Complete Application Received by LGU: 7/31/2024	
Date of LGU Decision: 9/18/2024	
Date this Notice was Sent: 9/18/2024	

WCA Decision Type - check all that apply

☒ Wetland Boundary/Type ☐ Sequencing ☐ Replacement Plan ☐ Bank Plan (not credit purchase)
☐ No-Loss (8420.0415) ☐ Exemption (8420.0420)
Part: ☐ A ☐ B ☐ C ☐ D ☐ E ☐ F ☐ G ☐ H Subpart: ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9

Replacement Plan Impacts (replacement plan decisions only)

Total WCA Wetland Impact Area**:**
Wetland Replacement Type: ☐ Project Specific Credits: ☐ Bank Credits:
Bank Account Number(s):

Technical Evaluation Panel Findings and Recommendations (attach if any)

☐ Approve ☐ Approve w/Conditions ☐ Deny ☒ No TEP Recommendation

LGU Decision

☐ Approved with Conditions (specify below)[1] ☒ Approved[1] ☐ Denied
List Conditions:

Decision-Maker for this Application: ☒ Staff ☐ Governing Board/Council ☐ Other:

Decision is valid for: ☒ 5 years (default) ☐ Other (specify):

[1] *Wetland Replacement Plan approval is not valid until BWSR confirms the withdrawal of any required wetland bank credits. For project-specific replacement a financial assurance per MN Rule 8420.0522, Subp. 9 and evidence that all required forms have been recorded on the title of the property on which the replacement wetland is located must be provided to the LGU for the approval to be valid.*

LGU Findings – Attach document(s) and/or insert narrative providing the basis for the LGU decision[1].

☒ Attachment(s) (specify): Site Location Map, Wetland Figure
☒ Summary: A wetland boundary & type application was submitted for a site located in Section 33, Township 120N, Range 22W, City of Dayton, Hennepin County. The site is located on the north of 113th Ave N. The property corresponds to 14800 113th Avenue North, and is 100-ac. PIDs 3312022130001 (14800 113th Ave N; 73 acres) and 3312022110001(14401 117th Ave N; 17.99 acres).

A field investigation was performed on June 14, 2024, as well as an offsite determination of the agricultural portions of the site. The LGU reviewed the offsite analysis and conducted a field review. It was determined that one wetland is present on the site.

Wetland 1: Type 1 – 1,090 sf This decision approves the wetland boundary & type for the site shown in the figure, which is attached. The City of Dayton approves this Application.

[1] *Findings must consider any TEP recommendations.*

Attached Project Documents

☒ Site Location Map ☒ Project Plan(s)/Descriptions/Reports (specify): Wetland Figure

Appeals of LGU Decisions

If you wish to appeal this decision, you must provide a written request within 30 calendar days of the date you received the notice. All appeals must be submitted to the Board of Water and Soil Resources Executive Director along with a check payable to BWSR for $500 *unless* the LGU has adopted a local appeal process as identified below. The check must be sent by mail and the written request to appeal can be submitted by mail or e-mail. The appeal should include a copy of this notice, name and contact information of appellant(s) and their representatives (if applicable), a statement clarifying the intent to appeal and supporting information as to why the decision is in error. Send to:

Appeals & Regulatory Compliance Coordinator
Minnesota Board of Water & Soils Resources
520 Lafayette Road North
St. Paul, MN 55155
travis.germundson@state.mn.us

Does the LGU have a local appeal process applicable to this decision?

☐ Yes[1] ☒ No

[1]*If yes, all appeals must first be considered via the local appeals process.*

Local Appeals Submittal Requirements (LGU must describe how to appeal, submittal requirements, fees, etc. as applicable)

Notice Distribution (include name)

Required on all notices:

☒ SWCD TEP Member: Stacey Lijewski , Hennepin SWCD	☒ BWSR TEP Member: Jed Chesnut
☐ LGU TEP Member (if different than LGU contact):	
☒ DNR Representative: Wes Saunders-Pearce and Melissa Collins	
☒ Watershed District or Watershed Mgmt. Org.: Elm Creek WMO	
☒ Applicant: Tom Dehn ☒ Agent/Consultant: Melissa Barrett	

Optional or As Applicable:

☒ Corps of Engineers: usace_requests_mn@usace.army.mil	
☐ BWSR Wetland Mitigation Coordinator (required for bank plan applications only):	
☐ Members of the Public (notice only):	☒ Other: City of Dayton

Signature: 	**Date:** 9/18/2024

This notice and accompanying application materials may be sent electronically or by mail. The LGU may opt to send a summary of the application to members of the public upon request per 8420.0255, Subp. 3.

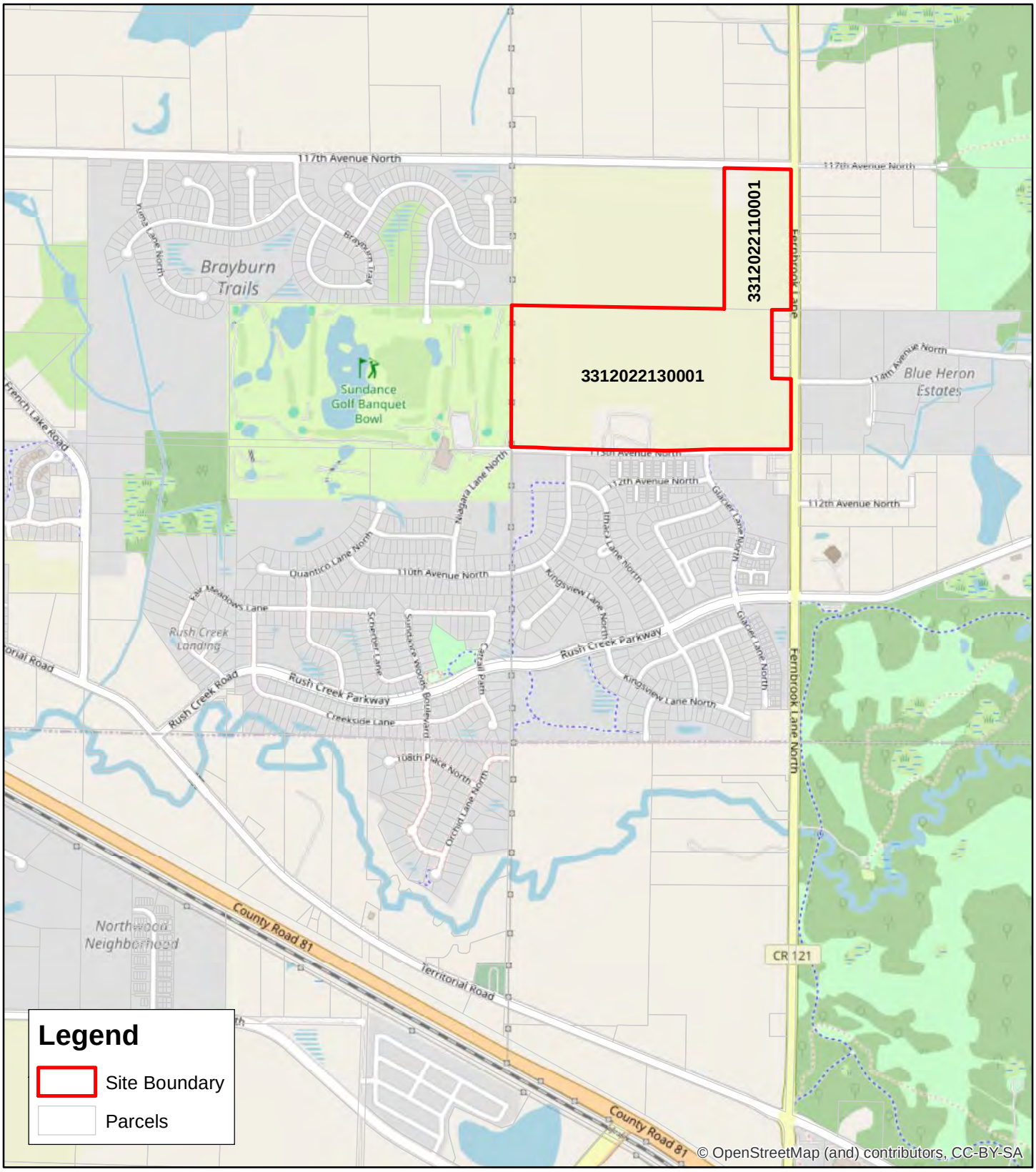


Figure 1 - Site Location

N

0 1,200 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: ESRI Streets Basemap

14800 113th Ave N (KES 2024-063)
Dayton, Minnesota

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

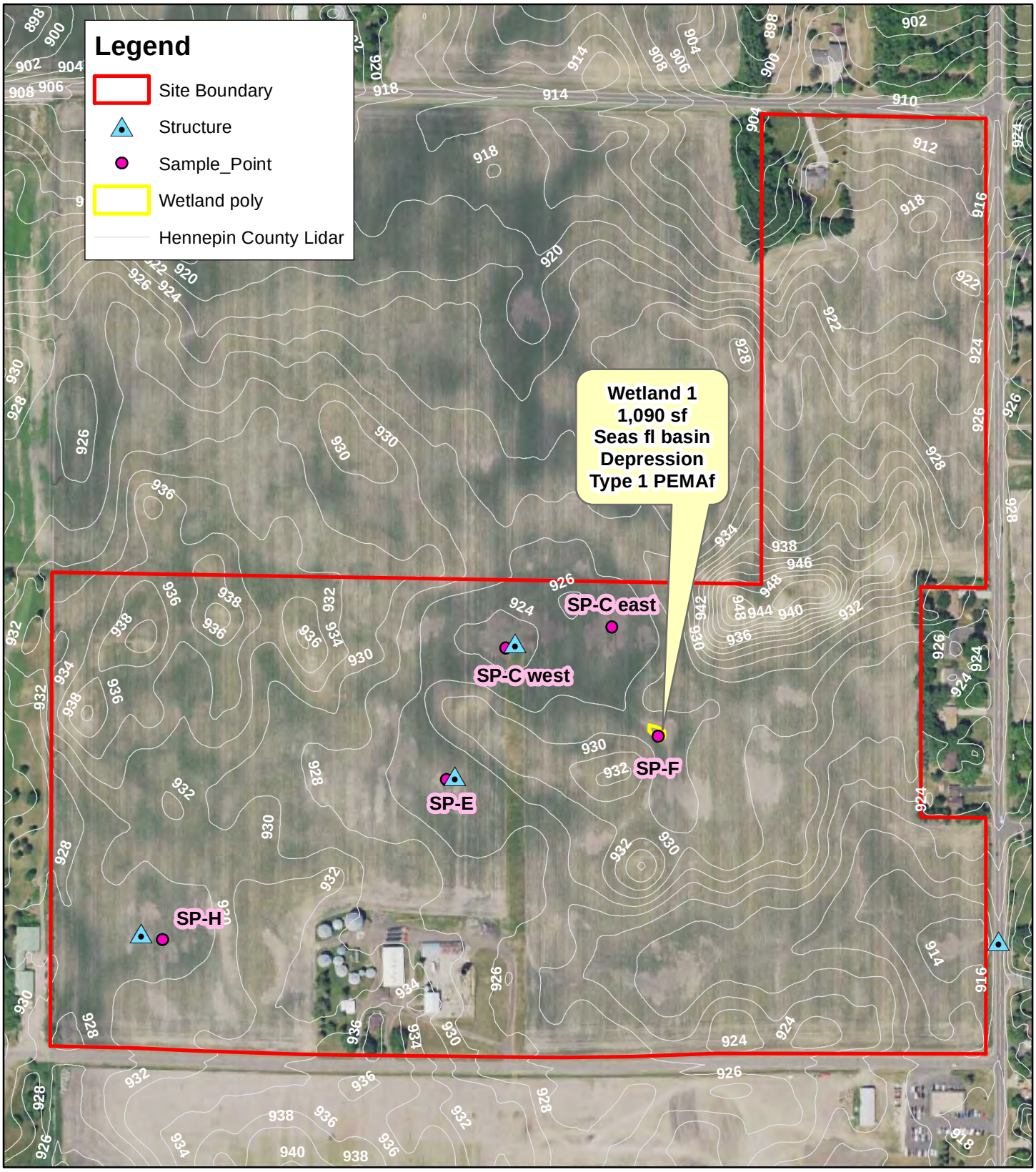


Figure 2 - Existing Conditions (6-18-2021 FSA Photo)

N

0 500 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MNGEO Spatial Commons

14800 113th Ave N (KES 2024-063)
Dayton, Minnesota

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

14800 113th Ave N

Dayton, Hennepin County, Minnesota

Wetland Delineation Report

Prepared for

Tom Dehn

by

Kjolhaug Environmental Services Company, Inc.
(KES Project No. 2024-063)

July 10, 2024

14800 113th Ave N

Dayton, Hennepin County, Minnesota

Wetland Delineation Report

TABLE OF CONTENTS

FIGURES

APPENDICES

14800 113th Ave N

Dayton, Hennepin County, Minnesota

Wetland Delineation Report

1. WETLAND DELINEATION SUMMARY

- The 90.99-ac 14800 113th Ave N site was inspected on June 14, 2024 for the presence and extent of wetland.
- The National Wetlands Inventory (NWI) map showed one PEM1Af wetland in the northeast corner of the site.
- The soil survey showed Cordova and Hamel as the mapped Predominantly Hydric and Partially Hydric soil types within site boundaries. All other soil types on the site are mapped as Not Hydric.
- The DNR Public Waters Inventory did not show any DNR Public Waters, Wetlands, or Watercourses within 1000 feet of site boundaries.
- The National Hydrography Dataset did not show any surface water features within or near site boundaries.
- One (1) Type 1 (PEMAf) farmed, seasonally flooded basin (HGM Class = depression) was delineated on the site as shown on **Figure 2**.

2. OVERVIEW

The 90.99-acre 14800 113th Ave N site was inspected on June 14, 2024 for the presence and extent of wetland. The property was located in Section 33, Township 120 North, Range 22 West, City of Dayton, Hennepin County, Minnesota. The site was located north of 113th Ave N, east of Sundance Golf Course, and West of Ferndale Lane N (**Figure 1**). The property corresponded to the Hennepin County PIDs 3312022130001 (14800 113th Ave N; 73 acres) and 3312022110001 (14401 117th Ave N; 17.99 acres).

The parcel was comprised of row crop land planted with both corn and soybeans for the 2024 season. A farmstead was located along 113th Ave, and a grass air strip was located in the center of the site. Topography on the site was undulating with hills, swales, and depressions scattered throughout. Some depressional areas contained agricultural tile inlets.

One (1) wetland was delineated within the site boundaries. The delineated wetland boundary 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 from the City of Dayton 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 boundary was located in the field 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) showed one PEM1Af wetland in the northeast corner of the site (**Figure 3**).

The Soil Survey (USDA NRCS 2015) showed Cordova and Hamel as the mapped Predominantly Hydric and Partially Hydric soil types within site boundaries. All other soil types on the site are mapped as Not Hydric. Soil types mapped on the property are listed in **Table 1** and a map showing soil types is included in **Figure 4**.

Table 1. Soil types mapped on the 14800 113th Ave N site.

Symbol	Soil Name	Acres	% of Area	% Hydric	Hydric Category
L22C2	Lester loam, 6 to 10 percent slopes, moderately eroded	5.6	6.20%	2	Predominantly Non-Hydric
L22D2	Lester loam, 10 to 16 percent slopes, moderately eroded	2.5	2.80%	0	Not Hydric
L23A	Cordova loam, 0 to 2 percent slopes	2	2.20%	95	Predominantly Hydric
L36A	Hamel, overwash-Hamel complex, 0 to 3 percent slopes	12.2	13.40%	45	Partially Hydric
L37B	Angus loam, 2 to 6 percent slopes	22.5	24.70%	5	Predominantly Non-Hydric
L44A	Nessel loam, 1 to 3 percent slopes	15.4	16.90%	10	Predominantly Non-Hydric
L45A	Dundas-Cordova complex, 0 to 3 percent slopes	30.7	33.70%	30	Predominantly Non-Hydric

The Minnesota DNR Public Waters Inventory (Minnesota Department of Natural Resources 2015) did not show any DNR Public Waters, Wetlands, or Watercourses within 1000 feet of site boundaries (**Figure 5**).

The National Hydrography Dataset (U.S. Geological Survey 2015) did not show any surface water features within or near site boundaries (**Figure 6**).

4.2 Wetland Determinations and Delineations

Potential wetlands were evaluated during field observations on June 14, 2024. One (1) wetland was identified and delineated on the property (**Figure 2**). Corresponding data forms are included in **Appendix B**. The following description of the wetland and its adjacent upland reflects conditions observed at the time of the field visit. At that time, the fields were planted with alternating rows/areas of corn and soybeans. Precipitation conditions were atypical (wet) based on the three-month antecedent precipitation data for a date of June 14, 2024, and ~ 3 inches above the 70th % (wet range) based on the 30-day rolling total (**Appendix C**).

Wetland 1 was a Type 1 (PEMAf) farmed, seasonally flooded basin (HGM = depression) that was that was sparely vegetated with yellow nut sedge. The depression lacked free water or

saturated soils within 12 inches of the soil surface. However, secondary hydrology indicators of geomorphic position and FAC-Neutral Test were observed. See ***Area F*** of **Section 4.3**.

No primary hydrology indicators were observed in the upland.

The wetland boundary corresponded with the limits of the sparsely vegetated area. Wetland 1 was not shown as wetland on the NWI map but was located within an area mapped with partially hydric soil (Hamel) on the soil survey.

4.3 Aerial Review for Offsite Hydrology Determinations

Areas in agricultural cropland that exhibited potential wetland signatures on aerial photography and with low or depressional topography were reviewed generally following methods described in Guidance for Offsite Hydrology/Wetland Determinations (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 2**).

Table 2. Aerial photograph interpretation codes

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

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 8 most recent normal photos used for the assessment included photos from 2023, 2022, 2020, 2019, 2018, 2015, 2014, and 2010.

Eleven (11) areas showing a wet signature on the 2017 FSA photo (most recent “wet” photo) were included in the review. The locations of ***Area A through Area K*** 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**. Results of the review are summarized in Table 3 below.

Table 3. Offsite Review Results

Area	% Signatures during normal period photo	Field Verification Required?	Determination
A	0%	Yes	No - Lack of one primary or two secondary hydrology indicators. Flat planted cropland.
B	0%	No	No
C (west depression)	63%	No (however, area was reviewed in field)	No - tile inlet present. Lack of one primary or two secondary hydrology indicators. See SP-C west.
C (east depression)	63%	No (however, area was reviewed in field)	No – Lack of one primary or two secondary hydrology indicators. See SP-C east.
D	13%	No	No
E	38%	Yes	No - soil not hydric (see SP-E). Tile inlet present. Lack of one primary or two secondary hydrology indicators.
F	50%	Yes	**Yes (Wetland 1**). See SP-F.
G	0%	No	No
H	50%	Yes	No - Tile inlet present. Lack of one primary or two secondary hydrology indicators. See SP-H.
I	25%	No	No
J	13%	No	No
K	13%	No	No

4.4 Other Areas

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

4.5 Request for Wetland Boundary and Jurisdictional Determination

Appendix A of this report includes a Joint Application Form for Activities Affecting Water Resources in Minnesota, which is submitted in request for a wetland boundary and type determination approval from the City of Dayton under the Minnesota Wetland Conservation Act (WCA).

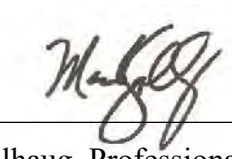
5. CERTIFICATION OF DELINEATION

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: July 8, 2024
Mark Kjolhaug, Professional Wetland Scientist No. 000845

14800 113th Ave N, Dayton

Wetland Delineation Report

FIGURES

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

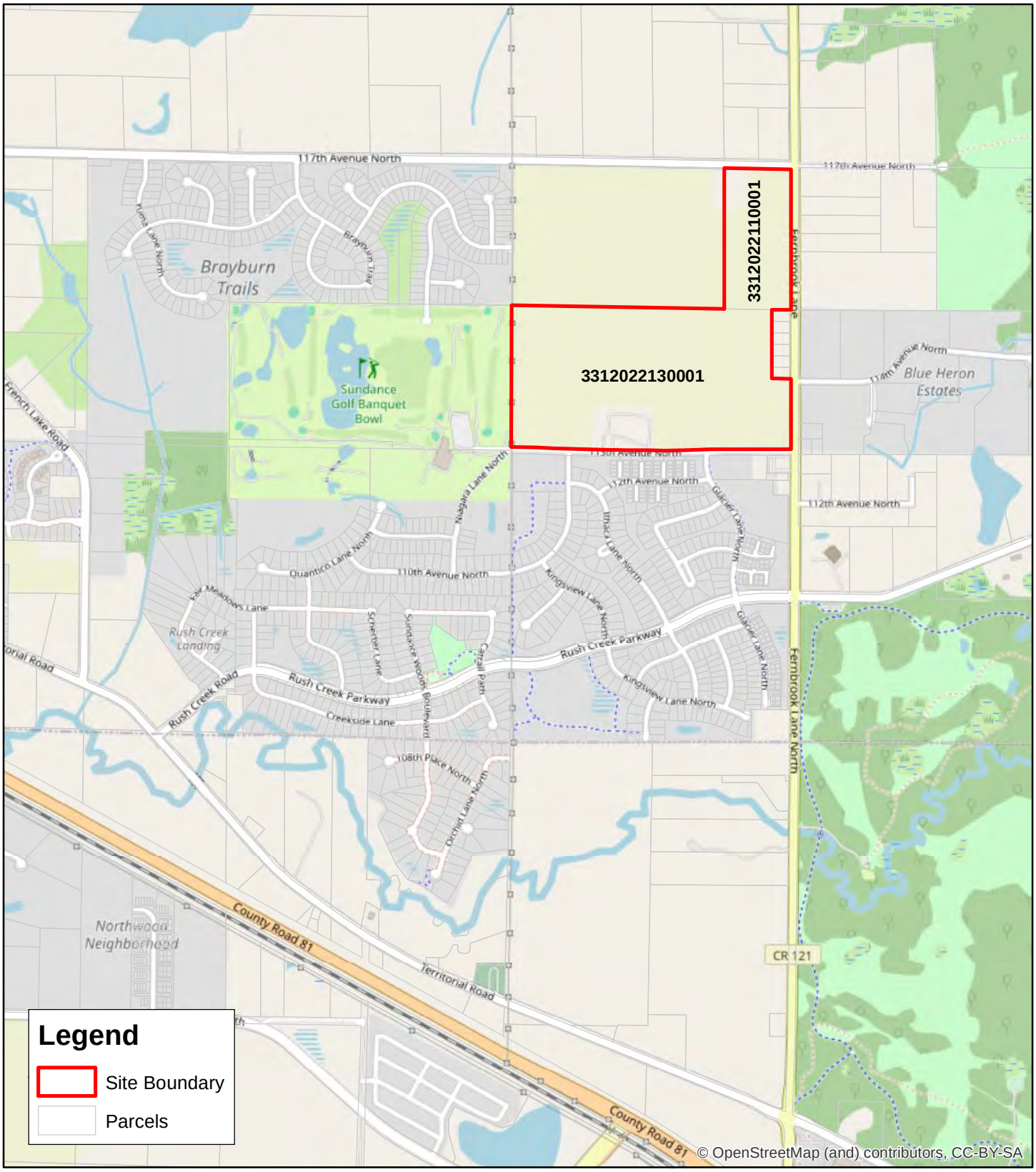


Figure 1 - Site Location

N

0 1,200 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: ESRI Streets Basemap

14800 113th Ave N (KES 2024-063)
Dayton, Minnesota

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

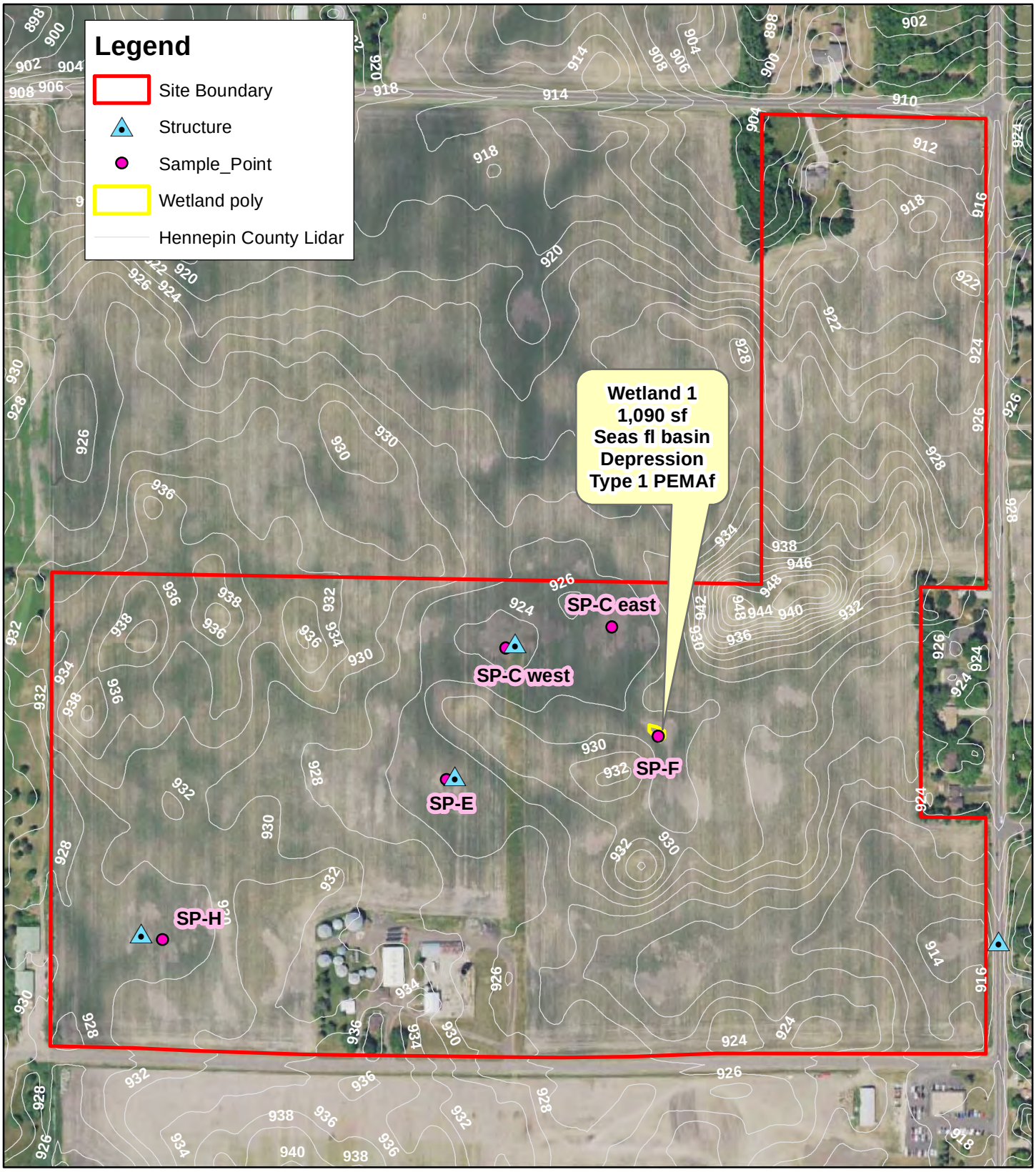


Figure 2 - Existing Conditions (6-18-2021 FSA Photo)

N

0 500 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MNGEO Spatial Commons

14800 113th Ave N (KES 2024-063)
Dayton, Minnesota

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

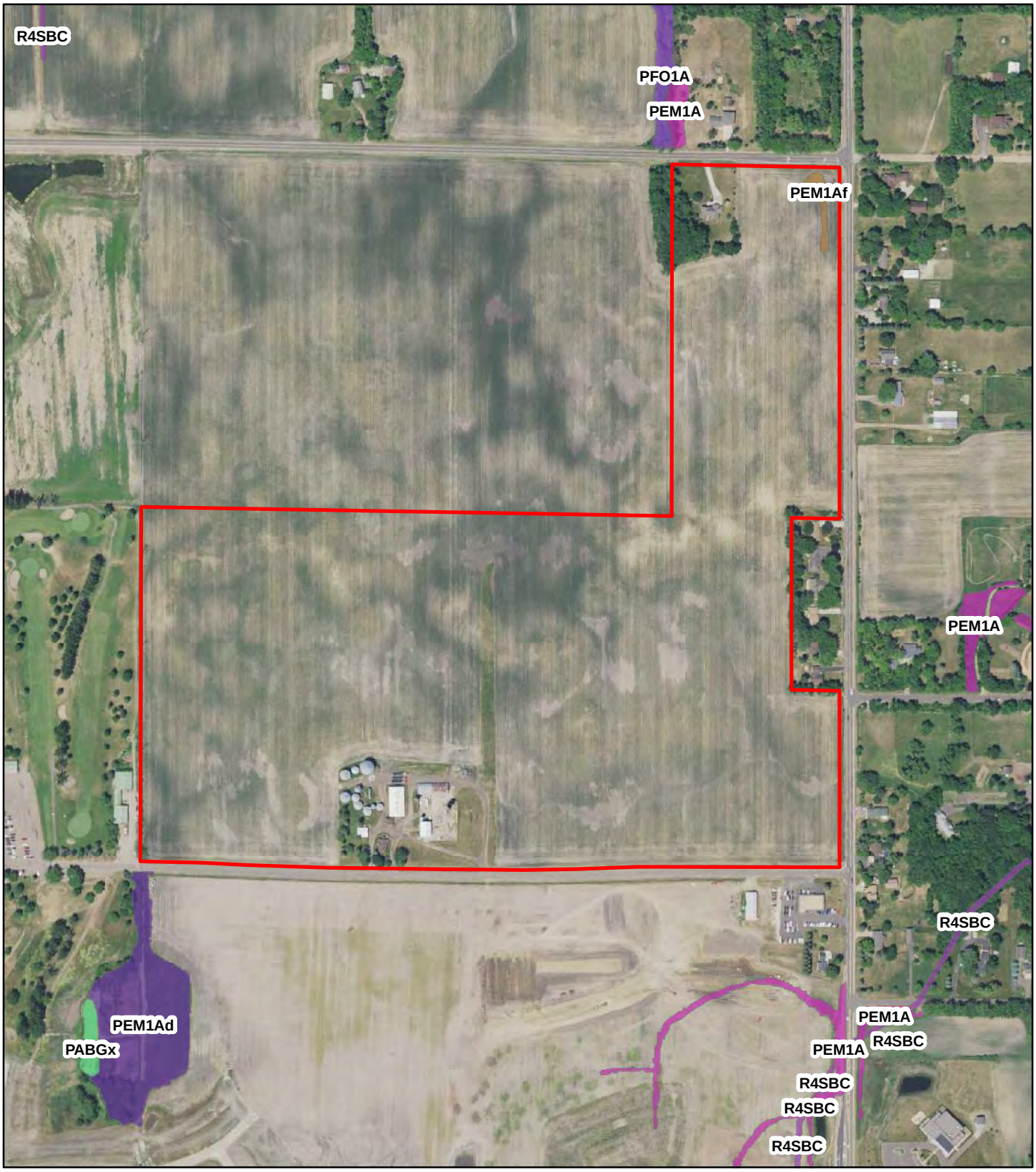


Figure 3 - National Wetlands Inventory

N

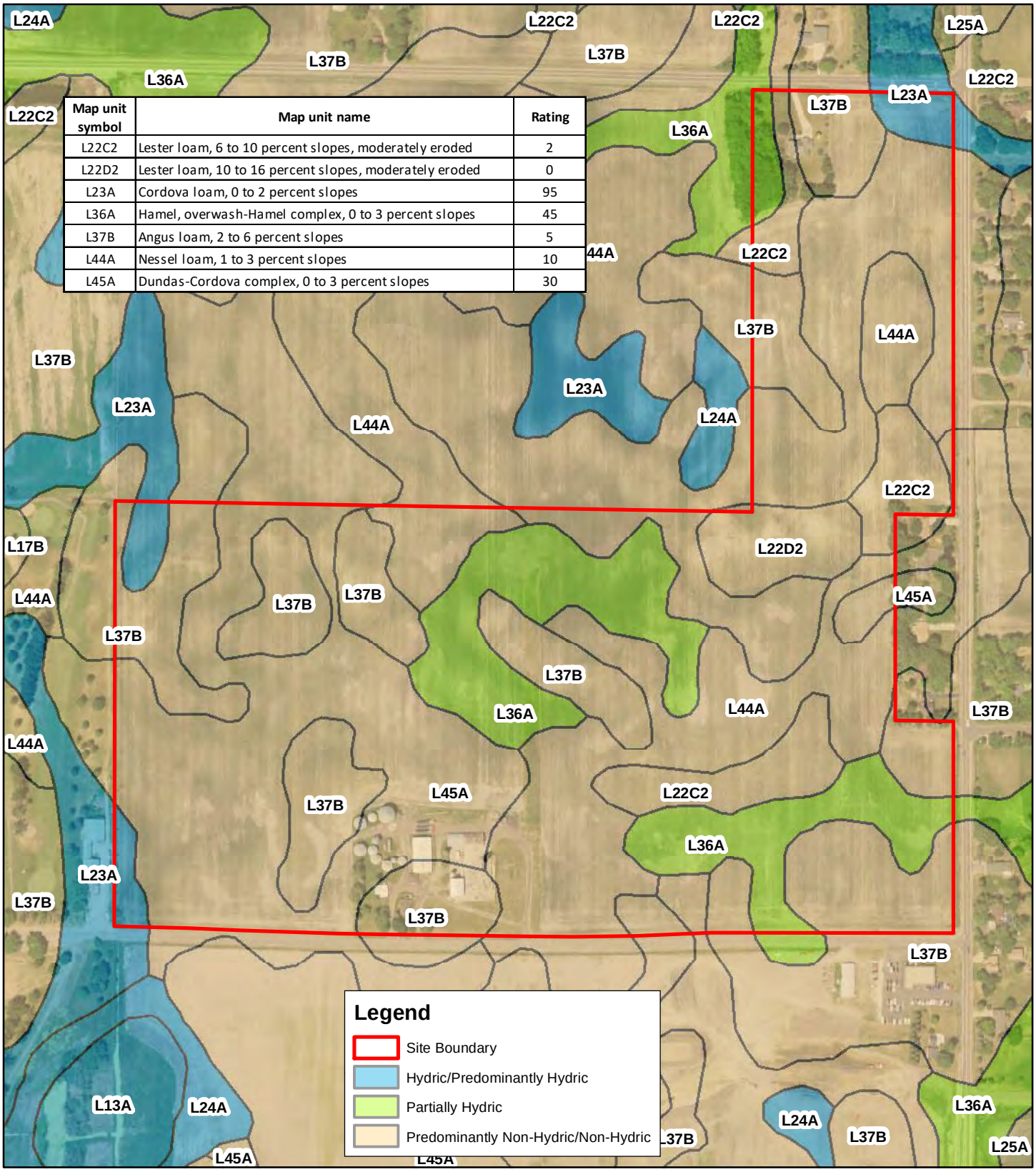
0 500 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MNGEO Spatial Commons, USFWS

14800 113th Ave N (KES 2024-063)
Dayton, Minnesota

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



Map unit symbol	Map unit name	Rating
L22C2	Lester loam, 6 to 10 percent slopes, moderately eroded	2
L22D2	Lester loam, 10 to 16 percent slopes, moderately eroded	0
L23A	Cordova loam, 0 to 2 percent slopes	95
L36A	Hamel, overwash-Hamel complex, 0 to 3 percent slopes	45
L37B	Angus loam, 2 to 6 percent slopes	5
L44A	Nessel loam, 1 to 3 percent slopes	10
L45A	Dundas-Cordova complex, 0 to 3 percent slopes	30

Figure 4 - Soil Survey

N

0 500 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MNGEO Spatial Commons, USDA, NRCS

14800 113th Ave N (KES 2024-063)
Dayton, Minnesota

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

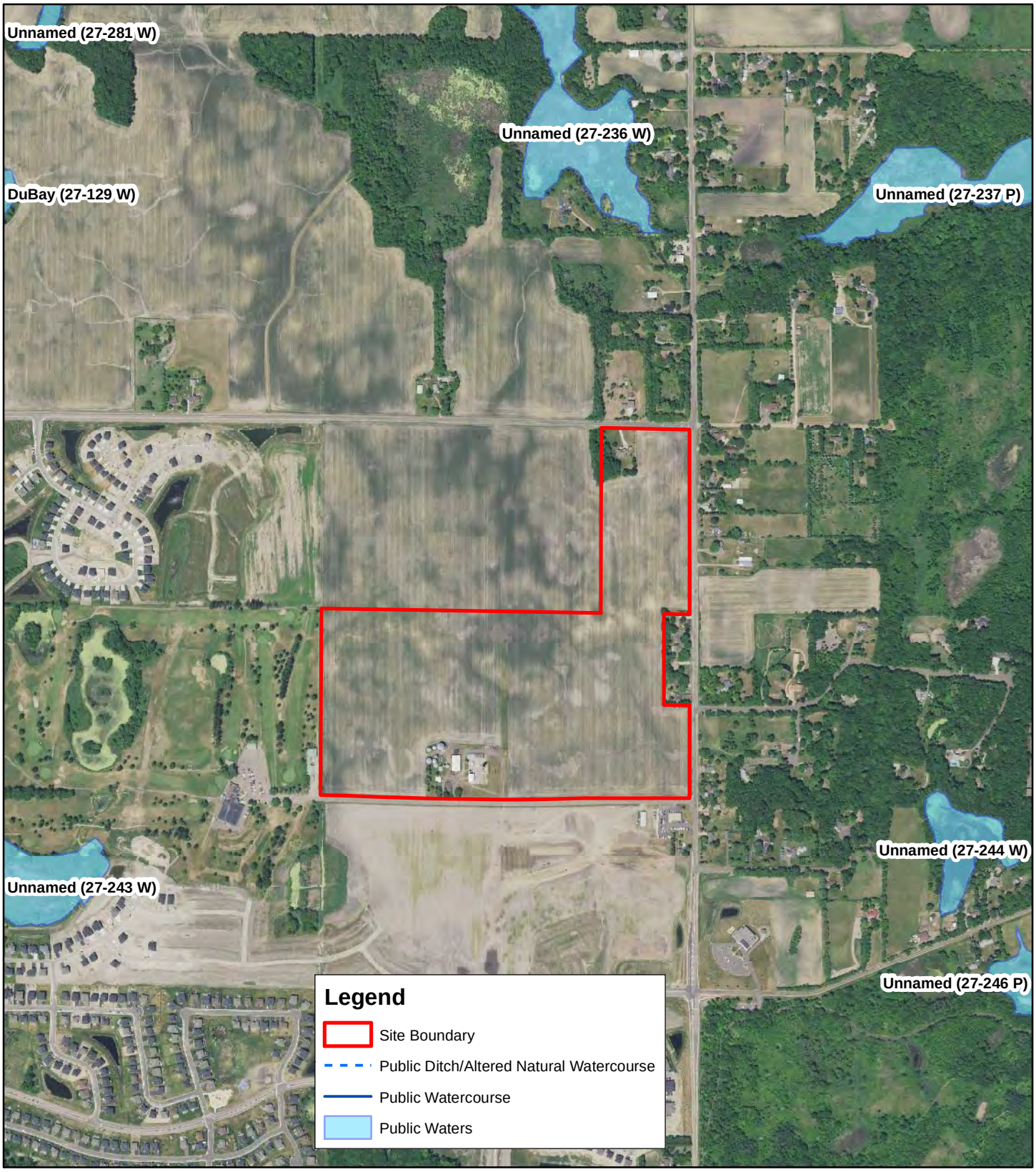


Figure 5 - DNR Public Waters Inventory

N

0 1,000 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MNGEO Spatial Commons, MN DNR

14800 113th Ave N (KES 2024-063)
Dayton, Minnesota

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

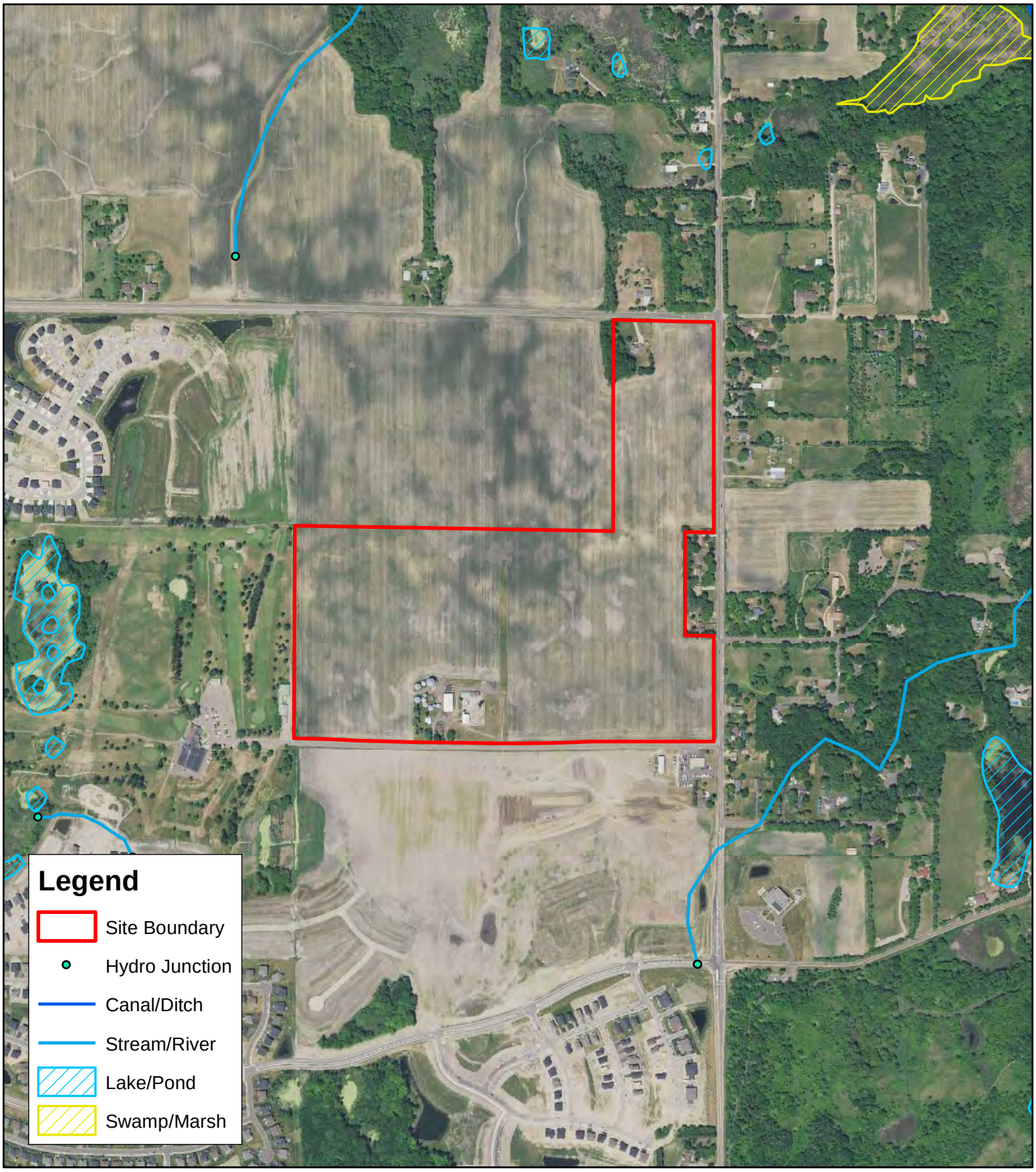


Figure 6 - National Hydrography Dataset

N

0 500 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MNGEO Spatial Commons, USGS

14800 113th Ave N (KES 2024-063)
Dayton, Minnesota

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

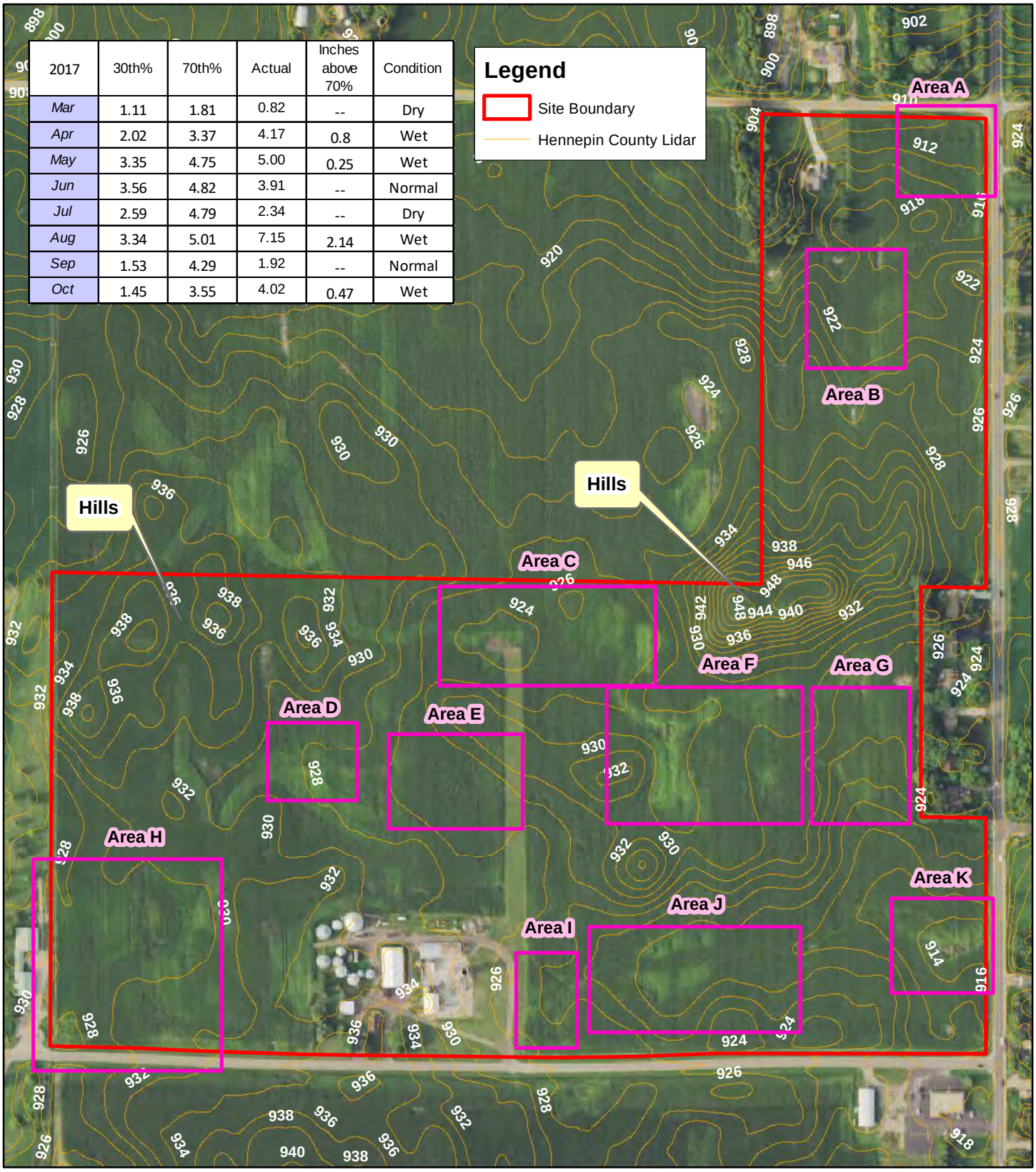


Figure 7 - Offsite Hydrology Assessment Areas (8-21-2017 FSA Wet Photo & Wet spring)

N

0 250 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MNGEO Spatial Commons

14800 113th Ave N (KES 2024-063)
Dayton, Minnesota

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

14800 113th Ave N, Dayton

Wetland Delineation Report

APPENDIX A

Joint Application Form for Activities Affecting Water Resources in Minnesota

PART ONE: Applicant Information

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

Applicant/Landowner Name: Tom Dehn
Mailing Address: 6781 Highway 10 Ramsey, MN 55303
Phone: (612)-328-2215
E-mail Address: tom.dehn@powerlodge.com

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

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

PART TWO: Site Location Information

County: Hennepin **City/Township: Dayton**
Parcel ID and/or Address: 3312022130001 and 3312022110001
Legal Description (Section, Township, Range): Sec 33, T120, R22
Lat/Long (decimal degrees): 45.161361, -93.466660
Attach a map showing the location of the site in relation to local streets, roads, highways. See Figure 1.
Approximate size of site (acres) or if a linear project, length (feet): 90.99-ac

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

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

PART THREE: General Project/Site Information

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

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

Application is for wetland delineation concurrence/approval.

PART FOUR: Aquatic Resource Impact[1] Summary

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

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

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

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

PART FIVE: Applicant Signature

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

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

Signature: _____ Date: 6/20/24

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

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

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

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

☒ **Wetland Type Confirmation**

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

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

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

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

14800 113th Ave N, Dayton

Wetland Delineation Report

APPENDIX B

Wetland Delineation Data Forms

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: 14800 113th Ave N | City/County: Dayton/Hennepin | Sampling Date: 6-14-2024

Applicant/Owner: Tom Dehn | State: MN | Sampling Point: SP-C west

Investigator(s): M. Barrett, K. Dickerson | Section, Township, Range: Sec 33, T120, R22

Landform (hillslope, terrace, etc.): depression | Local relief (concave, convex, none): concave

Slope (%): 0-2 | Lat: | Long: | Datum:

Soil Map Unit Name: Hamel, overwash-Hamel complex, 0 to 3 percent slopes | NWI Classification: None

Are climatic/hydrologic conditions of the site typical for this time of the year? N (If no, explain in remarks)

Are vegetation X, soil , or hydrology significantly disturbed? Are "normal circumstances" present? No

Are vegetation , soil , or hydrology naturally problematic?

SUMMARY OF FINDINGS

(If needed, explain any answers in remarks.)

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

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

Climatic conditions wet (atypical) per gridded database; Cropland = Not normal circumstances; disturbed veg.

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species	Indicator Status
1			
2			
3			
4			
5			
	0	= Total Cover	

Sapling/Shrub stratun (Plot size: 15)			
1			
2			
3			
4			
5			
	0	= Total Cover	

Herb stratum (Plot size: 5)			
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
	0	= Total Cover	

Woody vine stratum (Plot size: 30)			
1			
2			
	0	= Total Cover	

Dominance Test Worksheet

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

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

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

Prevalence Index Worksheet

Total % Cover of:

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

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

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

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

Hydrophytic vegetation present? Y

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

Due to wetness, recently re-planted soybeans (5%). See Area C west of offsite review.

SOIL

Sampling Point: SP-C west

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

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-18	10YR 2/1	100					Loam	
18-20	10YR 2/1	98	10YR 4/4	2	C	M	Loam	
20-24	10YR 3/1	90	10YR 4/4	10	C	M	Clay loam	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L)**
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Very Shallow Dark Surface (TF12)
- X Other (explain in remarks)

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? Y

Remarks:

Partially hydric mapped soil. May be depleted at some depth (A12). Soils lack redox w/i 8" or depleted matrix within 24"

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

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

Indicators of wetland hydrology present? N

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

Corresponds to Area C of offsite review with signatures in 63% normal photos.

Remarks:

Wetland per decision matrix. However, moist (not saturated) at 18 inches in period that is ~3" wetter than 70th%. Tile inlet present - D2 not applicable. Soils lack redox w/i 8" or depleted matrix within 24" of surface.

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: 14800 113th Ave N | City/County: Dayton/Hennepin | Sampling Date: 6-14-2024

Applicant/Owner: Tom Dehn | State: MN | Sampling Point: SP-C east

Investigator(s): M. Barrett, K. Dickerson | Section, Township, Range: Sec 33, T120, R22

Landform (hillslope, terrace, etc.): depression | Local relief (concave, convex, none): concave

Slope (%): 0-2 | Lat: | Long: | Datum:

Soil Map Unit Name: Hamel, overwash-Hamel complex, 0 to 3 percent slopes | NWI Classification: None

Are climatic/hydrologic conditions of the site typical for this time of the year? N (If no, explain in remarks)

Are vegetation X, soil , or hydrology significantly disturbed? Are "normal circumstances" present? No

Are vegetation , soil , or hydrology naturally problematic?

SUMMARY OF FINDINGS

(If needed, explain any answers in remarks.)

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

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

Climatic conditions wet (atypical) per gridded database; Cropland = Not normal circumstances; disturbed veg.

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species	Indicator Status
1			
2			
3			
4			
5			
	0 = Total Cover		

Sapling/Shrub stratun (Plot size: 15)			
1			
2			
3			
4			
5			
	0 = Total Cover		

Herb stratum (Plot size: 5)			
1 *Glycine max*	10	Y	UPL
2			
3			
4			
5			
6			
7			
8			
9			
10			
	10 = Total Cover		

Woody vine stratum (Plot size: 30)			
1			
2			
	0 = Total Cover		

Dominance Test Worksheet

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

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

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

Prevalence Index Worksheet

Total % Cover of:

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

Prevalence Index = B/A = 5.00

Hydrophytic Vegetation Indicators:

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

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

Hydrophytic vegetation present? N

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

See Area C of offsite review.

SOIL

Sampling Point: SP-C east

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

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-14	10YR 2/2	100					Loam	
14-18	10YR 2/1	97	10YR 4/4	3	C	M	Clay loam	
18-24	10YR 2/1	100					Clay loam	
24-26	10YR 2/1	95	10YR 4/6	5	C	PL	Clay loam	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L)**
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? N

Remarks:

Partially hydric mapped soil. May be depleted at some depth (A12). Soils lack redox w/i 8" or depleted matrix within 26'

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

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

Indicators of wetland hydrology present? N

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

Corresponds to Area C of offsite review with signatures in 63% of normal photos.

Remarks:

Wetland per decision matrix. However, no water or saturation to 24 inches in period that is ~3" wetter than 70th%. Area underlain by tile - D2 not applicable. Soils lack redox w/i 8" or depleted matrix within 24" of surface.

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site 14800 113th Ave N | City/County: Dayton/Hennepin | Sampling Date: 6-14-2024

Applicant/Owner: Tom Dehn | State: MN | Sampling Point: SP-E

Investigator(s): M. Barrett, K. Dickerson | Section, Township, Range: Sec 33, T120, R22

Landform (hillslope, terrace, etc.): broad flat depression | Local relief (concave, convex, none): none

Slope (%): 0-2 | Lat: | Long: | Datum:

Soil Map Unit Name: Dundas-Cordova complex, 0 to 3 percent slopes | NWI Classification: None

Are climatic/hydrologic conditions of the site typical for this time of the year? N (If no, explain in remarks)

Are vegetation X, soil , or hydrology significantly disturbed? Are "normal circumstances" present? No

Are vegetation , soil , or hydrology naturally problematic?

SUMMARY OF FINDINGS

(If needed, explain any answers in remarks.)

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

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

Climatic conditions wet (atypical) per gridded database; Cropland = Not normal circumstances; disturbed veg.

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species	Indicator Status
1			
2			
3			
4			
5			
	0	= Total Cover	

Sapling/Shrub stratun (Plot size: 15)			
1			
2			
3			
4			
5			
	0	= Total Cover	

Herb stratum (Plot size: 5)			
1 *Zea mays*	5	Y	UPL
2			
3			
4			
5			
6			
7			
8			
9			
10			
	5	= Total Cover	

Woody vine stratum (Plot size: 30)			
1			
2			
	0	= Total Cover	

Dominance Test Worksheet

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

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

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

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0	
FACW species	0	x 2 =	0	
FAC species	0	x 3 =	0	
FACU species	0	x 4 =	0	
UPL species	5	x 5 =	25	
Column totals	5	(A)	25	(B)

Prevalence Index = B/A = 5.00

Hydrophytic Vegetation Indicators:

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

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

Hydrophytic vegetation present? N

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

See Area E of offsite review

SOIL

Sampling Point: SP-E

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

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-8	10YR 2/2	100					Clay loam	
8-10	10YR 3/2	92					Clay loam	
10-12	10YR 3/2	95	10YR 4/6	5	C	M	Clay loam	
12-24	10YR 2/1	98	10YR 4/1	2	D	M	Clay loam	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L)**
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? N

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

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

Indicators of wetland hydrology present? N

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

Corresponds to Area E of offsite review with signatures in 38% of normal photos.

Remarks:

No water or saturation to 24 inches in period that is ~3" wetter than 70th%. Tile inlet present in bottom/center depression - D2 not applicable. Tile effectively removes hydrology.

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: 14800 113th Ave N | City/County: Dayton/Hennepin | Sampling Date: 6-14-2024

Applicant/Owner: Tom Dehn | State: MN | Sampling Point: SP-F

Investigator(s): M. Barrett | Section, Township, Range: Sec 33, T120, R22

Landform (hillslope, terrace, etc.): depression | Local relief (concave, convex, none): concave

Slope (%): 0-2 | Lat: | Long: | Datum:

Soil Map Unit Name: Hamel, overwash-Hamel complex, 0 to 3 percent slopes | NWI Classification: None

Are climatic/hydrologic conditions of the site typical for this time of the year? N (If no, explain in remarks)

Are vegetation X, soil , or hydrology significantly disturbed? Are "normal circumstances" present? No

Are vegetation , soil , or hydrology naturally problematic?

SUMMARY OF FINDINGS

(If needed, explain any answers in remarks.)

Hydrophytic vegetation present? Y	**Is the sampled area within a wetland?** Y
Hydric soil present? Y	If yes, optional wetland site ID: Wetland 1
Indicators of wetland hydrology present? Y	

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

Climatic conditions wet (atypical) per gridded database; Cropland = Not normal circumstances; disturbed veg.

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species	Indicator Status
1			
2			
3			
4			
5			
	0 = Total Cover		

Sapling/Shrub stratun (Plot size: 15)			
1			
2			
3			
4			
5			
	0 = Total Cover		

Herb stratum (Plot size: 5)			
1 *Cyperus esculetus*	10	Y	FACW
2			
3			
4			
5			
6			
7			
8			
9			
10			
	10 = Total Cover		

Woody vine stratum (Plot size: 30)			
1			
2			
	0 = Total Cover		

Dominance Test Worksheet

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

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

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

Prevalence Index Worksheet

Total % Cover of:

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

Prevalence Index = B/A = 2.00

Hydrophytic Vegetation Indicators:

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

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

Hydrophytic vegetation present? Y

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

See Area F of offsite review.

SOIL **Sampling Point:** SP-F

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

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-4	10YR 2/1	100					Clay loam	
4-12	10YR 2/1	98	10YR 4/4	8	C	M	Clay loam	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- X Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L)**
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Very Shallow Dark Surface (TF12)
- X Other (explain in remarks)

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? Y

Remarks:

Partially hydric mapped soil. May be depleted at some depth (A12).

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- X Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

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

Indicators of wetland hydrology present? Y

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

Corresponds to Area F of offsite review with signatures in 50% of normal photos.

Remarks:

No water or saturation to 12 inches in period that is ~3" wetter than 70th%.

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: 14800 113th Ave N | City/County: Dayton/Hennepin | Sampling Date: 6-14-2024
Applicant/Owner: Tom Dehn | State: MN | Sampling Point: SP-H
Investigator(s): M. Barrett, K. Dickerson | Section, Township, Range: Sec 33, T120, R22
Landform (hillslope, terrace, etc.): broad flat depression | Local relief (concave, convex, none): none
Slope (%): 0-2 | Lat: | Long: | Datum:
Soil Map Unit Name: Dundas-Cordova complex, 0 to 3 percent slopes | NWI Classification: None
Are climatic/hydrologic conditions of the site typical for this time of the year? N (If no, explain in remarks)
Are vegetation X, soil , or hydrology significantly disturbed? Are "normal circumstances" present? No
Are vegetation , soil , or hydrology naturally problematic?

SUMMARY OF FINDINGS

(If needed, explain any answers in remarks.)

Hydrophytic vegetation present?	N
Hydric soil present?	Y
Indicators of wetland hydrology present?	N

Is the sampled area within a wetland? N
If yes, optional wetland site ID:

Remarks: (Explain alternative procedures here or in a separate report.)
Climatic conditions wet (atypical) per gridded database; Cropland = Not normal circumstances; disturbed veg.

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species	Indicator Status
1			
2			
3			
4			
5			
	0 = Total Cover		

Sapling/Shrub stratun (Plot size: 15)			
1			
2			
3			
4			
5			
	0 = Total Cover		

Herb stratum (Plot size: 5)			
1 *Glycine max*	10	Y	UPL
2			
3			
4			
5			
6			
7			
8			
9			
10			
	10 = Total Cover		

Woody vine stratum (Plot size: 30)			
1			
2			
	0 = Total Cover		

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 0 (A)
Total Number of Dominant Species Across all Strata: 1 (B)
Percent of Dominant Species that are OBL, FACW, or FAC: 0.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

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

Prevalence Index = B/A = 5.00

Hydrophytic Vegetation Indicators:

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

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

Hydrophytic vegetation present? N

Remarks: (Include photo numbers here or on a separate sheet)
See Area H of offsite review

SOIL

Sampling Point: SP-H

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

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-8	10YR 2/1	100					Clay loam	
8-24	10YR 2/1	92	10YR 4/4	8	C	M	Clay loam	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- X Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L)**
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? Y

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

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

Indicators of wetland hydrology present? N

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

Corresponds to Area H of offsite review with signatures in 50% of normal photos.

Remarks:

No water or saturation to 24 inches in period that is ~3" wetter than 70th%. Tile inlet present in bottom/center depression - D2 not applicable. Tile effectively removes hydrology.

14800 113th Ave N, Dayton

Wetland Delineation Report

APPENDIX C

Precipitation Data

14800 113th Ave N, Dayton: Precipitation Summary
Source: Minnesota Climatology Working Group
Site Visit: June 14, 2024

Monthly Totals: 2024

Target: 120N 22W S33

Mon	Year	CC	Tttn	rrW	ss	nnnn	oooooooo	pre
Jan	2024	27	119N	22W	1	SWCD		.19
Feb	2024	27	119N	22W	1	SWCD		.71
Mar	2024	27	119N	22W	1	SWCD		2.32
Apr	2024	27	119N	22W	1	SWCD		4.05
May	2024	27	119N	22W	1	SWCD		5.83
Jun	2024	27	119N	22W	1	SWCD		6.33

April/May/June Daily Records

Date	Precip.
Apr 1, 2024	0
Apr 2, 2024	.05
Apr 3, 2024	0
Apr 4, 2024	0
Apr 5, 2024	0
Apr 6, 2024	0
Apr 7, 2024	.13
Apr 8, 2024	.64
Apr 9, 2024	.14
Apr 10, 2024	0
Apr 11, 2024	0
Apr 12, 2024	0
Apr 13, 2024	0
Apr 14, 2024	0
Apr 15, 2024	0
Apr 16, 2024	1.45
Apr 17, 2024	0
Apr 18, 2024	0
Apr 19, 2024	0
Apr 20, 2024	T
Apr 21, 2024	0
Apr 22, 2024	0
Apr 23, 2024	.10
Apr 24, 2024	0
Apr 25, 2024	0
Apr 26, 2024	.35
Apr 27, 2024	0
Apr 28, 2024	.79
Apr 29, 2024	.04
Apr 30, 2024	.36

Date	Precip.
May 1, 2024	0
May 2, 2024	.49
May 3, 2024	0
May 4, 2024	.21
May 5, 2024	0
May 6, 2024	0
May 7, 2024	.41
May 8, 2024	0
May 9, 2024	0
May 10, 2024	0
May 11, 2024	0
May 12, 2024	0
May 13, 2024	0
May 14, 2024	0
May 15, 2024	.11
May 16, 2024	0
May 17, 2024	.35
May 18, 2024	0
May 19, 2024	0
May 20, 2024	.51
May 21, 2024	1.51
May 22, 2024	0
May 23, 2024	0
May 24, 2024	.26
May 25, 2024	.28
May 26, 2024	0
May 27, 2024	0
May 28, 2024	.54
May 29, 2024	0
May 30, 2024	0
May 31, 2024	1.16

Date	Precip.	
Jun 1, 2024	0	
Jun 2, 2024	0	
Jun 3, 2024	.52	
Jun 4, 2024	.36	
Jun 5, 2024	.06	
Jun 6, 2024	0	
Jun 7, 2024	0	
Jun 8, 2024	.13	
Jun 9, 2024	0	
Jun 10, 2024	0	
Jun 11, 2024	.15	
Jun 12, 2024	.29	
Jun 13, 2024	0	
Jun 14, 2024	0	Site Visit
Jun 15, 2024	1.85	
Jun 16, 2024	0	
Jun 17, 2024	.87	
Jun 18, 2024	.95	
Jun 19, 2024	0	
Jun 20, 2024	0	
Jun 21, 2024	0	
Jun 22, 2024	.47	
Jun 23, 2024	0	
Jun 24, 2024	0	
Jun 25, 2024	0	
Jun 26, 2024	0	
Jun 27, 2024	.68	
Jun 28, 2024	0	
Jun 29, 2024	0	
Jun 30, 2024	0	

1991-2020 Summary Statistics

	Jan	*Feb*	*Mar*	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*	*WARM*	*ANN*	*WAT*
30%	0.50	0.53	1.11	2.02	3.35	3.56	2.59	3.34	1.53	1.45	0.84	0.64	17.02	27.70	28.04
70%	0.85	1.00	1.81	3.37	4.75	4.82	4.79	5.01	4.29	3.55	1.92	1.38	22.13	33.03	32.68
mean	0.74	0.82	1.49	2.93	4.19	4.51	4.00	4.16	3.30	2.70	1.56	1.11	20.15	31.51	31.49

Minnesota State Climatology Office

State Climatology Office - DNR Division of Ecological and Water Resources

Precipitation Worksheet Using Gridded Database

Precipitation data for target wetland location:

county: **Hennepin** township number: **120N**
township name: **Dayton** range number: **22W**
nearest community: **Fletcher** section number: **33**

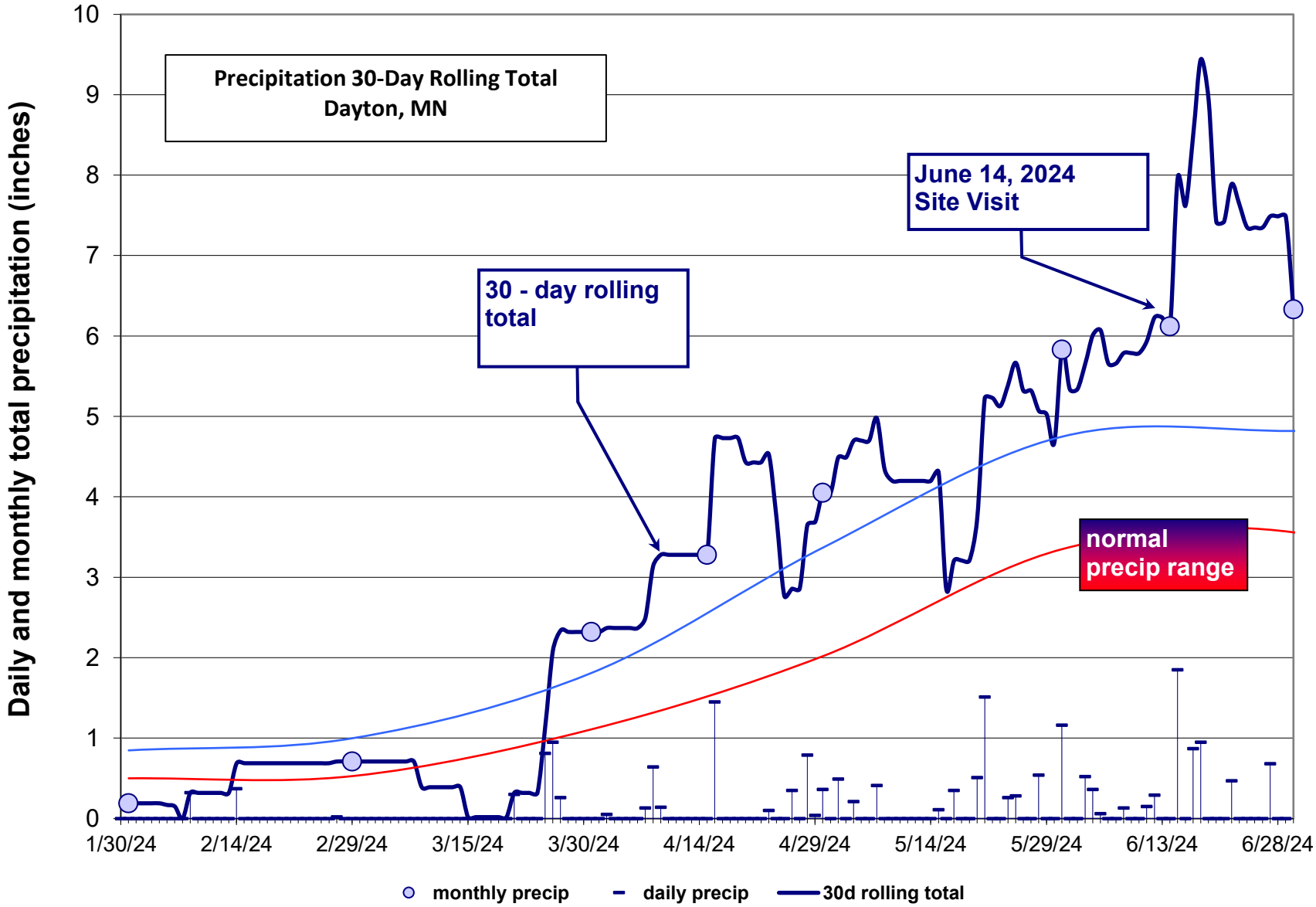
Aerial photograph or site visit date:
Friday, June 14, 2024

Score using 1991-2020 normal period

values are in inches A 'R' following a monthly total indicates a provisional value derived from radar-based estimates.	first prior month: **May 2024**	second prior month: **April 2024**	third prior month: **March 2024**
estimated precipitation total for this location:	**5.83**	**4.27R**	**2.29R**
there is a 30% chance this location will have less than:	3.35	2.02	1.11
there is a 30% chance this location will have more than:	4.75	3.37	1.81
type of month: dry normal wet	**Wet**	**wet**	**wet**
monthly score	**3*3=9**	**2 * 3 = 6**	**1 * 3 = 3**
multi-month score: 6 to 9 (dry) 10 to 14 (normal) 15 to 18 (wet)	**9+6+3=18 (wet)**		

Other Resources:

- retrieve daily precipitation data
- view radar-based precipitation estimates
- view weekly precipitation maps
- *Evaluating Antecedent Precipitation Conditions* (BWSR)


Precipitation 30-Day Rolling Total
Dayton, MN
June 14, 2024
Site Visit
30 - day rolling
total
normal
precip range
Daily and monthly total precipitation (inches)
10
9
8
7
6
5
4
3
2
1
0
1/30/24
2/14/24
2/29/24
3/15/24
3/30/24
4/14/24
4/29/24
5/14/24
5/29/24
6/13/24
6/28/24
monthly precip
daily precip
30d rolling total

14800 113th Ave N, Dayton

Wetland Delineation Report

APPENDIX D

Offsite Hydrology Review Recording Form and Aerial Photos

Exhibit 1 Field data sheet reference (if applicable):_____

Wetland Hydrology from Aerial Imagery – Recording Form

Project Name: 14800 113th Ave N **Date:** 5-20-2024 **County:** Hennepin

Investigator: M. Barrett **Legal Description (S, T, R):** S: 33 T: 120N R: 22W

Summary Table

Date Image Taken	Date Used	Image Source	Climate Condition (wet, dry, normal)*	Image Interpretation(s)					
				Area A	Area B	Area C	Area D	Area E	Area F
3/7/2024				Prior to growing season. Not used.					
5/25/2023	6/1/2023	Google Earth	Normal (1)	NV	NV	SS (1)	NV	DO (1)	SS (1)
8/4/2022	8/4/2022	Google Earth	Dry	Dry – not used.					
6/27/2022	7/1/2022	Google Earth	Normal (2)	NV	NV	SS (2)	NV	DO (2)	SS (2)
8/13/2021	8/13/2021	Google Earth	Dry	Dry – not used.					
6/18/2021	7/1/2021	FSA	Dry	Dry – not used.					
10/9/2020	10/9/2020	Google Earth	Normal	Used May 2020 normal photo instead.					
5/11/2020	5/11/2020	Google Earth	Normal (3)	NV	NV	SS (3)	NV	NV	NV
10/25/2019	11/1/2019	Google Earth	Wet	Wet – not used.					
7/27/2019	8/1/2019	FSA	Normal (4)	NV	NV	NV	NV	NV	NV
4/28/2018	5/1/2018	Google Earth	Normal (5)	NV	NV	SW (4)	NV	NV	SW (3)
4/5/2017				Prior to growing season. Not used.					
8/31/2017	9/1/2017	FSA	Wet	Wet – not used.					
3/11/2016				Prior to growing season. Not used.					
8/11/2015	8/11/2015	Google Earth	Wet	Normal for a date of 9/1/2015. Used September 2015 normal photo.					
9/27/2015	10/1/2015	FSA	Normal (6)	NV	NV	NV	NV	NV	NV
10/11/2014	10/11/2014	Google Earth	Normal (7)	NV	NV	WO	NV	DO (3)	WO
9/15/2013	10/1/2013	Google Earth	Normal	Wet spring, 7/12/13 FSA photo = Wet. Included for viewing.					
7/12/2013	7/1/2013	FSA	Wet	Wet. Included for viewing.					
4/3/2012				Prior to growing season. Not used.					
9/12/2010	9/12/2010	FSA	Normal (8)	NV	NV	NV	CS (1)	NV	CS (4)
6/23/2010	7/1/2010	Google Earth	Normal	Same photo as FSA photo with known date. Not used.					
5/18/2010	6/1/2010	Google Earth	Dry	Dry – not used.					
				*** Per gridded database/3-month antecedent conditions**					
Number of normal years				8	8	8	8	8	8
Number with wet signatures				0	0	4	1	3	4
Percent with wet signatures				0%	0%	50%	13%	38%	50%

KEY		
WS - wetland signature	SS - soil wetness signature	CS - crop stress
NC - not cropped	AP - altered pattern	NV - normal vegetative cover
DO - drowned out	SW - standing water	NSS – no soil wetness signature
Other labels or comments:	FP - Farming Practice Feature	WO – washout (apparent erosion, not a signature)

Exhibit 1 Field data sheet reference (if applicable):_____

Wetland Determination from Aerial Imagery – Recording Form

Project Name: 14800 113th **Date:** 5-20-2024 **County:** Hennepin

Investigator: M. Barrett **Legal Description (S, T, R):** S: 33 T: 120N R: 22W

Use the Decision Matrix below to complete Table 1.

Hydric Soils present[1]	Identified on NWI or other wetland map[2]	Percent with wet signatures	Field verification required[3]	Wetland?
Yes	Yes	>50%	No	Yes
Yes	Yes	30-50%	No	Yes
Yes	Yes	<30%	Yes	Yes, if other hydrology indicators present
Yes	No	>50%	No	Yes
Yes	No	30-50%	Yes	Yes, if other hydrology indicators present
Yes	No	<30%	No	No
No	Yes	>50%	No	Yes
No	Yes	30-50%	No	Yes
No	Yes	<30%	No	No
No	No	>50%	Yes	Yes, if other hydrology indicators present
No	No	30-50%	Yes	Yes, if other hydrology indicators present
No	No	<30%	No	No

[1] The presence of hydric soils can be determined from the "Hydric Rating by Map Unit Feature" under "Land Classifications" from the Web Soil Survey. "Not Hydric" is the only category considered to not have hydric soils. Field sampling for the presence/absence of hydric soil indicators can be used in lieu of the hydric rating if appropriately documented by providing completed field data sheets.

[2] At minimum, the most updated NWI data available for the area must be reviewed for this step. Any and all other local or regional wetland maps that are publicly available should be reviewed.

[3] Area should be reviewed in the field for the presence/absence of wetland hydrology indicators per the applicable 87 Manual Regional Supplement, including the D2 indicator (geomorphic position).

Table 1.

Area	Hydric Soils Present	Identified on NWI or other wetland map	Percent with wet signatures	Field Verification Required	Wetland?
A	Yes	Yes	0%	Yes	No - Lack of one primary or two secondary hydrology indicators. Flat planted cropland.
B	No	No	0%	No	No
C	Yes – Partially Hydric	No	50%	Yes	No - tile inlet present. Lack of one primary or two secondary hydrology indicators. See SP-C west and SP-C east.
D	No	No	13%	No	No
E	Yes – Partially Hydric	No	38%	Yes	No - soil not hydric (see SP-E). Tile inlet present. Lack of one primary or two secondary hydrology indicators.
F	Yes – Partially Hydric	No	50%	Yes	Yes – **Wetland 1**

[1] Answer "N/A" if field verification is not required and was not conducted

Exhibit 1 Field data sheet reference (if applicable):_____

Wetland Hydrology from Aerial Imagery – Recording Form

Project Name: 14800 113th Ave N **Date:** 5-20-2024 **County:** Hennepin

Investigator: M. Barrett **Legal Description (S, T, R):** S: 33 T: 120N R: 22W

Summary Table

Date Image Taken	Date Used	Image Source	Climate Condition (wet, dry, normal)*	Image Interpretation(s)					
				Area G	Area H	Area I	Area J	Area K	
3/7/2024				Prior to growing season. Not used.					
5/25/2023	6/1/2023	Google Earth	Normal (1)	NV	DO (1)	SS (1)	NV	NV	
8/4/2022	8/4/2022	Google Earth	Dry	Dry – not used.					
6/27/2022	7/1/2022	Google Earth	Normal (2)	NV	DO (2)	NV	NV	NV	
8/13/2021	8/13/2021	Google Earth	Dry	Dry – not used.					
6/18/2021	7/1/2021	FSA	Dry	Dry – not used.					
10/9/2020	10/9/2020	Google Earth	Normal	Used May 2020 normal photo instead.					
5/11/2020	5/11/2020	Google Earth	Normal (3)	NV	NV	NV	NV	NV	
10/25/2019	11/1/2019	Google Earth	Wet	Wet – not used.					
7/27/2019	8/1/2019	FSA	Normal (4)	NV	NV	NV	NV	CS (1)	
4/28/2018	5/1/2018	Google Earth	Normal (5)	NV	DO (3)	NV	NV	NV	
4/5/2017				Prior to growing season. Not used.					
8/31/2017	9/1/2017	FSA	Wet	Wet – not used.					
3/11/2016				Prior to growing season. Not used.					
8/11/2015	8/11/2015	Google Earth	Wet	Normal for a date of 9/1/2015. Used September 2015 normal photo.					
9/27/2015	10/1/2015	FSA	Normal (6)	NV	NV	NV	NV	NV	
10/11/2014	10/11/2014	Google Earth	Normal (7)	NV	NV	NV	NV	NV	
9/15/2013	10/1/2013	Google Earth	Normal	Wet spring, 7/12/13 FSA photo = Wet. Included for viewing.					
7/12/2013	7/1/2013	FSA	Wet	Wet. Included for viewing.					
4/3/2012				Prior to growing season. Not used.					
9/12/2010	9/12/2010	FSA	Normal (8)	NV	CS/DO (4)	CS/DO (2)	CS/DO (1)	NV	
6/23/2010	7/1/2010	Google Earth	Normal	Same photo as FSA photo with known date. Not used.					
5/18/2010	6/1/2010	Google Earth	Dry	Dry – not used.					
				*** Per gridded database/3-month antecedent conditions**					
Number of normal years				8	8	8	8	8	
Number with wet signatures				0	4	2	1	1	
Percent with wet signatures				0%	50%	25%	13%	13%	

KEY		
WS - wetland signature	SS - soil wetness signature	CS - crop stress
NC - not cropped	AP - altered pattern	NV - normal vegetative cover
DO - drowned out	SW - standing water	NSS – no soil wetness signature
Other labels or comments:	FP - Farming Practice Feature	WO – washout (apparent erosion, not a signature)

Exhibit 1 Field data sheet reference (if applicable):_____

Wetland Determination from Aerial Imagery – Recording Form

Project Name: 14800 113th **Date:** 5-20-2024 **County:** Hennepin

Investigator: M. Barrett **Legal Description (S, T, R):** S: 33 T: 120N R: 22W

Use the Decision Matrix below to complete Table 1.

Hydric Soils present[1]	Identified on NWI or other wetland map[2]	Percent with wet signatures	Field verification required[3]	Wetland?
Yes	Yes	>50%	No	Yes
Yes	Yes	30-50%	No	Yes
Yes	Yes	<30%	Yes	Yes, if other hydrology indicators present
Yes	No	>50%	No	Yes
Yes	No	30-50%	Yes	Yes, if other hydrology indicators present
Yes	No	<30%	No	No
No	Yes	>50%	No	Yes
No	Yes	30-50%	No	Yes
No	Yes	<30%	No	No
No	No	>50%	Yes	Yes, if other hydrology indicators present
No	No	30-50%	Yes	Yes, if other hydrology indicators present
No	No	<30%	No	No

[1] The presence of hydric soils can be determined from the "Hydric Rating by Map Unit Feature" under "Land Classifications" from the Web Soil Survey. "Not Hydric" is the only category considered to not have hydric soils. Field sampling for the presence/absence of hydric soil indicators can be used in lieu of the hydric rating if appropriately documented by providing completed field data sheets.

[2] At minimum, the most updated NWI data available for the area must be reviewed for this step. Any and all other local or regional wetland maps that are publicly available should be reviewed.

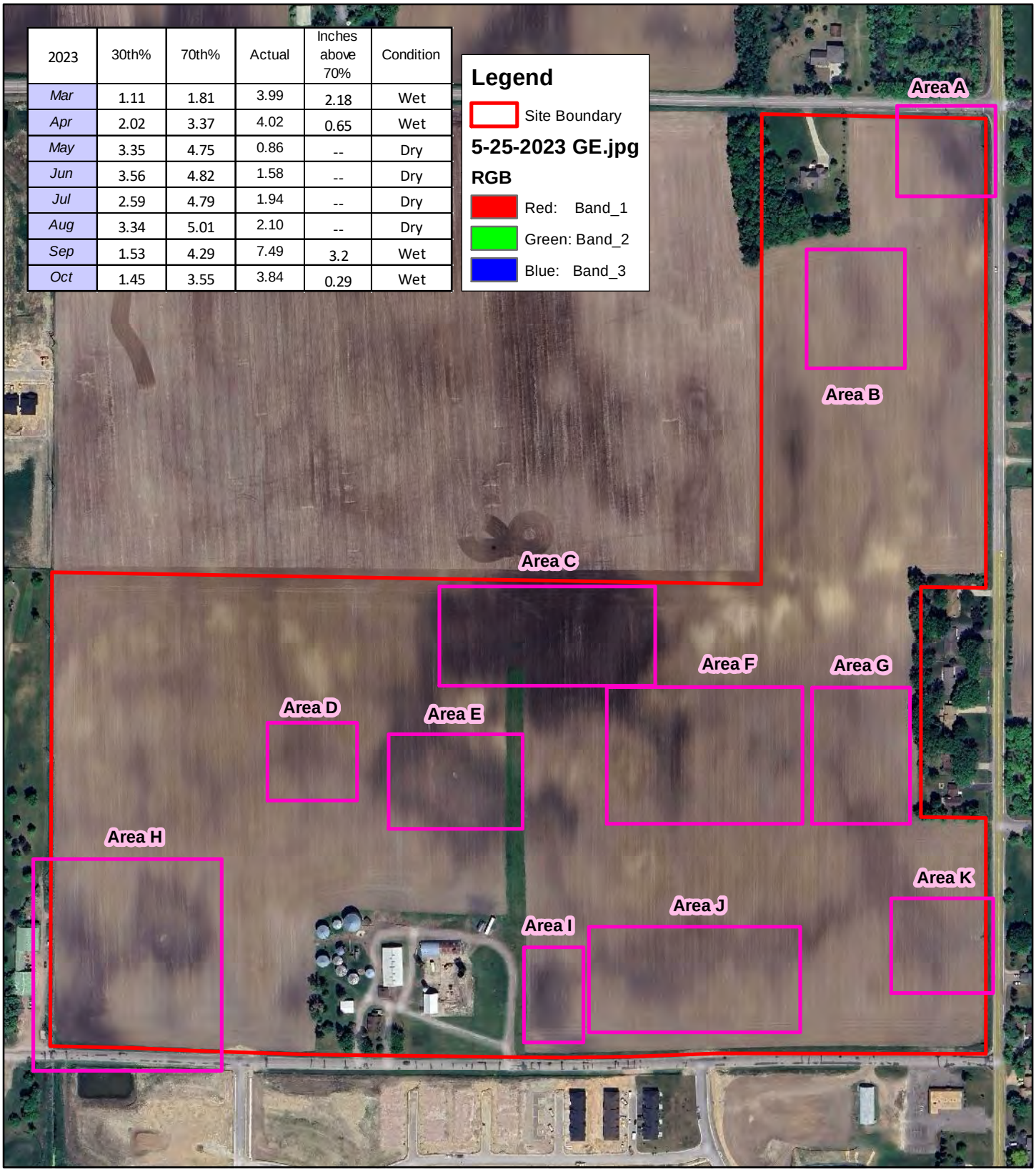
[3] Area should be reviewed in the field for the presence/absence of wetland hydrology indicators per the applicable 87 Manual Regional Supplement, including the D2 indicator (geomorphic position).

Table 1.

Area	Hydric Soils Present	Identified on NWI or other wetland map	Percent with wet signatures	Field Verification Required	Wetland?
G	No	No	0%	No	No
H	No	No	50%	Yes	No – tile inlet present. Lack of one primary or two secondary hydrology indicators
I	No	No	25%	No	No
J	Yes – Partially Hydric	No	13%	No	No
K	Yes – Partially Hydric	No	13%	No	No

[1] Answer "N/A" if field verification is not required and was not conducted

2023	30th%	70th%	Actual	Inches above 70%	Condition
Mar	1.11	1.81	3.99	2.18	Wet
Apr	2.02	3.37	4.02	0.65	Wet
May	3.35	4.75	0.86	--	Dry
Jun	3.56	4.82	1.58	--	Dry
Jul	2.59	4.79	1.94	--	Dry
Aug	3.34	5.01	2.10	--	Dry
Sep	1.53	4.29	7.49	3.2	Wet
Oct	1.45	3.55	3.84	0.29	Wet



5-23-2023 Google Earth - Normal

N

0 250 Feet

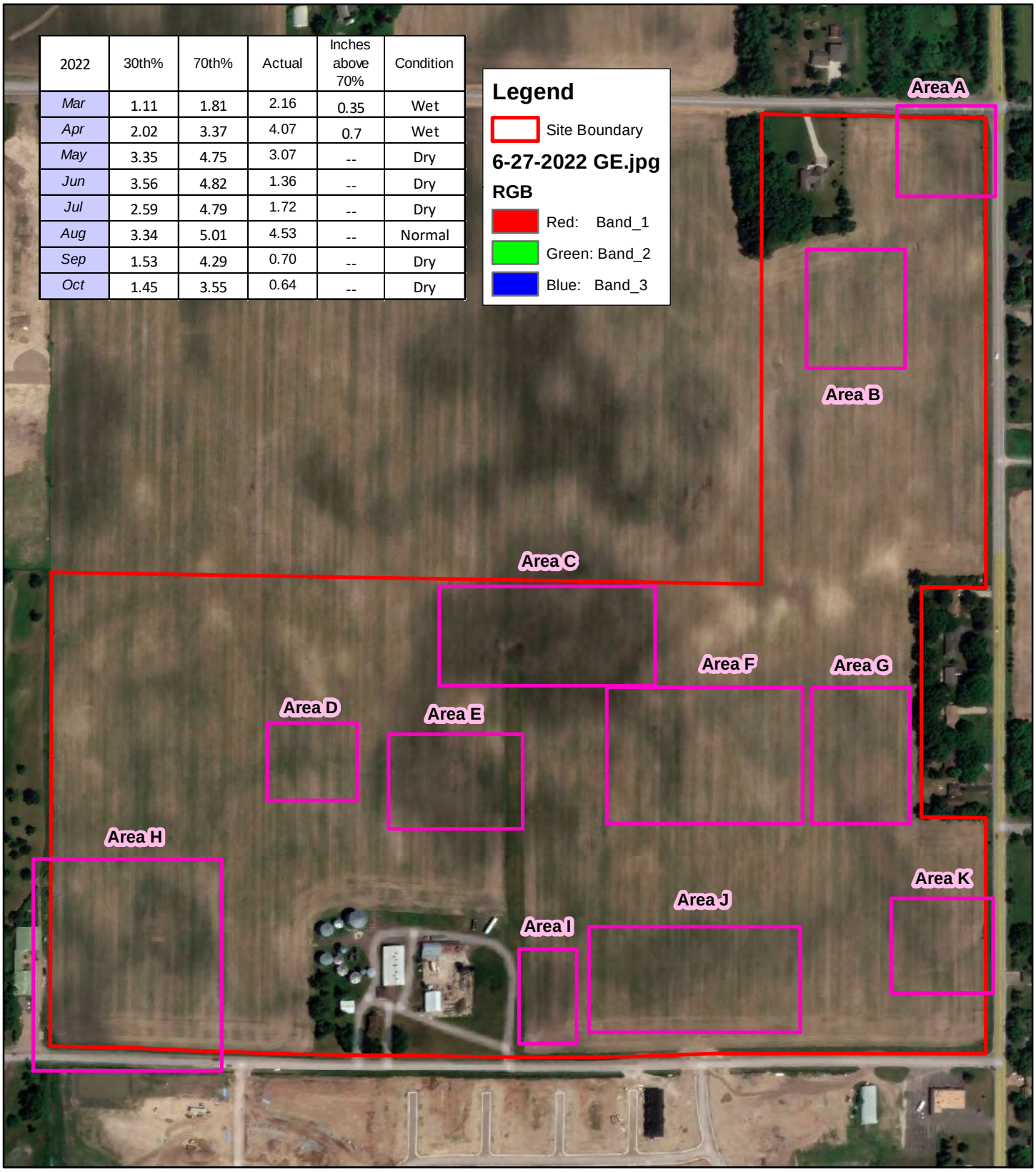
KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MNGEO Spatial Commons

14800 113th Ave N (KES 2024-063)
Dayton, Minnesota

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

2022	30th%	70th%	Actual	Inches above 70%	Condition
Mar	1.11	1.81	2.16	0.35	Wet
Apr	2.02	3.37	4.07	0.7	Wet
May	3.35	4.75	3.07	--	Dry
Jun	3.56	4.82	1.36	--	Dry
Jul	2.59	4.79	1.72	--	Dry
Aug	3.34	5.01	4.53	--	Normal
Sep	1.53	4.29	0.70	--	Dry
Oct	1.45	3.55	0.64	--	Dry



6-27-2022 Google Earth - Normal (wet spring)

N

0 250 Feet

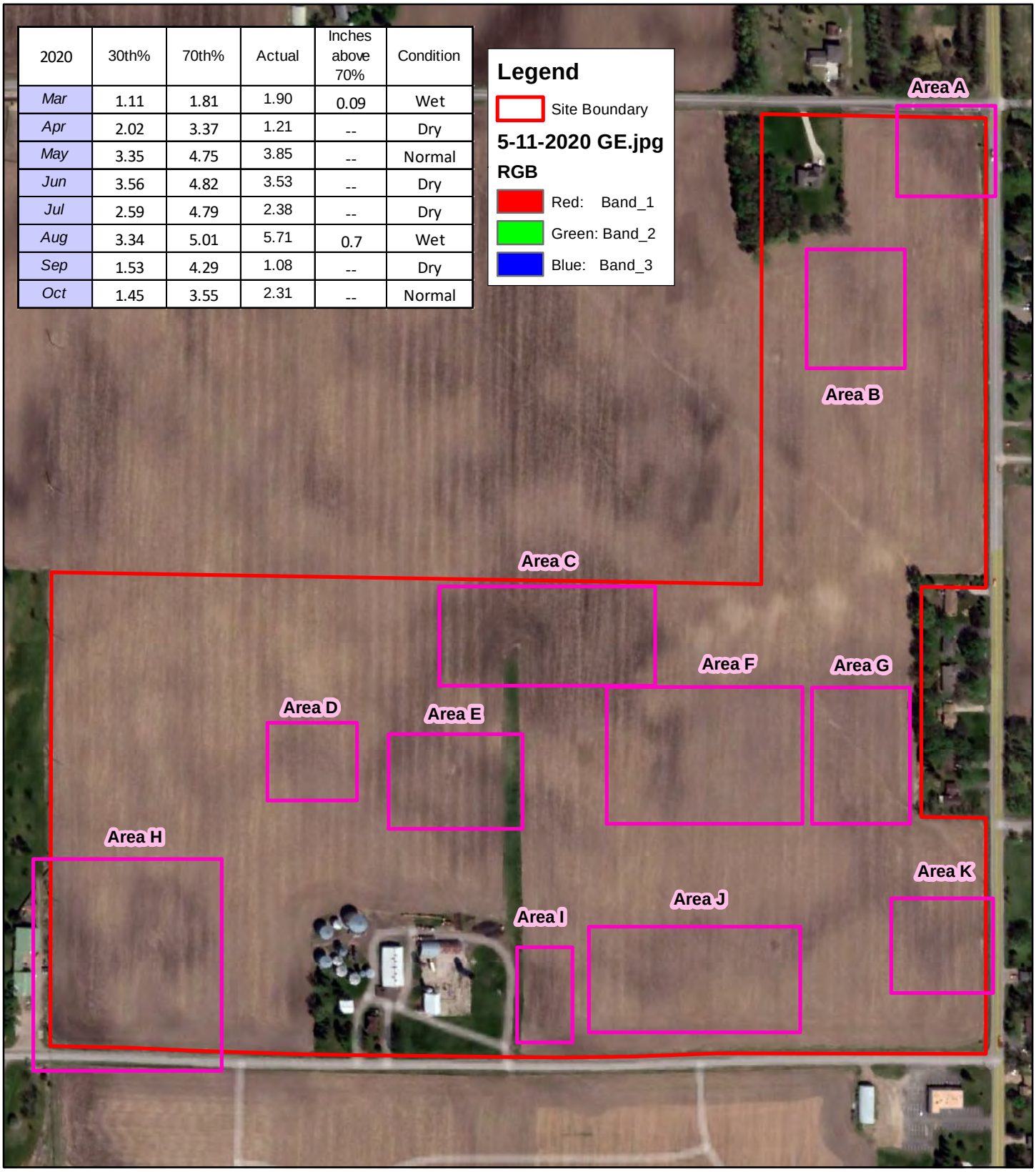
KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MNGEO Spatial Commons

14800 113th Ave N (KES 2024-063)
Dayton, Minnesota

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

2020	30th%	70th%	Actual	Inches above 70%	Condition
Mar	1.11	1.81	1.90	0.09	Wet
Apr	2.02	3.37	1.21	--	Dry
May	3.35	4.75	3.85	--	Normal
Jun	3.56	4.82	3.53	--	Dry
Jul	2.59	4.79	2.38	--	Dry
Aug	3.34	5.01	5.71	0.7	Wet
Sep	1.53	4.29	1.08	--	Dry
Oct	1.45	3.55	2.31	--	Normal



5-11-2020 Google Earth - Normal

N

0 250 Feet

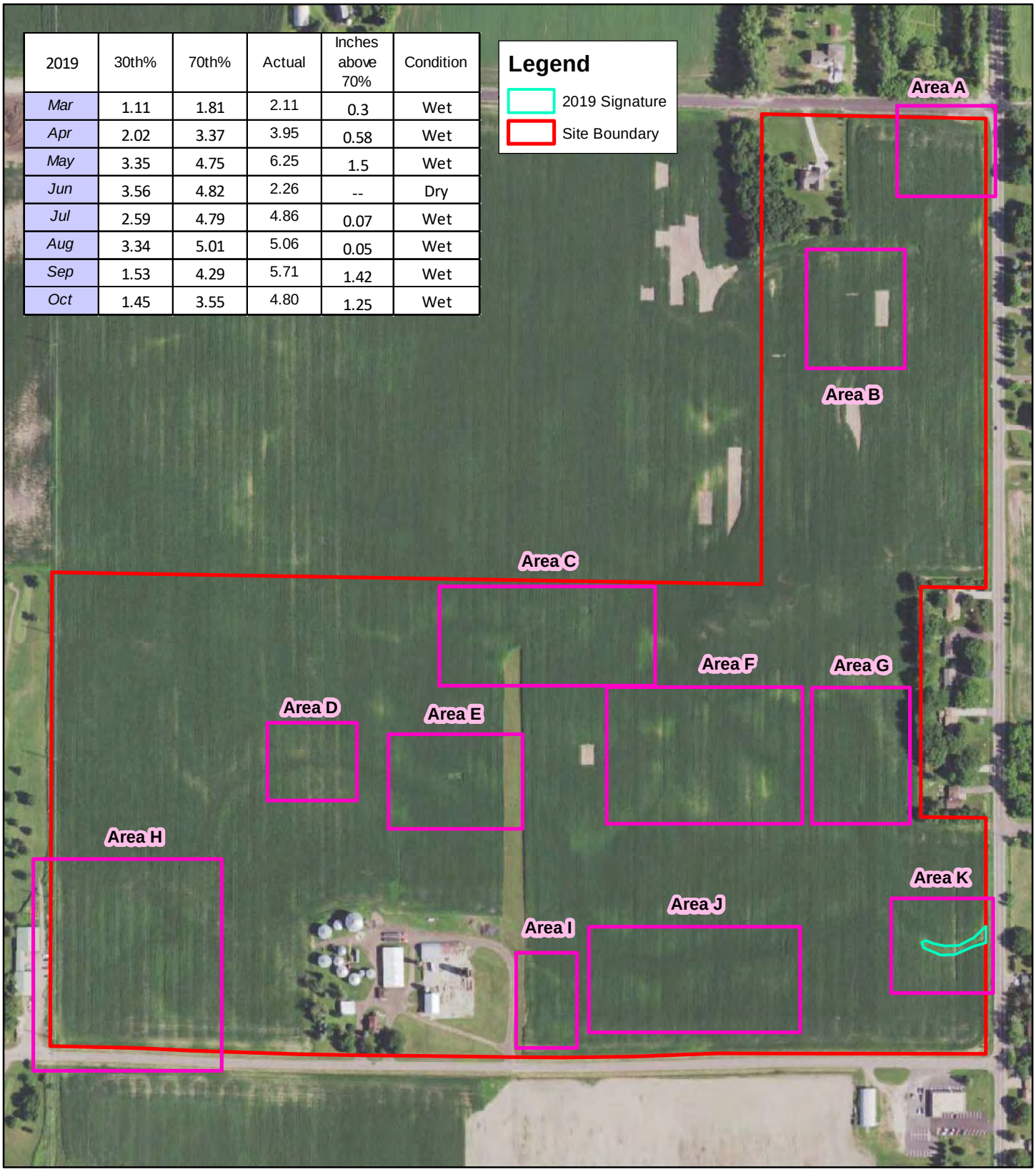
KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MNGEO Spatial Commons

14800 113th Ave N (KES 2024-063)
Dayton, Minnesota

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

2019	30th%	70th%	Actual	Inches above 70%	Condition
Mar	1.11	1.81	2.11	0.3	Wet
Apr	2.02	3.37	3.95	0.58	Wet
May	3.35	4.75	6.25	1.5	Wet
Jun	3.56	4.82	2.26	--	Dry
Jul	2.59	4.79	4.86	0.07	Wet
Aug	3.34	5.01	5.06	0.05	Wet
Sep	1.53	4.29	5.71	1.42	Wet
Oct	1.45	3.55	4.80	1.25	Wet



7-27-2019 FSA - Normal

N

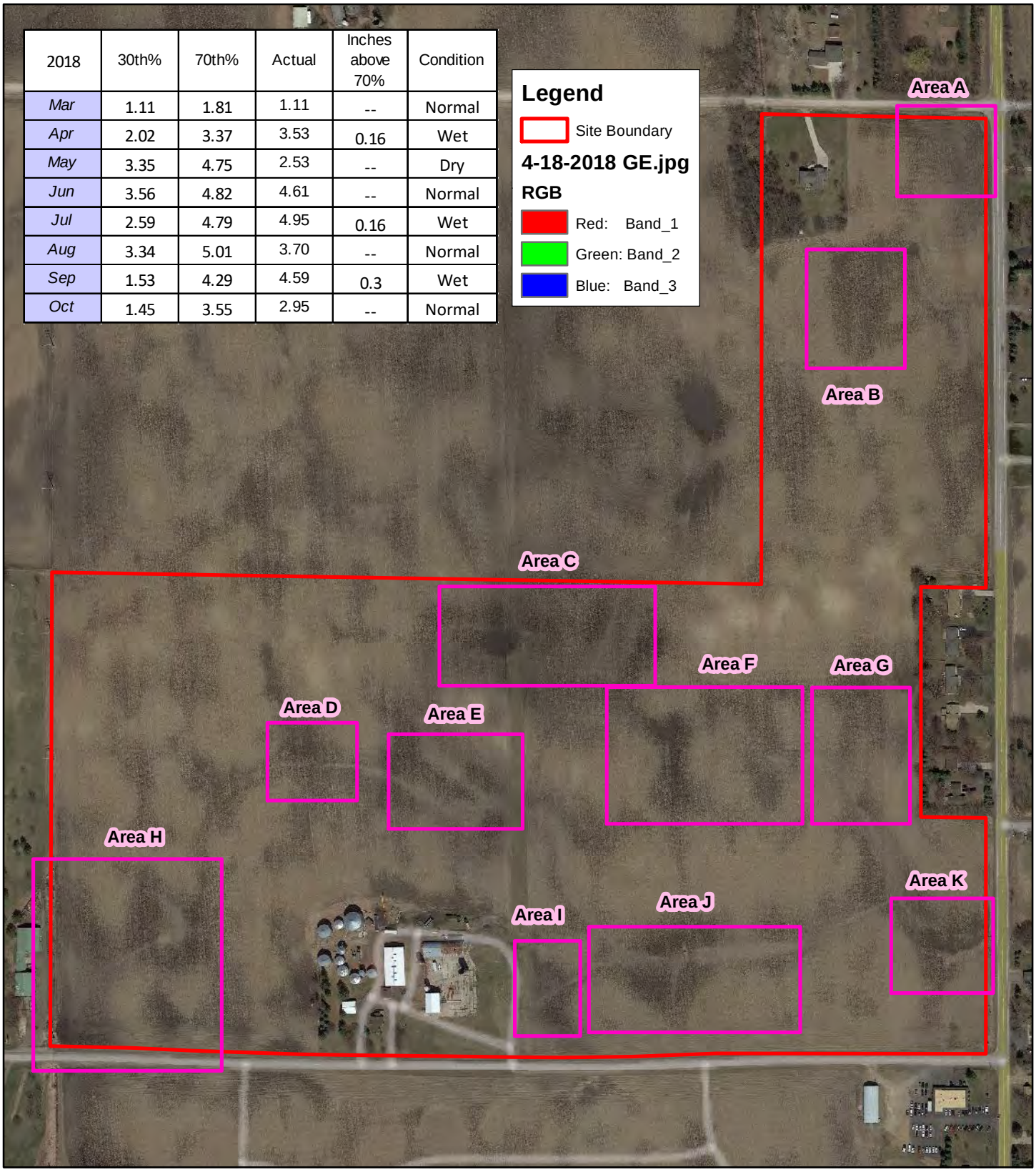
0 250 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MNGEO Spatial Commons

14800 113th Ave N (KES 2024-063)
Dayton, Minnesota

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



4-28-2018 Google Earth - Normal

N

0 250 Feet

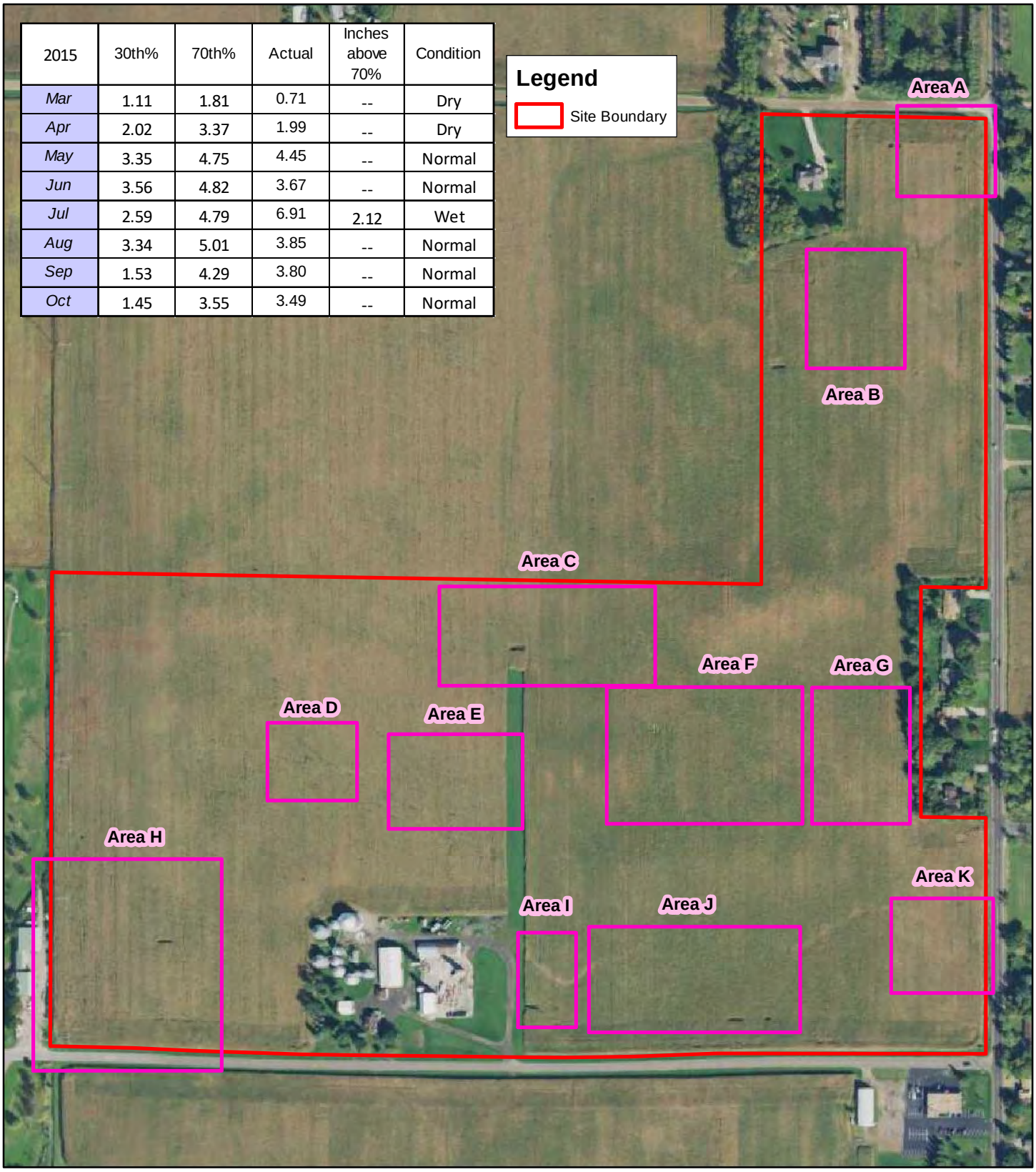
KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MNGEO Spatial Commons

14800 113th Ave N (KES 2024-063)
Dayton, Minnesota

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

2015	30th%	70th%	Actual	Inches above 70%	Condition
Mar	1.11	1.81	0.71	--	Dry
Apr	2.02	3.37	1.99	--	Dry
May	3.35	4.75	4.45	--	Normal
Jun	3.56	4.82	3.67	--	Normal
Jul	2.59	4.79	6.91	2.12	Wet
Aug	3.34	5.01	3.85	--	Normal
Sep	1.53	4.29	3.80	--	Normal
Oct	1.45	3.55	3.49	--	Normal



9-27-2015 FSA - Normal

N

0 250 Feet

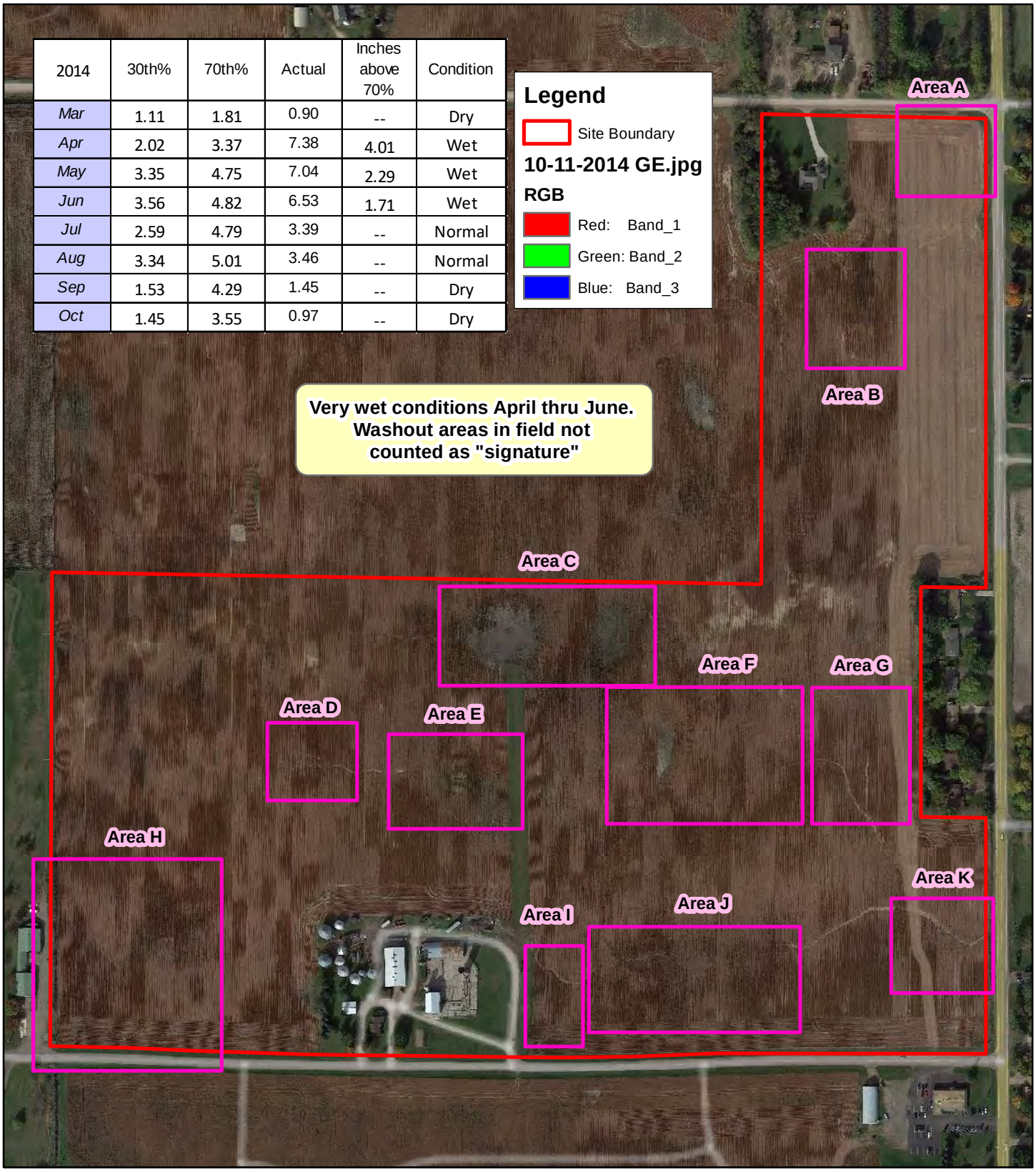
KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MNGEO Spatial Commons

14800 113th Ave N (KES 2024-063)
Dayton, Minnesota

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

2014	30th%	70th%	Actual	Inches above 70%	Condition
Mar	1.11	1.81	0.90	--	Dry
Apr	2.02	3.37	7.38	4.01	Wet
May	3.35	4.75	7.04	2.29	Wet
Jun	3.56	4.82	6.53	1.71	Wet
Jul	2.59	4.79	3.39	--	Normal
Aug	3.34	5.01	3.46	--	Normal
Sep	1.53	4.29	1.45	--	Dry
Oct	1.45	3.55	0.97	--	Dry



10-11-2014 Google Earth - Normal (very wet spring)

N

0 250 Feet

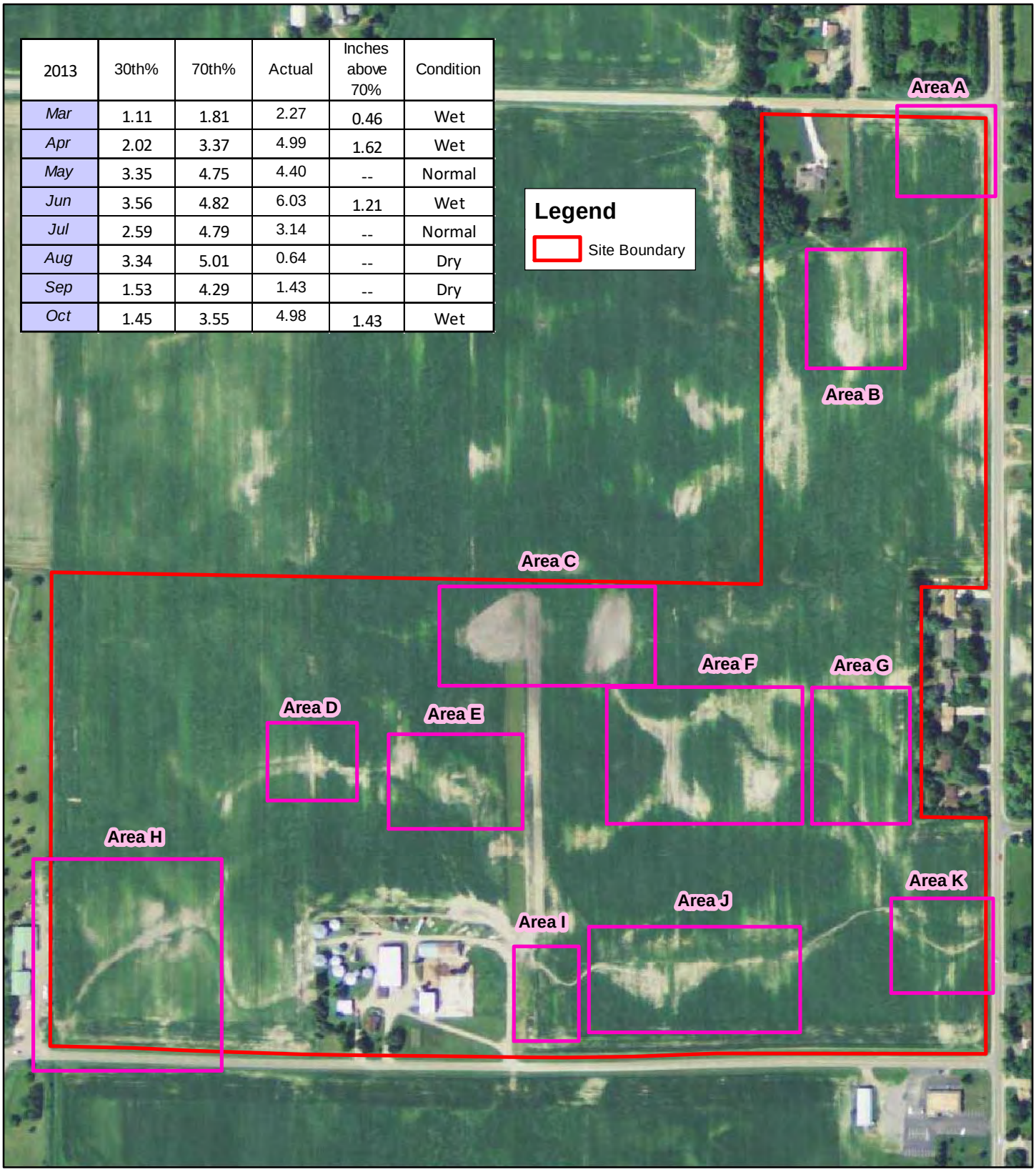
KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MNGEO Spatial Commons

14800 113th Ave N (KES 2024-063)
Dayton, Minnesota

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

2013	30th%	70th%	Actual	Inches above 70%	Condition
Mar	1.11	1.81	2.27	0.46	Wet
Apr	2.02	3.37	4.99	1.62	Wet
May	3.35	4.75	4.40	--	Normal
Jun	3.56	4.82	6.03	1.21	Wet
Jul	2.59	4.79	3.14	--	Normal
Aug	3.34	5.01	0.64	--	Dry
Sep	1.53	4.29	1.43	--	Dry
Oct	1.45	3.55	4.98	1.43	Wet



7-12-2013 FSA - Wet (included for viewing)

N

0 250 Feet

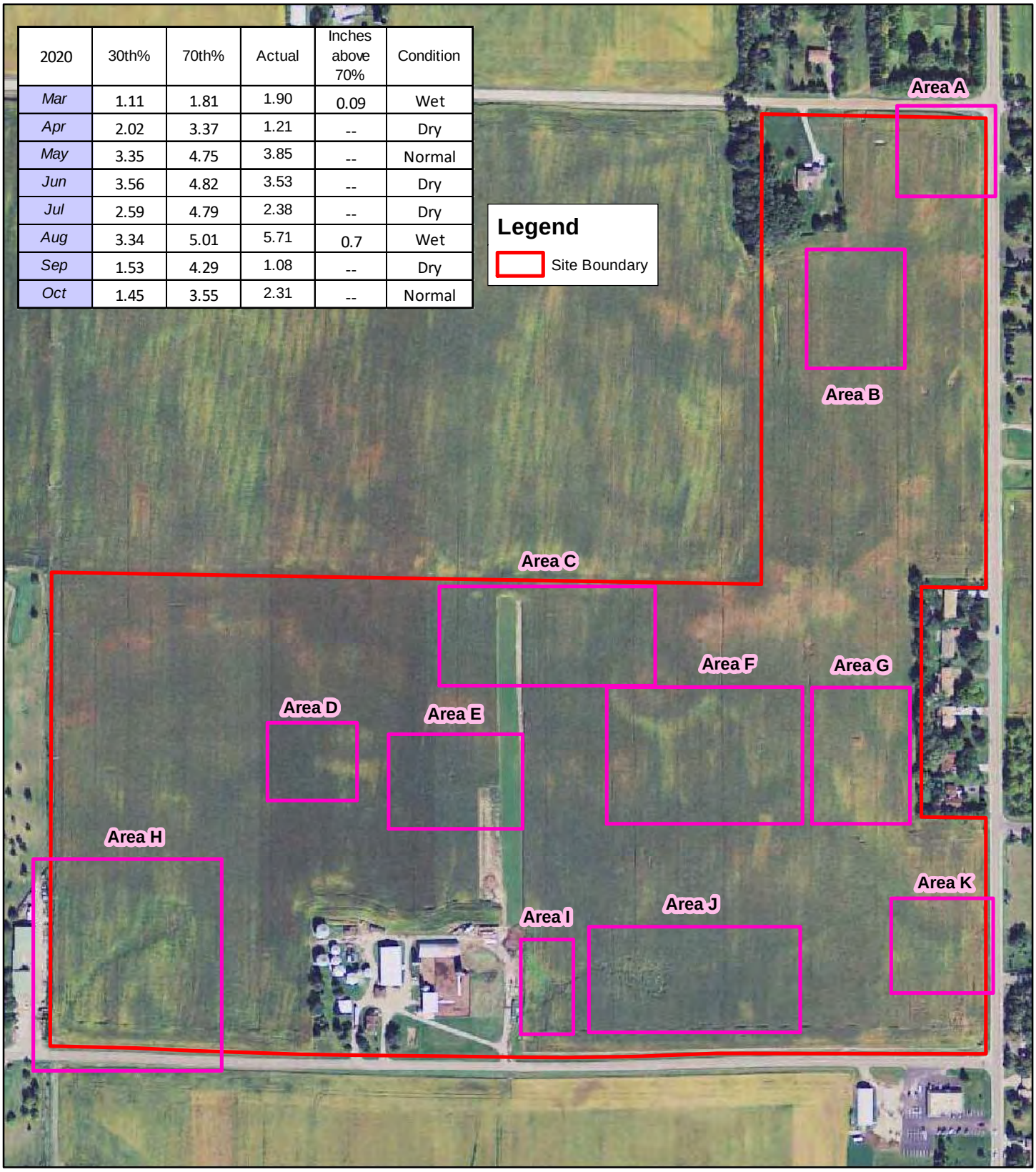
KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MNGEO Spatial Commons

14800 113th Ave N (KES 2024-063)
Dayton, Minnesota

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

2020	30th%	70th%	Actual	Inches above 70%	Condition
Mar	1.11	1.81	1.90	0.09	Wet
Apr	2.02	3.37	1.21	--	Dry
May	3.35	4.75	3.85	--	Normal
Jun	3.56	4.82	3.53	--	Dry
Jul	2.59	4.79	2.38	--	Dry
Aug	3.34	5.01	5.71	0.7	Wet
Sep	1.53	4.29	1.08	--	Dry
Oct	1.45	3.55	2.31	--	Normal



9-12-2010 Google Earth - Normal

N

0 250 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MNGEO Spatial Commons

14800 113th Ave N (KES 2024-063)
Dayton, Minnesota

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

Appendix F

DNR NHIS Response Letter and USFWS IPaC Species List

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

December 31, 2024

Mia Bauer
Stantec

RE: Natural Heritage Review of the proposed **DCM Farms**,
T120N R22W Section 33; Hennepin County

Dear Mia Bauer,

For all correspondence regarding the Natural Heritage Review of this project please include the project ID **MCE-2024-00946** in the email subject line.

As requested, the Minnesota Natural Heritage Information System has been reviewed to determine if the proposed project has the potential to impact any rare species or other significant natural features. Based on the project details provided with the request, the following rare features may be impacted by the proposed project:

State-listed Species

- Blanding's turtles (*Emydoidea blandingii*), a state-listed threatened species, have been documented in the vicinity of the proposed project. Blanding's turtles use upland areas up to and over a mile distant from wetlands, waterbodies, and watercourses. Uplands are used for nesting, basking, periods of dormancy, and traveling between wetlands. Factors believed to contribute to the decline of this species include collisions with vehicles, wetland drainage and degradation, and the development of upland habitat. Any added mortality can be detrimental to populations of Blanding's turtles, as these turtles have a low reproduction rate that depends upon a high survival rate to maintain population levels.

  This project has the potential to impact this rare turtle through direct fatalities and habitat disturbance/destruction due to activities associated with the project. Minnesota's Endangered Species Statute (Minnesota Statutes, section 84.0895) and associated Rules (Minnesota Rules, part 6212.1800 to 6212.2300 and 6134) prohibit the take of threatened or endangered species without a permit. As such, **the following avoidance measures are required**:
  - Avoid wetland and aquatic impacts during hibernation season, between September 15 and April 15, if the area is suitable for hibernation.
  - Install and maintain a temporary turtle proof barrier, such as a silt fence, to keep turtles out of soil stockpiles, gravel pads, and other areas of exposed soil/sand/sediment during nesting season, May 15 to July 15. The turtle proof barrier must be buried a minimum of 10 inches and removed once project is complete.

- Check pit/trenches for turtles every morning before construction activities begin and immediately prior to pits/trenches being backfilled.
- Limit erosion and sediment control to wildlife friendly erosion control.
- Avoid hydro-mulch products that contain any materials with synthetic (plastic) fiber additives, as the fibers can re-suspend and flow into waterbodies.
- Check bare ground within construction areas for turtles before the use of heavy equipment or any ground disturbance.
- The Blanding's turtle flyer must be given to all contractors working in the area.
- Report any sightings using the Quick Species Observation Form.
- If turtles are in imminent danger, move them by hand out of harm's way; otherwise, they are to be left undisturbed. Directions on how to move turtles safely can be found at Helping Turtles Across the Road
- If installing culverts, Culverts need to be 36 inches or greater in diameter, at least twice as wide as the normal width of open water, and have an elliptical, flat bottom, or embedded.

Additional Blanding's turtle avoidance measures may include, but are not limited to, the following recommendations:

- Recommendations from List 1 and List 2 of the Blanding's turtle fact sheet.
- Roads should be ditched, not curbed or below grade. If curbs must be used, install wildlife friendly curbs to allow turtles to leave the road. Gutters and stormwater inlets should be designed to prevent turtles from entering the storm sewer. For an example, reference "Curb Design and Small Animals" (Chapter 1, Page 24) in Best Practices for Meeting DNR General Public Waters Work Permit GP 2004-0001 (state.mn.us).

Please contact Review.NHIS@state.mn.us **to confirm that the above required avoidance measures will be implemented or to inform us that they are not feasible.** If the measures are not feasible, a project-specific avoidance plan will likely be needed.

- Little brown myotis (*Myotis lucifugus*) and big brown bat (*Eptesicus fuscus*), both state-listed bat species of special concern, have been documented in the vicinity of the proposed project. During the winter these bats hibernate in caves and mines. During the active season (approximately April-November) bats roost underneath bark, in cavities, or in crevices of both live and dead trees; and in human structures such as buildings and bridges. Activities that may impact these bats include, but are not limited to, wind farm operation, any disturbance to hibernacula, and destruction/degradation of habitat. 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 are not able to fly. To minimize impacts to bats, **the DNR recommends that tree removal be avoided from June 1 through August 15.**

- 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.

Federally Protected Species

- 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 RPBB guidance provides guidance on avoiding impacts to rusty patched bumble bee and a key for determining if actions are likely to affect the species; the determination key can be found in the appendix.

Environmental Review and Permitting

- The Environmental Assessment Worksheet should address whether the proposed project has the potential to adversely affect the above rare features and, if so, it should identify specific measures that will be taken to avoid or minimize disturbance. Sufficient information should be provided so the DNR can determine whether a permit to take will be needed for any of the above protected species.

- Please include a copy of this letter and the MCE-generated Final Project Report in any state or local license or permit application. Please note that measures to avoid or minimize disturbance to the above rare features may be included as restrictions or conditions in any required permits or licenses.

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 native plant communities, rare species, and other rare features. However, the NHIS is not an exhaustive inventory and does not contain the locations of all rare features in 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 project description provided with the request. **If project details change or the project has not occurred within one year, please resubmit the project for review within one year of 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. Visit Natural Heritage Review for additional information regarding this process, survey guidance, and other related information. For information on the environmental review process or other natural resource concerns, please 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,

Molly Barrett Digitally signed by Molly Barrett
Date: 2024.12.31 16:16:33 -06'00'

Natural Heritage Review Specialist
molly.barrett@state.mn.us

Cc: Melissa Collins, Regional Environmental Assessment Ecologist, Central (Region 3)

Environmental Review Fact Sheet Series

Endangered, Threatened, and Special Concern Species of Minnesota

Blanding's Turtle

(*Emydoidea blandingii*)

Minnesota Status:	Threatened	State Rank[1]:	S2
Federal Status:	none	Global Rank[1]:	G4

HABITAT USE

Blanding's turtles need both wetland and upland habitats to complete their life cycle. The types of wetlands used include ponds, marshes, shrub swamps, bogs, and ditches and streams with slow-moving water. In Minnesota, Blanding's turtles are primarily marsh and pond inhabitants. Calm, shallow water bodies (Type 1-3 wetlands) with mud bottoms and abundant aquatic vegetation (e.g., cattails, water lilies) are preferred, and extensive marshes bordering rivers provide excellent habitat. Small temporary wetlands (those that dry up in the late summer or fall) are frequently used in spring and summer -- these fishless pools are amphibian and invertebrate breeding habitat, which provides an important food source for Blanding's turtles. Also, the warmer water of these shallower areas probably aids in the development of eggs within the female turtle. Nesting occurs in open (grassy or brushy) sandy uplands, often some distance from water bodies. Frequently, nesting occurs in traditional nesting grounds on undeveloped land. Blanding's turtles have also been known to nest successfully on residential property (especially in low density housing situations), and to utilize disturbed areas such as farm fields, gardens, under power lines, and road shoulders (especially of dirt roads). Although Blanding's turtles may travel through woodlots during their seasonal movements, shady areas (including forests and lawns with shade trees) are not used for nesting. Wetlands with deeper water are needed in times of drought, and during the winter. Blanding's turtles overwinter in the muddy bottoms of deeper marshes and ponds, or other water bodies where they are protected from freezing.

LIFE HISTORY

Individuals emerge from overwintering and begin basking in late March or early April on warm, sunny days. The increase in body temperature which occurs during basking is necessary for egg development within the female turtle. Nesting in Minnesota typically occurs during June, and females are most active in late afternoon and at dusk. Nesting can occur as much as a mile from wetlands. The nest is dug by the female in an open sandy area and 6-15 eggs are laid. The female turtle returns to the marsh within 24 hours of laying eggs. After a development period of approximately two months, hatchlings leave the nest from mid-August through early-October. Nesting females and hatchlings are often at risk of being killed while crossing roads between wetlands and nesting areas. In addition to movements associated with nesting, all ages and both sexes move between wetlands from April through November. These movements peak in June and July and again in September and October as turtles move to and from overwintering sites. In late autumn (typically November), Blanding's turtles bury themselves in the substrate (the mud at the bottom) of deeper wetlands to overwinter.

IMPACTS / THREATS / CAUSES OF DECLINE

- loss of wetland habitat through drainage or flooding (converting wetlands into ponds or lakes)
- loss of upland habitat through development or conversion to agriculture
- human disturbance, including collection for the pet trade* and road kills during seasonal movements
- increase in predator populations (skunks, racoons, etc.) which prey on nests and young

*It is illegal to possess this threatened species.

RECOMMENDATIONS FOR AVOIDING AND MINIMIZING IMPACTS

These recommendations apply to typical construction projects and general land use within Blanding's turtle habitat, and are provided to help local governments, developers, contractors, and homeowners minimize or avoid detrimental impacts to Blanding's turtle populations. **List 1** describes minimum measures which we recommend to prevent harm to Blanding's turtles during construction or other work within Blanding's turtle habitat. **List 2** contains recommendations which offer even greater protection for Blanding's turtles populations; this list should be used *in addition to the first list* in areas which are known to be of state-wide importance to Blanding's turtles (contact the DNR's Natural Heritage and Nongame Research Program if you wish to determine if your project or home is in one of these areas), or in any other area where greater protection for Blanding's turtles is desired.

List 1. Recommendations for all areas inhabited by Blanding's turtles.	**List 2. *Additional* recommendations for areas known to be of state-wide importance to Blanding's turtles.**
GENERAL	
A flyer with an illustration of a Blanding's turtle should be given to all contractors working in the area. Homeowners should also be informed of the presence of Blanding's turtles in the area.	Turtle crossing signs can be installed adjacent to road-crossing areas used by Blanding's turtles to increase public awareness and reduce road kills.
Turtles which are in imminent danger should be moved, by hand, out of harms way. Turtles which are not in imminent danger should be left undisturbed.	Workers in the area should be aware that Blanding's turtles nest in June, generally after 4pm, and should be advised to minimize disturbance if turtles are seen.
If a Blanding's turtle nests in your yard, do not disturb the nest.	If you would like to provide more protection for a Blanding's turtle nest on your property, see "Protecting Blanding's Turtle Nests" on page 3 of this fact sheet.
Silt fencing should be set up to keep turtles out of construction areas. It is critical that silt fencing be removed after the area has been revegetated.	Construction in potential nesting areas should be limited to the period between September 15 and June 1 (this is the time when activity of adults and hatchlings in upland areas is at a minimum).
WETLANDS	
Small, vegetated temporary wetlands (Types 2 & 3) should not be dredged, deepened, filled, or converted to storm water retention basins (these wetlands provide important habitat during spring and summer).	Shallow portions of wetlands should not be disturbed during prime basking time (mid morning to mid- afternoon in May and June). A wide buffer should be left along the shore to minimize human activity near wetlands (basking Blanding's turtles are more easily disturbed than other turtle species).
Wetlands should be protected from pollution; use of fertilizers and pesticides should be avoided, and run-off from lawns and streets should be controlled. Erosion should be prevented to keep sediment from reaching wetlands and lakes.	Wetlands should be protected from road, lawn, and other chemical run-off by a vegetated buffer strip at least 50' wide. This area should be left unmowed and in a natural condition.
ROADS	
Roads should be kept to minimum standards on widths and lanes (this reduces road kills by slowing traffic and reducing the distance turtles need to cross).	Tunnels should be considered in areas with concentrations of turtle crossings (more than 10 turtles per year per 100 meters of road), and in areas of lower density if the level of road use would make a safe crossing impossible for turtles. Contact your DNR Regional Nongame Specialist for further information on wildlife tunnels.
Roads should be ditched, not curbed or below grade. If curbs must be used, 4 inch high curbs at a 3:1 slope are preferred (Blanding's turtles have great difficulty climbing traditional curbs; curbs and below grade roads trap turtles on the road and can cause road kills).	Roads should be ditched, not curbed or below grade.

ROADS cont.	
Culverts between wetland areas, or between wetland areas and nesting areas, should be 36 inches or greater in diameter, and elliptical or flat-bottomed.	Road placement should avoid separating wetlands from adjacent upland nesting sites, or these roads should be fenced to prevent turtles from attempting to cross them (contact your DNR Nongame Specialist for details).
Wetland crossings should be bridged, or include raised roadways with culverts which are 36 in or greater in diameter and flat-bottomed or elliptical (raised roadways discourage turtles from leaving the wetland to bask on roads).	Road placement should avoid bisecting wetlands, or these roads should be fenced to prevent turtles from attempting to cross them (contact your DNR Nongame Specialist for details). This is especially important for roads with more than 2 lanes.
Culverts under roads crossing streams should be oversized (at least twice as wide as the normal width of open water) and flat-bottomed or elliptical.	Roads crossing streams should be bridged.
UTILITIES	
Utility access and maintenance roads should be kept to a minimum (this reduces road-kill potential).	
Because trenches can trap turtles, trenches should be checked for turtles prior to being backfilled and the sites should be returned to original grade.	
LANDSCAPING AND VEGETATION MANAGEMENT	
Terrain should be left with as much natural contour as possible.	As much natural landscape as possible should be preserved (installation of sod or wood chips, paving, and planting of trees within nesting habitat can make that habitat unusable to nesting Blanding's turtles).
Graded areas should be revegetated with native grasses and forbs (some non-natives form dense patches through which it is difficult for turtles to travel).	Open space should include some areas at higher elevations for nesting. These areas should be retained in native vegetation, and should be connected to wetlands by a wide corridor of native vegetation.
Vegetation management in infrequently mowed areas -- such as in ditches, along utility access roads, and under power lines -- should be done mechanically (chemicals should not be used). Work should occur fall through spring (after October 1st and before June 1st).	Ditches and utility access roads should not be mowed or managed through use of chemicals. If vegetation management is required, it should be done mechanically, as infrequently as possible, and fall through spring (mowing can kill turtles present during mowing, and makes it easier for predators to locate turtles crossing roads).

Protecting Blanding's Turtle Nests: Most predation on turtle nests occurs within 48 hours after the eggs are laid. After this time, the scent is gone from the nest and it is more difficult for predators to locate the nest. Nests more than a week old probably do not need additional protection, unless they are in a particularly vulnerable spot, such as a yard where pets may disturb the nest. Turtle nests can be protected from predators and other disturbance by covering them with a piece of wire fencing (such as chicken wire), secured to the ground with stakes or rocks. The piece of fencing should measure at least 2 ft. x 2 ft., and should be of medium sized mesh (openings should be about 2 in. x 2 in.). It is ***very important*** that the fencing be **removed before August 1st** so the young turtles can escape from the nest when they hatch!

REFERENCES

[1]Association for Biodiversity Information. "Heritage Status: Global, National, and Subnational Conservation Status Ranks." NatureServe. Version 1.3 (9 April 2001). http://www.natureserve.org/ranking.htm (15 April 2001).

Coffin, B., and L. Pfannmuller. 1988. Minnesota's Endangered Flora and Fauna. University of Minnesota Press, Minneapolis, 473 pp.

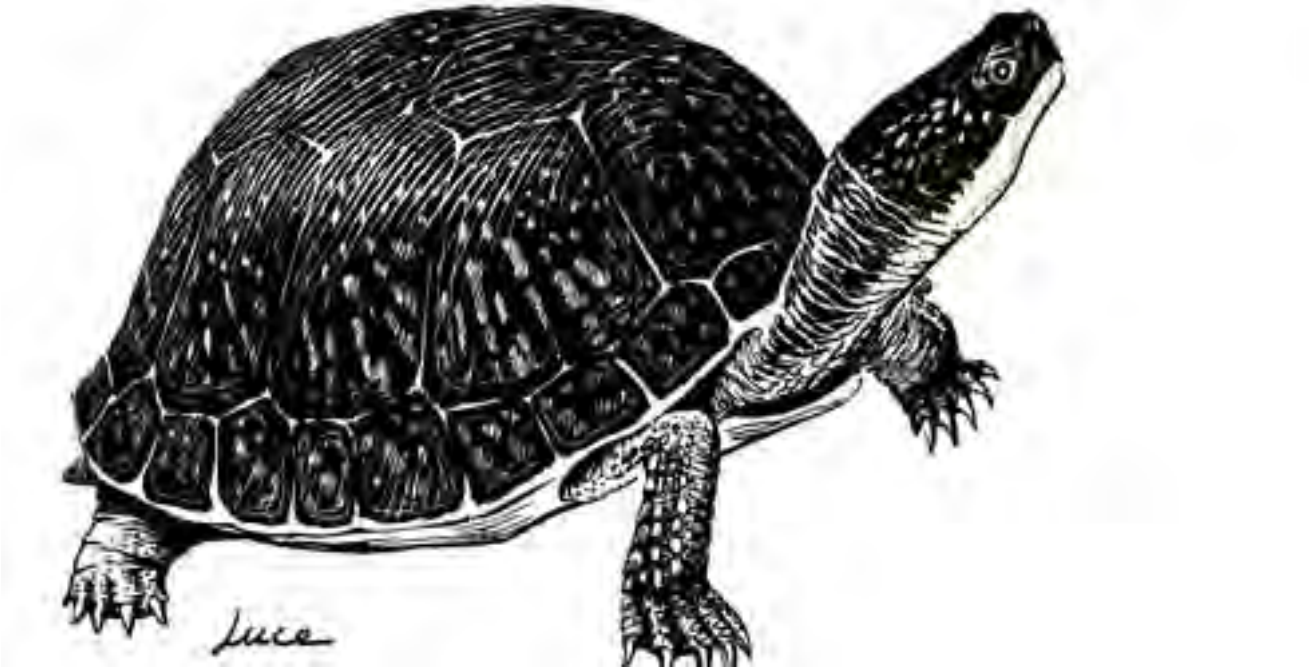
REFERENCES (cont.)

Moriarty, J. J., and M. Linck. 1994. Suggested guidelines for projects occurring in Blanding's turtle habitat. Unpublished report to the Minnesota DNR. 8 pp.

Oldfield, B., and J. J. Moriarty. 1994. Amphibians and Reptiles Native to Minnesota. University of Minnesota Press, Minneapolis, 237 pp.

Sajwaj, T. D., and J. W. Lang. 2000. Thermal ecology of Blanding's turtle in central Minnesota. Chelonian Conservation and Biology 3(4):626-636.

CAUTION



BLANDING'S TURTLES

MAY BE ENCOUNTERED IN THIS AREA

The unique and rare Blanding's turtle has been found in this area. Blanding's turtles are a State Threatened species and are protected under Minnesota Statute 84.095, Protection of Threatened and Endangered Species. Please be careful of turtles on roads and in construction sites. For additional information on turtles, or to report a Blanding's turtle sighting, contact the DNR Nongame Specialist nearest you: Bemidji (218-308-2641); Grand Rapids (218-327-4518); New Ulm (507-359-6033); Rochester (507-280-5070); or St. Paul (651-259-5764).

DESCRIPTION: The Blanding's turtle is a medium to large turtle (5 to 10 inches) with a black or dark blue, dome-shaped shell with muted yellow spots and bars. The bottom of the shell is hinged across the front third, enabling the turtle to pull the front edge of the lower shell firmly against the top shell to provide additional protection when threatened. The head, legs, and tail are dark brown or blue-gray with small dots of light brown or yellow. A distinctive field mark is the bright yellow chin and neck.

Illustration by Don Luce, from Turtles in Minnesota, Natural History Leaflet No. 9, June 1989, James Ford Bell Museum of Natural History

SUMMARY OF RECOMMENDATIONS FOR AVOIDING AND MINIMIZING IMPACTS TO BLANDING'S TURTLE POPULATIONS

(see Environmental Review Fact Sheet Series for full recommendations)

- A flyer with an illustration of an adult Blanding's turtle should be given to all contractors working in the area. Homeowners should also be informed of the presence of Blanding's turtles in the area.
- Turtles which are in imminent danger should be moved, by hand, out of harms way. Turtles which are not in imminent danger should be left undisturbed to continue their travel among wetlands and/or nest sites.
- If a Blanding's turtle nests in your yard, do not disturb the nest, and do not allow pets near the nest.
- Blanding's turtles do not make good pets. It is illegal to keep this threatened species in captivity.
- Silt fencing should be set up to keep turtles out of construction areas. It is critical that silt fencing be removed after the area has been revegetated.
- Small, vegetated temporary wetlands should not be dredged, deepened, or filled.
- All wetlands should be protected from pollution; use of fertilizers and pesticides should be avoided, and run-off from lawns and streets should be controlled. Erosion should be prevented to keep sediment from reaching wetlands and lakes.
- Roads should be kept to minimum standards on widths and lanes.
- Roads should be ditched, not curbed or below grade. If curbs must be used, 4" high curbs at a 3:1 slope are preferred.
- Culverts under roads crossing wetland areas, between wetland areas, or between wetland and nesting areas should be at least 36 in. diameter and flat-bottomed or elliptical.
- Culverts under roads crossing streams should be oversized (at least twice as wide as the normal width of open water) and flat-bottomed or elliptical.
- Utility access and maintenance roads should be kept to a minimum.
- Because trenches can trap turtles, trenches should be checked for turtles prior to being backfilled and the sites should be returned to original grade.
- Terrain should be left with as much natural contour as possible.
- Graded areas should be revegetated with native grasses and forbs.
- Vegetation management in infrequently mowed areas -- such as in ditches, along utility access roads, and under power lines -- should be done mechanically (chemicals should not be used). Work should occur fall through spring (after October 1st and before June 1st).

Compiled by the Minnesota Department of Natural Resources Division of Ecological Resources, Updated March 2008
Endangered Species Environmental Review Coordinator, 500 Lafayette Rd., Box 25, St. Paul, MN 55155 / 651-259-5109

Wildlife-friendly Erosion Control

Wildlife entanglement in, and death from, plastic netting and other man-made plastic materials has been documented in birds (Johnson, 1990; Fuller-Perrine and Tobin, 1993), fish (Johnson, 1990), mammals (Derraik, 2002), and reptiles (Barton and Kinkead, 2005; Kapfer and Paloski, 2011). Unfortunately, the use of these materials for erosion control continues in many cases, often without consideration for wildlife impact. This plastic netting is frequently used for erosion control during construction and landscape projects and can negatively impact terrestrial and aquatic wildlife populations as well as snag in maintenance machinery, resulting in costly repairs and delays. However, erosion-control materials that are wildlife friendly do exist and are sold by several large companies. Below are a few key considerations before starting a project.

Know Your Options

- Remember to consult with local natural resource agencies (DNR, USFWS, etc.) before starting a project. They can help you identify sensitive areas and rare species.
- When erosion control is necessary, select products with biodegradable netting (natural fiber, biodegradable polyesters, etc.).
- DO NOT use products that require UV-light to biodegrade (also called "photodegradable") as they do not biodegrade properly when shaded by vegetation.
- Use netting with rectangular-shaped mesh (not square mesh).
- Use netting with flexible (non-welded) mesh.

Woven 100% natural fiber erosion-control materials being utilized along a central Minnesota stream. ©MN DNR, Nick Proulx

Know the Landscape

- It is especially important to use wildlife-friendly erosion control around:
    - Areas with threatened or endangered species.
    - Wetlands, rivers, lakes, and other watercourses.
    - Habitat-transition zones (prairie – woodland edges, rocky outcrop – woodland edges, steep rocky slopes, etc.).

Fish trapped and killed by welded-plastic square erosion-control mesh improperly placed along a small central Minnesota stream. Photo courtesy of Ben Lowe.

- Use erosion mesh wisely; not all areas with disturbed ground necessitate its use. Do not use plastic mesh unless it is specifically required. Other erosion-control options exist (open weave textile (OWT), rolled erosion control products (RECPs) with woven, natural fiber netting).

Protect Wildlife

- Avoid photodegradable erosion-control materials where possible.
- Use only biodegradable materials (typically made from natural fibers), preferably those that will biodegrade under a variety of conditions.
- The cost of erosion-control material that is wildlife friendly is often comparable to conventional plastic netting.

Plains Gartersnake trapped and killed by welded-plastic square erosion-control mesh placed along a newly installed cement culvert in southern Minnesota. ©MN DNR, Carol Hall

A small vole that was strangled and killed by plastic erosion-control material with welded and square mesh. Photo taken in southern Minnesota and provided courtesy of Tom Jessen.

Literature Referenced

Barton, C. and K. Kinkead. 2005. Do erosion control and snakes mesh? Soil and Water Conservation Society 60:33A-35A.

Derraik, J.G.B. 2002. The pollution of the marine environment by plastic debris: a review. Marine Pollution Bulletin 44:842-852.

Fuller-Perrine, L.D., and M.E. Tobin. 1993. A method for applying and removing bird-exclusion netting in commercial vineyards. Wildlife Society Bulletin 21:47-51.

Johnson, S.W. 1990. Distribution, abundance, and source of entanglement debris and other plastics on Alaskan beaches, 1982-1988. Proceedings of the Second International Conference on Marine Debris 331-348.

Kapfer, J.M., and R.A. Paloski. 2011. On the threat to snakes of mesh deployed for erosion control and wildlife exclusion. Herpetological Conservation and Biology 6:1-9.

IPaC **U.S. Fish & Wildlife Service**

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

Hennepin County, Minnesota

Local office

Minnesota-Wisconsin Ecological Services Field Office

(952) 858-0793

3815 American Blvd East

Bloomington, MN 55425-1659

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

---

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information. IPaC only shows species that are regulated by USFWS (see FAQ).

2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Mammals

NAME	STATUS
Tricolored Bat Perimyotis subflavus Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/10515	Proposed Endangered

Birds

NAME	STATUS
Whooping Crane Grus americana No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/758	EXPN

Clams

NAME	STATUS
Salamander Mussel Simpsonaias ambigua Wherever found There is **proposed** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/6208	Proposed Endangered

Insects

NAME	STATUS
Monarch Butterfly Danaus plexippus Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/9743	Candidate
Rusty Patched Bumble Bee Bombus affinis Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/9383	Endangered

Western Regal Fritillary Argynnis idalia occidentalis Proposed Threatened
Wherever found

No critical habitat has been designated for this species.

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

There are no critical habitats at this location.

You are still required to determine if your project(s) may have effects on all above listed species.

Bald & Golden Eagles

Bald and golden eagles are protected under the Bald and Golden Eagle Protection Act[1] and the Migratory Bird Treaty Act[2].

Any person or organization who plans or conducts activities that may result in impacts to bald or golden eagles, or their habitats[3], should follow appropriate regulations and consider implementing appropriate conservation measures, as described in the links below. Specifically, please review the "Supplemental Information on Migratory Birds and Eagles".

Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

There are likely bald eagles present in your project area. For additional information on bald eagles, refer to Bald Eagle Nesting and Sensitivity to Human Activity

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, see the PROBABILITY OF PRESENCE SUMMARY below to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bald Eagle Haliaeetus leucocephalus This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Dec 1 to Aug 31

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read "Supplemental Information on Migratory Birds and Eagles", specifically the FAQ section titled "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.

3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

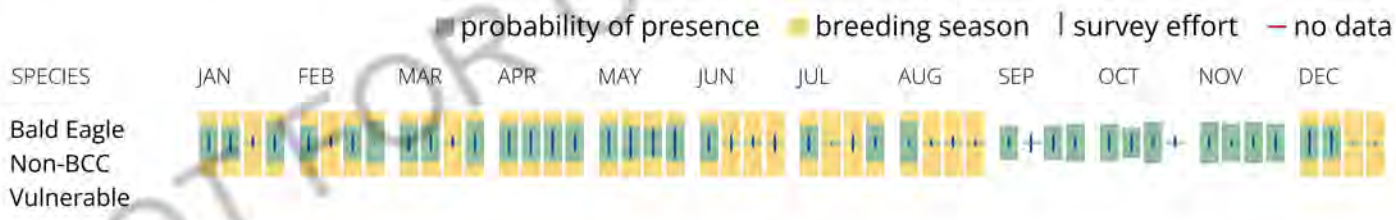
Breeding Season (▮)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



What does IPaC use to generate the potential presence of bald and golden eagles in my specified location?

The potential for eagle presence is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply). To see a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What does IPaC use to generate the probability of presence graphs of bald and golden eagles in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur. Please contact your local Fish and Wildlife Service Field Office if you have questions.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats[3] should follow appropriate regulations and consider implementing appropriate conservation measures, as described in the links below. Specifically, please review the "Supplemental Information on Migratory Birds and Eagles".

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this

location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, see the PROBABILITY OF PRESENCE SUMMARY below to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bald Eagle *Haliaeetus leucocephalus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Dec 1 to Aug 31
Black Tern *Chlidonias niger surinamenisis* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/3093	Breeds May 15 to Aug 20
Black-billed Cuckoo *Coccyzus erythropthalmus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9399	Breeds May 15 to Oct 10
Bobolink *Dolichonyx oryzivorus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 20 to Jul 31
Canada Warbler *Cardellina canadensis* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 20 to Aug 10

Cerulean Warbler Setophaga cerulea — Breeds Apr 22 to Jul 20
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/2974

Chimney Swift Chaetura pelagica — Breeds Mar 15 to Aug 25
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Eastern Whip-poor-will Antrostomus vociferus — Breeds May 1 to Aug 20
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Golden-winged Warbler Vermivora chrysoptera — Breeds May 1 to Jul 20
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/8745

Grasshopper Sparrow Ammodramus savannarum perpallidus — Breeds Jun 1 to Aug 20
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA
https://ecos.fws.gov/ecp/species/8329

Henslow's Sparrow Centronyx henslowii — Breeds May 1 to Aug 31
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/3941

Lesser Yellowlegs Tringa flavipes — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9679

Red-headed Woodpecker Melanerpes erythrocephalus — Breeds May 10 to Sep 10
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Ruddy Turnstone Arenaria interpres morinella — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA

Rusty Blackbird Euphagus carolinus — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA

Wood Thrush Hylocichla mustelina — Breeds May 10 to Aug 31
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read "Supplemental Information on Migratory Birds and Eagles", specifically the FAQ section titled "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season (■)

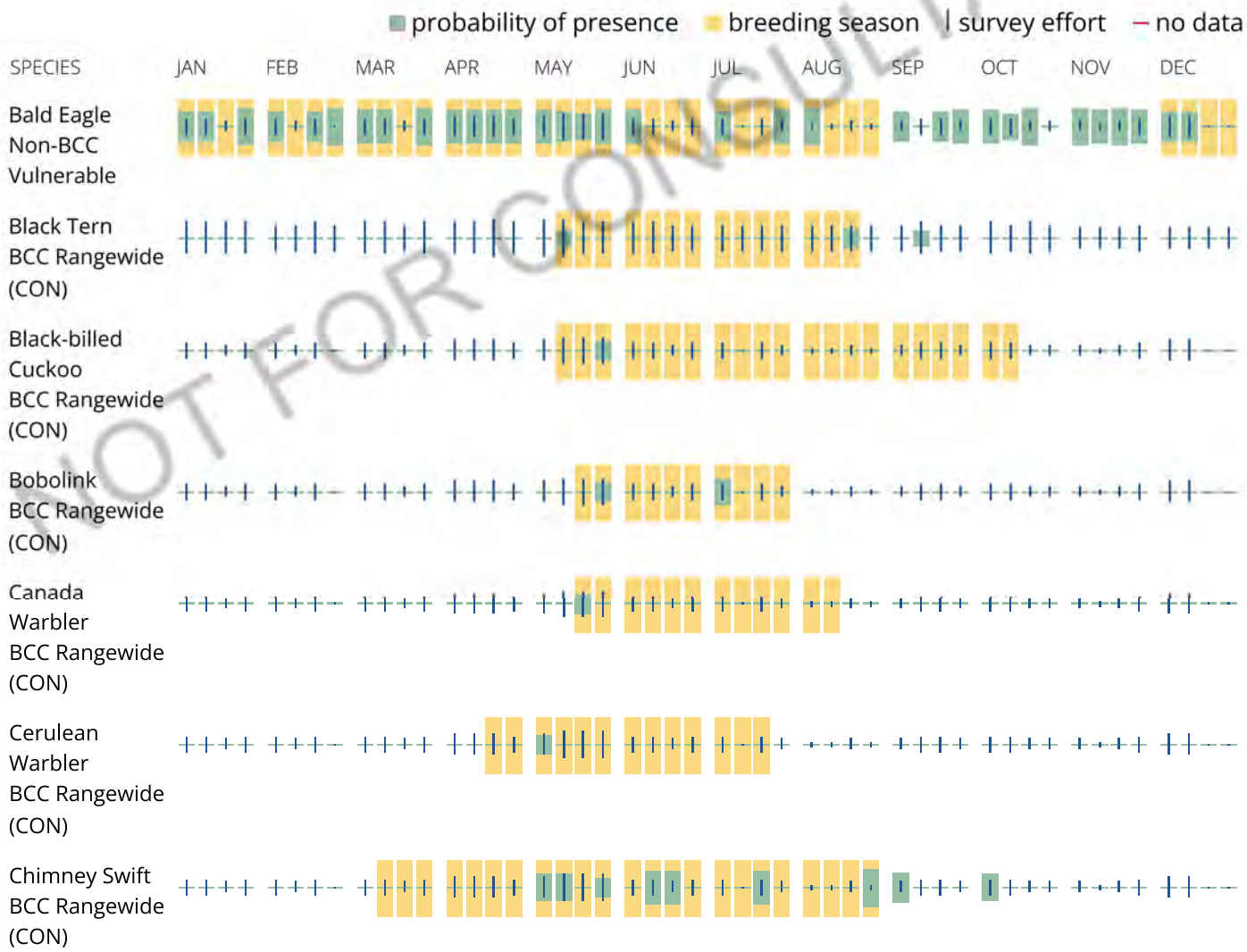
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

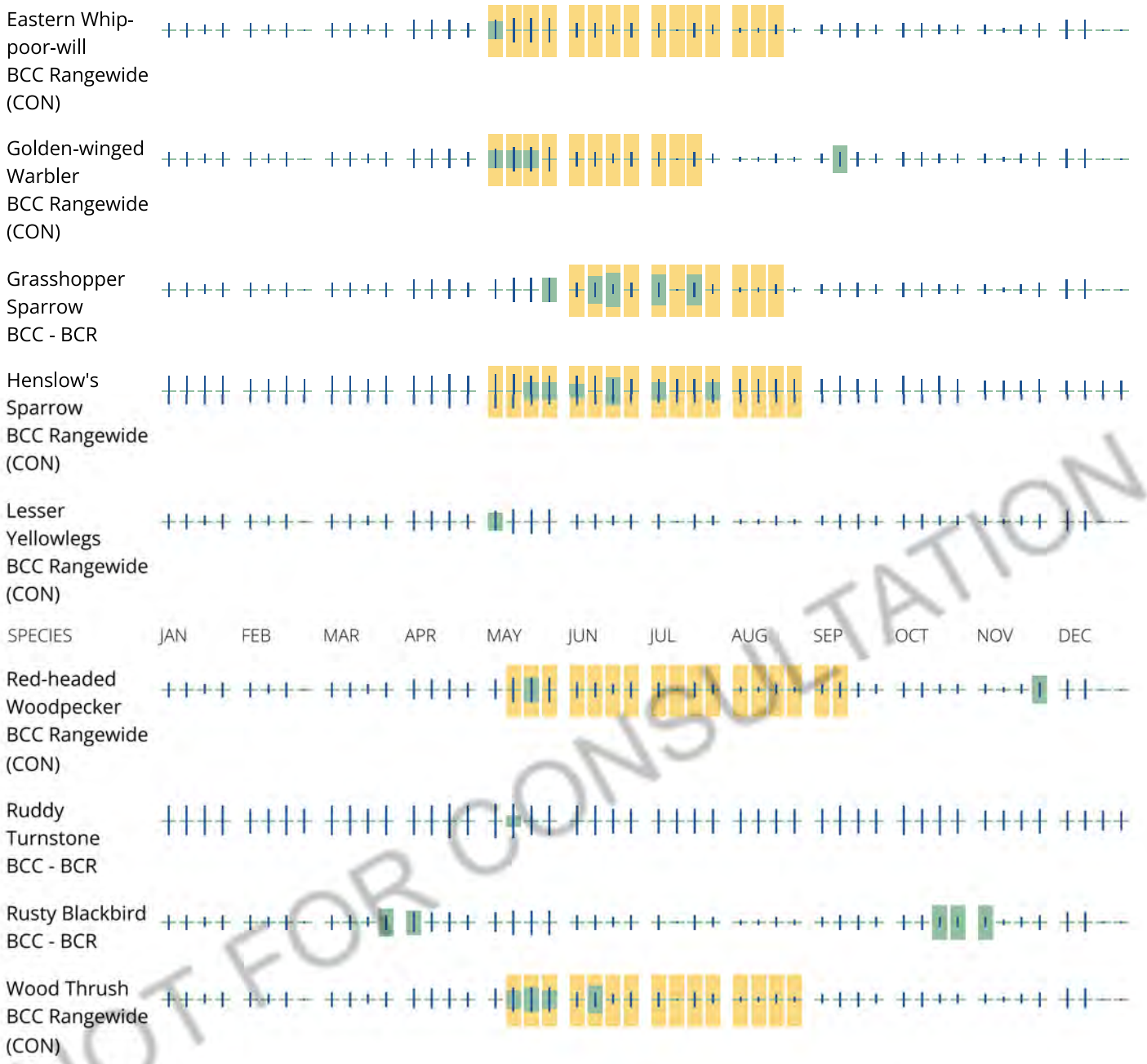
Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.





Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the list of migratory birds that potentially occur in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets.

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering or migrating in my area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may query your location using the RAIL Tool and look at the range maps provided for birds in your area at the bottom of the profiles provided for each bird in your results. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

There are no refuge lands at this location.

Fish hatcheries

There are no fish hatcheries at this location.

Wetlands in the National Wetlands Inventory (NWI)

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Wetland information is not available at this time

This can happen when the National Wetlands Inventory (NWI) map service is unavailable, or for very large projects that intersect many wetland areas. Try again, or visit the NWI map to view wetlands at this location.

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate Federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

Appendix G

MnSHPO Concurrence Letter

DEPARTMENT OF ADMINISTRATION
STATE HISTORIC PRESERVATION OFFICE

January 3, 2025

Jon Sevald
Community Development Director
City of Dayton
jsevald@cityofdaytonmn.com

RE: DCM Farms Development Project
T120 R22 S33, Hennepin County
SHPO Number: 2025-0285

Dear Jon Sevald:

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

We have reviewed the submitted report, *An Archaeological Reconnaissance Survey of the DCM Farms Project, Hennepin County, Minnesota* (December 5, 2024) as prepared by Stantec. Based on the results of the survey, we have determined that there are **no properties** listed in the National or State Registers of Historic Places, or within the Historic Sites Network, that will be affected by this project. We have also determined that there are no known or suspected archaeological resources in the area that will be affected by this project.

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 Kelly Gragg-Johnson, Environmental Review Program Specialist, at (651) 201-3285 or kelly.graggjohnson@state.mn.us.

Sincerely,

Amy Spong
Director & Deputy State Historic Preservation Officer

Appendix H

Greenhouse Gas Analysis Calculations

DCM Farms Project
GHG Emissions Summary

		Scenario A - Business Park/Warehouses			
Scope	**Source**	**CO_2 (ton/yr)**	**CH_4 (ton/yr)**	**N_2O (ton/yr)**	**CO_2e (ton/yr)**
Direct Emissions					
Scope 1	Construction - Mobile Sources Onroad - Gasoline and Diesel	48	0.0004	0.0013	48
Scope 1	Construction - Mobile Sources Non-road - Diesel	413	0.041	0.038	425
Scope 1	Operations - Stationary Combustion - Natural Gas	1,611	0.0305	0.00296	1,612
Scope 1	Operations - Mobile Sources - Gasoline and Diesel	51,088	0.725	0.470	51,246
Indirect Emissions					
Scope 2	Purchased Electricity	4,651	0.50	0.070	4,684
Scope 2	Waste - Operations				461
Atmospheric Removals of GHGs					
Scope 1 - Sinks	Land Use (CO2 Removals to Terrestrial Storage)				96
Total		**57,810**	**1.3**	**0.58**	**58,477**

Lifetime 2,923,830

DCM Farms Project

Source ID	Description	Building Activity	Number of Units	Lodging Square Footage[1]	Maximum Build		
					Bldg Square Footage	Natural Gas Combustion (scf/yr)	Electricity Usage (kWh/yr)
Lodging	Villas	Lodging	141	2,000	282,000.00	12,436,200.00	4,342,800.00
Lodging	Single Family	Lodging	59	2,500	147,500.00	6,504,750.00	2,271,500.00
Lodging	Alley Row Homes	Lodging	67	1,800	120,600.00	5,318,460.00	1,857,240.00
Retail	Retail	Retail	N/A	N/A	11,880.00	313,632.00	167,508.00
Food Services	Coffee Shop	Food Services	N/A	N/A	2,400.00	508,800.00	103,440.00
Service	Daycare	Service	N/A	N/A	5,500.00	164,725.00	111,100.00
Retail	Convenience Store	Retail	N/A	N/A	10,000.00	264,000.00	141,000.00
Office	Corporate Office/Bank	Office	N/A	N/A	8,400.00	220,920.00	128,520.00
Food Services	Restaurant	Restaurant	N/A	N/A	5,500.00	1,166,000.00	237,050.00
		Total			**593,780**	**26,897,487**	**9,360,158**

1: Housing square footage based on the average market square footage in Dayton, MN for Villas and Single Family homes. Minimum square footage used for Alley Row Homes.

Back to Intro | Back to Summary | Heat Content | Help

Scope 1 Emissions from Stationary Combustion Sources

EPA CENTER FOR CORPORATE CLIMATE LEADERSHIP
U.S. Environmental Protection Agency

Guidance

(A) Enter annual data for each combustion unit, facility, or site (by fuel type) in ORANGE cells on **Table 1**. Example entry is shown in first row (*GREEN Italics*).
- Select "Fuel Combusted" from drop down box.
- Enter "Quantity Combusted" and choose the appropriate units from the drop down box in the unit column. If it's necessary to convert units, common heat contents can be found on the "Heat Content" sheet and unit conversions on the "Unit Conversion" sheet.

(B) If fuel is consumed in a facility but stationary fuel consumption data are not available, an estimate should be made for completeness. See the "Items to Note" section of the Help sheet for suggested estimation approaches.

(C) Biomass CO_2 emissions are not reported in the total emissions, but are reported separately at the bottom of the sheet.

Table 1. Stationary Source Fuel Combustion

Source ID	Source Description	Source Area (sq ft)	Fuel Combusted	Fuel State (solid, liquid, gas)	Quantity Combusted	Units
BLR-012	*East Power Plant*	*12,517*	*Natural Gas*	*Gas*	*10,000*	*MMBtu*
Lodging	Villas	282,000	Natural Gas	Gas	12,436,200	SCF
Lodging	Single Family	147,500	Natural Gas	Gas	6,504,750	SCF
Lodging	Alley Row Homes	120,600	Natural Gas	Gas	5,318,460	SCF
Retail	Retail	11,880	Natural Gas	Gas	313,632	SCF
Food Servic	Coffee Shop	2,400	Natural Gas	Gas	508,800	SCF
Service	Daycare	5,500	Natural Gas	Gas	164,725	SCF
Retail	Convenience Store	10,000	Natural Gas	Gas	264,000	SCF
Office	Corporate Office/Bank	8,400	Natural Gas	Gas	220,920	SCF
Food Servic	Restaurant	5,500	Natural Gas	Gas	1,166,000	SCF

GHG Emissions

Total Organization-Wide Stationary Source Combustion by Fuel Type

Fuel Type	Quantity Combusted	Units
Coal and Coke - Solid		
Anthracite Coal	0	short ton
Bituminous Coal	0	short ton
Sub-bituminous Coal	0	short ton
Lignite Coal	0	short ton
Mixed (Commercial Sector)	0	short ton
Mixed (Electric Power Sector)	0	short ton
Mixed (Industrial Coking)	0	short ton
Mixed (Industrial Sector)	0	short ton
Coal Coke	0	short ton
Other Fuels - Solid		
Municipal Solid Waste	0	short ton
Petroleum Coke (Solid)	0	short ton
Plastics	0	short ton
Tires	0	short ton
Biomass Fuels - Solid		
Agricultural Byproducts	0	short ton
Peat	0	short ton
Solid Byproducts	0	short ton
Wood and Wood Residuals	0	short ton
Gaseous Fuels		
Natural Gas	26,897,487	scf
Propane Gas	0	scf
Landfill Gas	0	scf
Petroleum Products		
Distillate Fuel Oil No. 2	0	gallons
Residual Fuel Oil No. 6	0	gallons
Kerosene	0	gallons
Liquefied Petroleum Gases (LPG)	0	gallons
Biomass Fuels - Liquid		
Biodiesel (100%)	0	gallons
Ethanol (100%)	0	gallons
Rendered Animal Fat	0	gallons
Vegetable Oil	0	gallons

Total Organization-Wide CO_2, CH_4 and N_2O Emissions from Stationary Source Fuel Combustion

Fuel Type	CO_2 (kg)	CH_4 (g)	N_2O (g)
Coal and Coke - Solid			
Anthracite Coal	0.0	0.0	0.0
Bituminous Coal	0.0	0.0	0.0
Sub-bituminous Coal	0.0	0.0	0.0
Lignite Coal	0.0	0.0	0.0
Mixed (Commercial Sector)	0.0	0.0	0.0
Mixed (Electric Power Sector)	0.0	0.0	0.0
Mixed (Industrial Coking)	0.0	0.0	0.0
Mixed (Industrial Sector)	0.0	0.0	0.0
Coal Coke	0.0	0.0	0.0
Other Fuels - Solid			
Municipal Solid Waste	0.0	0.0	0.0
Petroleum Coke (Solid)	0.0	0.0	0.0
Plastics	0.0	0.0	0.0
Tires	0.0	0.0	0.0
Gaseous Fuels			
Natural Gas	1,464,299.2	27,704.4	2,689.7
Propane Gas	0.0	0.0	0.0
Landfill Gas	0.0	0.0	0.0
Petroleum Products			
Distillate Fuel Oil No. 2	0.0	0.0	0.0
Residual Fuel Oil No. 6	0.0	0.0	0.0
Kerosene	0.0	0.0	0.0
Liquefied Petroleum Gases (LPG)	0.0	0.0	0.0
Total Fossil Fuel Emissions	**1,464,299.2**	**27,704.4**	**2,689.7**
Biomass Fuels - Solid			
Agricultural Byproducts	0.0	0.0	0.0
Peat	0.0	0.0	0.0
Solid Byproducts	0.0	0.0	0.0
Wood and Wood Residuals	0.0	0.0	0.0
Biomass Fuels - Liquid			
Biodiesel (100%)	0.0	0.0	0.0
Ethanol (100%)	0.0	0.0	0.0
Rendered Animal Fat	0.0	0.0	0.0
Vegetable Oil	0.0	0.0	0.0
Total Non-Fossil Fuel Emissions	**0.0**	**0.0**	**0.0**
Total Emissions for all Fuels	**1,464,299.2**	**27,704.4**	**2,689.7**

Total CO_2 Equivalent Emissions (metric tons) - Stationary Combustion	**1,465.8**
Total Biomass CO_2 Equivalent Emissions (metric tons) - Stationary Combustion	**0.0**

Back to Intro | Back to Summary | Help | Help - Market-Based Method

Scope 2 Emissions from Purchase of Electricity

EPA CENTER FOR CORPORATE CLIMATE LEADERSHIP
U.S. Environmental Protection Agency

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

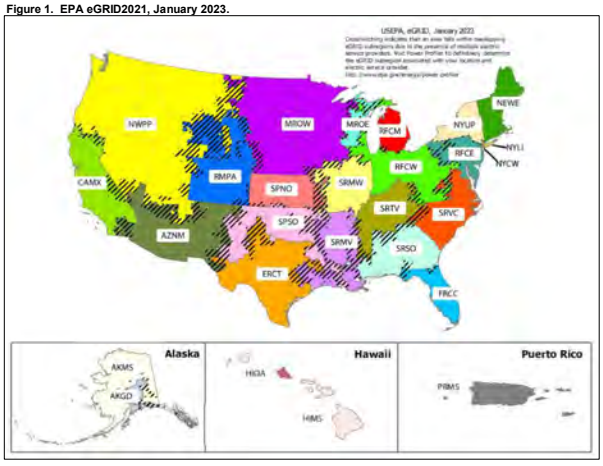
					Market-Based						Location-Based		
					Use these cells to enter applicable market-based emission factors								
					Emission Factors			Emissions			Emissions		
Source ID	Source Description	Source Area (sq ft)	eGRID Subregion *where electricity is consumed*	Electricity Purchased (kWh)	CO_2 Emissions (lb/MWh)	CH_4 Emissions (lb/MWh)	N_2O Emissions (lb/MWh)	CO_2 Emissions (lb)	CH_4 Emissions (lb)	N_2O Emissions (lb)	CO_2 Emissions (lb)	CH_4 Emissions (lb)	N_2O 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*
Lodging	Villas	282,000	MROW (MRO West)	4,342,800	<enter factor>	<enter factor>	<enter factor>	4,324,560.2	464.7	65.1	4,324,560.2	464.7	65.1
Lodging	Single Family	147,500	MROW (MRO West)	2,271,500	<enter factor>	<enter factor>	<enter factor>	2,261,959.7	243.1	34.1	2,261,959.7	243.1	34.1
Lodging	Alley Row Homes	120,600	MROW (MRO West)	1,857,240	<enter factor>	<enter factor>	<enter factor>	1,849,439.6	198.7	27.9	1,849,439.6	198.7	27.9
Retail	Retail	11,880	MROW (MRO West)	167,508	<enter factor>	<enter factor>	<enter factor>	166,804.5	17.9	2.5	166,804.5	17.9	2.5
Food Services	Coffee Shop	2,400	MROW (MRO West)	103,440	<enter factor>	<enter factor>	<enter factor>	103,005.6	11.1	1.6	103,005.6	11.1	1.6
Service	Daycare	5,500	MROW (MRO West)	111,100	<enter factor>	<enter factor>	<enter factor>	110,633.4	11.9	1.7	110,633.4	11.9	1.7
Retail	Convenience Store	10,000	MROW (MRO West)	141,000	<enter factor>	<enter factor>	<enter factor>	140,407.8	15.1	2.1	140,407.8	15.1	2.1
Office	Corporate Office/Bank	8,400	MROW (MRO West)	128,520	<enter factor>	<enter factor>	<enter factor>	127,980.2	13.8	1.9	127,980.2	13.8	1.9
Food Services	Restaurant	5,500	MROW (MRO West)	237,050	<enter factor>	<enter factor>	<enter factor>	236,054.4	25.4	3.6	236,054.4	25.4	3.6
					<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>						
					<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>						
					<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>						
					<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>						
					<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>						
					<enter factor>	<enter factor>	<enter factor>						
					<enter factor>	<enter factor>	<enter factor>						
Total Emissions for All Sources				9,360,158				9,320,845.3	1,001.5	140.4	9,320,845.3	1,001.5	140.4

GHG Emissions

CO_2 Equivalent Emissions (metric tons)	
Location-Based Electricity Emissions	4,258.3
Market-Based Electricity Emissions	4,258.3

Notes:
1. CO_2, CH_4 and N_2O 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).

Figure 1. EPA eGRID2021, January 2023.



Construction Emissions
Mobile Source Information

Construction	3.5	Years (estimate)
Project Lifetime	50	Years (estimate)

									Annual		Total for Project		Emission Factors[4]			Total Emissions (ton)				Emissions Annualized over Project Lifetime (50 yrs)			
Onroad/Off-Road	Vehicle Type[1]	Number of Vehicles per Day[2]	Fuel Type	Vehicle Year[3]	VMT (miles per day, per vehicle)[4]	Miles per Gallon[4]	Fuel Usage (gal/day, all vehicles)	Days Per Year[2]	Miles Traveled (mi/yr, all vehicles)	Fuel Usage (gal/yr, all vehicles)	Miles Traveled (mi)	Fuel Usage (gal)	CO2 (kg/gal)	CH4 (g/mile)	N2O (g/mile)	CO2 (short ton)	CH4 (short ton)	N2O (short ton)	CO2e (short ton)	CO2 (short ton/yr)	CH4 (short ton/yr)	N2O (short ton/yr)	CO2e (short ton/yr)
Onroad	Light Duty Vehicles - Laborers (commute)	30	Gas	2011	20	21.4	28.08	260	156,000	7,301	546,000	25,553	8.78	0.0071	0.0046	246.79	0.0043	0.00276	248	4.9	0.00009	0.00006	4.954
	Heavy Duty Trucks - Dump Trucks (onsite and offsite)	12	Diesel	2011	60	7.6	94.74	260	187,200	24,632	655,200	86,211	10.21	0.0095	0.0431	968.23	0.0068	0.0311	978	19.4	0.00014	0.0006	19.553
	Heavy Duty Trucks - Semis (onsite and offsite)	12	Diesel	2011	60	6.2	116.13	260	187,200	30,194	655,200	105,677	10.21	0.0095	0.0431	1,186.86	0.0068	0.0311	1,196	23.7	0.00014	0.0006	23.926
															Total	**2,402**	**0.018**	**0.065**	**2,422**	**48.0**	**0.00036**	**0.0013**	**48.4**

1. Vehicle types are defined by the Federal Highway Administration (FHWA). Light duty vehicle, short wheel base replaces the old category passenger car and includes passenger cars, light trucks, vans and sport utility vehicles with a wheelbase (WB) equal to or less than 121 inches. Light duty, long wheel base replaces "Other 2-axle, 4-tire vehicle and includes large passenger cars, vans, pickup trucks, and sport/utility vehicles with wheelbases larger than 121 inches. Light Duty Vehicles includes all vehicles in the short and long wheel base category.

2. Estimates based on similar project.

3. Assumed, based on the national average age of cars and light trucks on the road in 2021 (https://www.usatoday.com/story/money/cars/2022/05/24/average-american-car-12-years-old/9907901002/).

4. For light duty vehicles, based on 1995-2020: U.S. Department of Transportation, Federal Highway Administration, Highway Statistics (Washington, DC: Annual Issues), table VM-1, available at http://www.fhwa.dot.gov/policyinformation/statistics.cfm as of Dec. 29, 2021. For heavy duty vehicles, average miles per gallon values from the U.S. Department of Transportation, Federal Highway Administration, Highway Statistics 2020 (November 2022), Table VM-1.

5. Emission factors based on the U.S. EPA's Emission Factors Hub (https://www.epa.gov/climateleadership/ghg-emission-factors-hub, updated June 2024).

									Emission Factors[4]			Total Project Emissions				Emissions Annualized over Project Lifetime (50 yrs)			
Onroad/Offroad	Vehicle Type	Number of Vehicles[1]	Fuel type	Engine Size (hp)[1]	Consumption Rate (gal per hp-hr)[2]	Hours per Year[3]	Total Gallons per Year	Total Gallons for Project	CO2 (kg/gal)	CH4 (g/gal)	N2O (g/gal)	CO2 (short ton)	CH4 (short ton)	N2O (short ton)	CO2e (short ton)	CO2 (short ton/yr)	CH4 (short ton/yr)	N2O (short ton/yr)	CO2e (short ton/yr)
Off-road	Crane	4	Diesel	250	0.05	2,080	104,000	364,000	10.21	1.01	0.94	4088.08	0.404	0.376	4,210	81.8	0.0081	0.0075	84.2
	Backhoe	6	Diesel	125	0.05	2,080	78,000	273,000	10.21	1.01	0.94	3066.06	0.303	0.282	3,158	61.3	0.0061	0.0056	63.2
	Loader	8	Diesel	250	0.05	2,080	208,000	728,000	10.21	1.01	0.94	8176.17	0.809	0.753	8,421	163.5	0.0162	0.0151	168.4
	Excavator	4	Diesel	250	0.05	2,080	104,000	364,000	10.21	1.01	0.94	4088.08	0.404	0.376	4,210	81.8	0.0081	0.0075	84.2
	Skid Steer	6	Diesel	50	0.05	2,080	31,200	109,200	10.21	1.01	0.94	1226.43	0.121	0.113	1,263	24.5	0.0024	0.0023	25.3
	Total	28					525,200	1,838,200			**Total**	**20,645**	**2.042**	**1.901**	**21,262**	**412.9**	**0.04084**	**0.0380**	**425.2**

1. Estimates based on similar project.

2. Off-road mobile source fuel usage based on South Coast Air Quality Management District CEQA Air Quality Handbook, Table A9-3E.

3. Based on 8 hr/day, 5 day/wk, 52 wk/yr.

4. Emission factors based on the U.S. EPA's Emission Factors Hub (https://www.epa.gov/climateleadership/ghg-emission-factors-hub, updated June 2024).

Operational Emissions
Mobile Source - Operations

													Emission Factors[7]			Emissions			
Onroad/Off-Road	Vehicle Type[1]	Vehicle Driver	Daily Trips[2]	Fuel Type	Vehicle Year[3]	VMT (miles per trip)[4]	Miles per Gallon[5]	Fuel Usage (gal/day, all vehicles)	Days Per Year[6]	Miles per Year (per Vehicle)	Miles per Year All Vehicles	Fuel Usage (gal/yr, all vehicles)	CO2 (kg/gal)	CH4 (g/mile)	N2O (g/mile)	CO2 (short ton/yr)	CH4 (short ton/yr)	N2O (short ton/yr)	CO2e (short ton/yr)
Onroad	Heavy Duty Trucks	Delivery Vehicles	1674	Gas	2011	30	7.3	6881.10	260	7,800	13,060,320	1,789,085	8.78	0.0071	0.0046	17278.98	0.1020	0.0661	17301.23
Onroad	Light Duty Vehicle, Short Wheel Base (Passenger Cars, small trucks and SUVs)	Retail Workers/Daycare/Office/Food services	6698	Gas	2011	30	22.8	8812.63	260	7,800	52,241,280	2,291,284	8.78	0.0071	0.0046	22129.22	0.4080	0.2643	22218.20
		Residential	2518	Gas	2011	30	22.8	3313.16	365	10,950	27,572,100	1,209,303	8.78	0.0071	0.0046	11679.44	0.2153	0.1395	11726.40
			10890												Total	51,088	0.73	0.47	51,246

1. Assumes employees drive gasoline powered light duty vehicles and deliveries are made by heavy duty diesel vehicles.

2. Estimate, based on traffic study. Assumed 20% of non-residential traffic is heavy duty trucks.

3. Assumed, based on the national average age of cars and light trucks on the road in 2021 (https://www.usatoday.com/story/money/cars/2022/05/24/average-american-car-12-years-old/9907901002/).

4. Assumes 30 miles per trip for all vehicles.

5. For light duty vehicles, based on 1995-2020: U.S. Department of Transportation, Federal Highway Administration, Highway Statistics (Washington, DC: Annual Issues), table VM-1, available at http://www.fhwa.dot.gov/policyinformation/statistics.cfm as of October 2024. For heavy duty vehicles, average miles per gallon values from the U.S. Department of Transportation, Federal Highway Administration, Highway Statistics 2022 (January 2024), Table VM-1.

6. Assume daily trips take place 260 days per year.

7. Emission factors based on the U.S. EPA's Emission Factors Hub (https://www.epa.gov/climateleadership/ghg-emission-factors-hub, updated June 2024).

Waste Generation and Disposal Estimates

Location Type	Waste Generation Rate - (lb/unit/day)[1]	Waste Generation Rate - (lb/sq ft/day)[1]	Waste Generation Rate - (lb/seat/day)[1]	Square Footage	Total Units	Total Seats[2]	Total Waste per Day (lb/day)	Total Waste per Year (ton/yr)	Percent of Waste Recycled (paper, cardboard)	Amount of Waste Recycled (ton/yr)	Landfilled Waste	Amount of Waste Landfilled (ton/yr)
Villas	12.23	N/A	N/A	N/A	141	N/A	1,724	315	0%	0	100%	315
Single Family	12.23	N/A	N/A	N/A	59	N/A	722	132	0%	0	100%	132
Alley Row Homes	12.23	N/A	N/A	N/A	67	N/A	819	150	0%	0	100%	150
Retail	N/A	0.046	N/A	11,880.00	N/A	N/A	546	100	0%	0	100%	100
Coffee Shop	N/A	N/A	1	2,400.00	N/A	150	150	27	0%	0	100%	27
Daycare	N/A	0.007	N/A	5,500.00	N/A	N/A	39	7	0%	0	100%	7
Convenience Store	N/A	0.046	N/A	10,000.00	N/A	N/A	460	84	0%	0	100%	84
Corporate Office/Bank	N/A	0.006	N/A	8400.00	N/A	N/A	50	9	0%	0	100%	9
Restaurant	N/A	N/A	1	5500.0	N/A	344	344	63	0%	0	100%	63
											Total	886.0

1 Source: CalRecycle. Accessed November 2024. (https://www2.calrecycle.ca.gov/WasteCharacterization/General/Rates)
2 Same source as Reference 1. Used 16 square feet per seat conversion as used in the study referenced at Reference 1.

Back to Intro | Back to Summary | Help

EPA CENTER FOR CORPORATE CLIMATE LEADERSHIP
U.S. Environmental Protection Agency

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 (CO_2, CH_4 and N_2O)

Source ID	Source Description	Waste Material	Disposal Method	Weight	Unit	CO_2e Emissions (kg)
Bldg-012	*East Power Plant Finished Goods*	*Copper Wire*	*Landfilled*	*1,000*	*metric ton*	*22,040*
Lodging	Villas	Mixed MSW municipal solid waste	Landfilled	315	short ton	*163,648*
Lodging	Single Family	Mixed MSW municipal solid waste	Landfilled	132	short ton	*68,477*
Lodging	Alley Row Homes	Mixed MSW municipal solid waste	Landfilled	150	short ton	*77,762*
Retail	Retail	Mixed MSW municipal solid waste	Landfilled	100	short ton	*51,861*
Food Services	Coffee Shop	Mixed MSW municipal solid waste	Landfilled	27	short ton	*14,235*
Service	Daycare	Mixed MSW municipal solid waste	Landfilled	7	short ton	*3,654*
Retail	Convenience Store	Mixed MSW municipal solid waste	Landfilled	84	short ton	*43,654*
Office	Corporate Office/Bank	Mixed MSW municipal solid waste	Landfilled	9	short ton	*4,783*
Food Services	Restaurant	Mixed MSW municipal solid waste	Landfilled	63	short ton	*32,622*

GHG Emissions

Total Emissions by Disposal Method

Waste Material	CO_2e (kg)
Recycled	-
Landfilled	460,696
Combusted	-
Composted	-
Anaerobically Digested (Dry Digestate with Curing)	-
Anaerobically Digested (Wet Digestate with Curing)	-

Total CO_2 Equivalent Emissions (metric tons) - Waste	**460.7**

DCM Farms Project
Greenhouse Gas Emissions Associated with Land Use Changes

			Land Use Emissions or Reductions					
Land Use Change[1]	**Description**	**Land Area (acres)**	**Net CO2 Emissions Flux (tons CO2e)[2]**	**Total Area Land Use Change (hectares)[3]**	**Emission Factor (tons CO2e/acre)**	**Emissions (tons CO2e, negative value represents sink/removal of carbon)**	**Project Lifetime Multiplier (assume 50+ years)**	**Emission Rate (ton/yr)**
Wetland Remaining Wetland (includes stormwater ponds)		7.5	15,800,000	37,658,000	0.17	1.3	1	1.3
Wetland to Settlement		0.03	300,000	46,000	2.64	0.1	1	0.1
Forest to Settlement		0.5	61,500,000	541,000	46.01	23.0	1	23
Impervious Surface Remaining Impervious Surface		4.5	0	0	0	0	1	0
Cropland to Wetland (Stormwater Pond)		7.5	5,000	440,000	0.005	0.03	1	0.03
Cropland to Settlement	Settlement includes developed areas, including residential, industrial, commercial and institutional land.	73.5	5,900,000	2,452,000	0.97	71.6	1	72
Total		**93.53**						**96**

1. Stormwater ponds are not represented in the U.S. Greenhouse Gas Emissions Sources and Sinks: 1990-2020 document. Conservatively assume the stormwater ponds have the same carbon sequestration as wetlands.

2. Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2020. Net Flux from Soil, Dead Organic Matter and Biomass Carbon Stock Changes.
Cropland Converted to Settlements: Table 6-125
Wetland Converted to Settlements: Table 6-125
Forest Converted to Settlements: Table 6-125
Cropland Converted to Wetland: Table 6-87 (Note that value "does not exceed <5,000 tons CO2e")
Wetlands Remaining Wetlands: Table 6-1.

3. Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2020. Land Use and Land-Use Change for the U.S. Managed Land Base for All 50 States, Table 6-5.

Appendix I

Traffic Impact Study

File #193807316
December 17, 2024

Traffic Impact Study for DCM Farms in Dayton, MN

Prepared for:
City of Dayton
12260 S Diamond Lake Rd
Dayton, MN 55327

Prepared by:

Stantec Consulting Services Inc.
One Carlson Pkwy, #100
Plymouth, MN 55447
Phone: 7963-479-4200
Fax: 763-479-4242

Table of Contents

FIGURES

I hereby certify that this 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.

_____ DATE: December 17, 2024

Edward F. Terhaar
License No. 24441

1.0 Executive Summary

The purpose of this Traffic Impact Study is to evaluate the impacts of the DCM Farms project, a residential and commercial development in Dayton, MN. The project site is located in the southwest quadrant of the Fernbrook Lane (CSAH 121)/117th Avenue N intersection.

This study examined weekday a.m. and p.m. peak hour traffic impacts of the proposed project at the following intersections:

- Fernbrook Lane/117th Avenue
- Fernbrook Lane/114th Avenue
- Fernbrook Lane/Rush Creek Parkway
- 117th Avenue/E. French Lake Road
- Territorial Road/Rush Creek Parkway

The proposed project will consist of the following uses:

- Single Family Detached - 267 dwelling units
- Gas Station - 20 vehicle positions
- High Turnover Sit-Down Restaurant - 5,500 square feet
- Bank - 8,400 square feet
- Daycare - 5,500 square feet
- Coffee Shop - 2,400 square feet
- Retail - 11,880 square feet

Access will be provided to 113th Avenue and other residential streets to the west in existing developments. The project is expected to be completed by 2030.

The conclusions drawn from the information and analyses presented in this report are as follows:

- The proposed development is expected to generate 1,123 trips during the a.m. peak hour, 1,079 trips during the p.m. peak hour, and 10,890 trips daily.

- Other nearby development is expected to generate 222 trips during the a.m. peak hour, 381 trips during the p.m. peak hour, and 3,541 trips daily.

- At Fernbrook Lane/Rush Creek Parkway, the eastbound and westbound movements operate at poor levels of service under all future scenarios both without and with the proposed project. The overall intersection also operates poorly under the Build scenarios in the a.m. peak hour and both the No-Build and Build scenarios during the p.m. peak hour.

- At Fernbrook Lane/117th Avenue, the eastbound and westbound movements operate at poor levels of service under all future scenarios during the p.m. peak hour both without and with the proposed project. The overall intersection operates at LOS A during all scenarios during the a.m. and p.m. peak hours.

- At Fernbrook Lane/114th Avenue, 117th Avenue/E. French Lake Road, and Territorial Road/Rush Creek Parkway, all movements and intersections operate at acceptable levels of service under all scenarios.

- Based on the traffic forecasts and operations analysis for each intersection, the following mitigation measures are recommended:

    - Fernbrook Lane/117th Avenue - Monitor intersection operations as additional development occurs to determine if intersection control changes are needed.

    - Fernbrook Lane/114th Avenue - Construct intersection with roundabout control.

    - Fernbrook Lane/Rush Creek Parkway – Install traffic signal control or roundabout control.

    - 117th Avenue/E. French Lake Road – No improvements needed.

    - Territorial Road/Rush Creek Parkway – No improvements needed.

2.0 Purpose and Background

The purpose of this Traffic Impact Study is to evaluate the impacts of the DCM Farms project, a residential and commercial development in Dayton, MN. The project site is located in the southwest quadrant of the Fernbrook Lane (CSAH 121)/117th Avenue N intersection. The project location is shown in Figure 1.

This study examined weekday a.m. and p.m. peak hour traffic impacts of the proposed project at the following intersections:

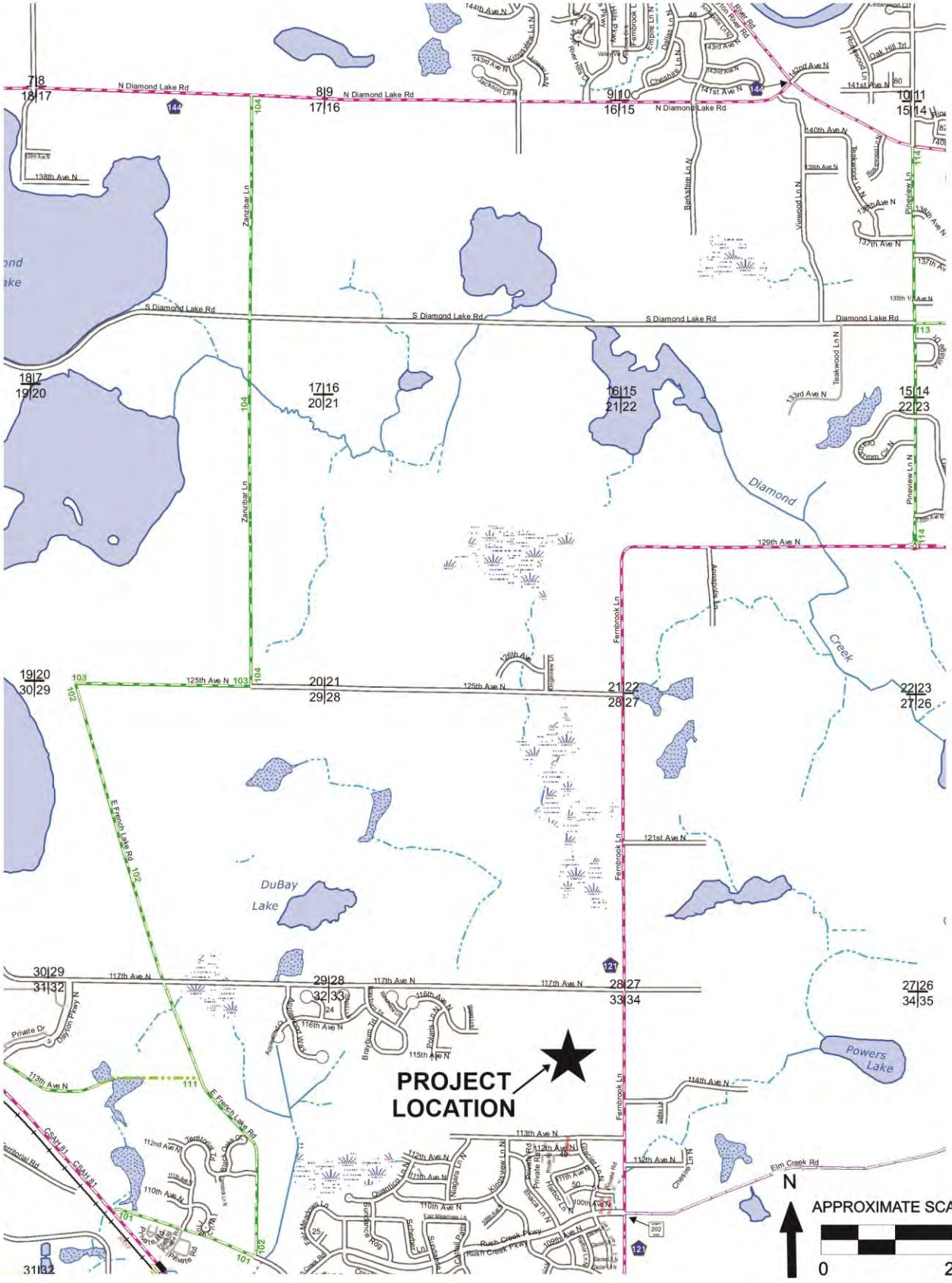
- Fernbrook Lane/117th Avenue
- Fernbrook Lane/114th Avenue
- Fernbrook Lane/Rush Creek Parkway
- 117th Avenue/E. French Lake Road
- Territorial Road/Rush Creek Parkway

Proposed Development Characteristics

The proposed project will consist of the following uses:

- Single Family Detached - 267 dwelling units
- Gas Station - 20 vehicle positions
- High Turnover Sit-Down Restaurant - 5,500 square feet
- Bank - 8,400 square feet
- Daycare - 5,500 square feet
- Coffee Shop - 2,400 square feet
- Retail - 11,880 square feet

Access will be provided to 113th Avenue and other residential streets to the west in existing developments. The project is expected to be completed by 2030. The current site plan is shown in Figure 2.



Stantec

TRAFFIC IMPACT STUDY
FOR DCM FARMS
IN DAYTON, MN

FIGURE 1

PROJECT LOCATION

Stantec

TRAFFIC IMPACT STUDY
FOR DCM FARMS
IN DAYTON, MN

FIGURE 2

SITE PLAN

3.0 Existing Conditions

The proposed project site is currently used for agricultural purposes. The site is bounded by Fernbrook Lane on the east, 117th Avenue on the north, 113th Avenue on the south, and existing residential uses on the west.

Near the site location, Fernbrook Lane, 117th Avenue, and 113th Avenue are two lane roadways with turn lanes at major intersections.

Existing conditions near the proposed project location are shown in Figure 3 and described below.

Fernbrook Lane/117th Avenue

This four-way intersection is controlled with stop signs on the eastbound and westbound approaches. The eastbound approach provides one through/left turn lane and one right turn lane. The northbound, southbound, and westbound approaches provide one left turn/through/right turn lane.

Fernbrook Lane/114th Avenue

This three-way intersection is controlled with a stop sign on the westbound approach. The westbound approach provides one left turn/right turn lane. The northbound approach provides one through/right turn lane. The southbound approach provides through/left turn lane.

Fernbrook Lane/113th Avenue

This three-way intersection is controlled with a stop sign on the eastbound approach. The eastbound approach provides one left turn/right turn lane. The southbound approach provides one through/right turn lane. The northbound approach provides through/left turn lane.

The intersection we be removed when 113th Avenue is relocated north to the 114th Avenue intersection with Fernbrook Lane as shown in the site plan.

Fernbrook Lane/Rush Creek Parkway

This four-way intersection is controlled with stop signs on the eastbound and westbound approaches. The eastbound approach provides one left turn/through lane and one right turn lane. The westbound approach provides one left turn/through/right turn lane. The northbound and southbound approaches provide one left turn lane, one through lane, and right turn lane.

117th Avenue/E. French Lake Road

This four-way intersection is controlled with stop signs on all approaches. All approaches provide one left turn/through/right turn lane.

Territorial Road/Rush Creek Parkway

This three-way intersection is controlled with a stop sign on the westbound approach. The westbound approach provides one left turn/right turn lane. The northbound approach provides one through/right turn lane. The southbound approach provides through/left turn lane.

Traffic Volume Data

Weekday traffic volume data was recorded at the existing intersections in November, 2024. Existing traffic volume data is presented later in this report.

Stantec

TRAFFIC IMPACT STUDY
FOR DCM FARMS
IN DAYTON, MN

FIGURE 3

EXISTING CONDITIONS

4.0 Traffic Forecasts

Traffic Forecast Scenarios

To adequately address the impacts of the proposed project and other development in the area, forecasts and analyses were completed for the years 2030 and 2040. Specifically, weekday a.m. and p.m. peak hour traffic forecasts were completed for the following scenarios:

- *2024 Existing*. Existing volumes were determined through traffic counts at the subject intersections. The existing volume information includes trips generated by existing uses near the project site.

- *2030 No-Build*. Existing volumes were increased by 1.0 percent per year to account for background growth in the surrounding area. The growth rate was based on historic growth in the area. In addition, trips generated from other nearby developments were also included in the 2030 No-Build volumes as described below.

- *2030 Build*. Trips generated by the proposed development were added to the 2030 No-Build volumes to determine 2030 Build volumes.

- *2040 No-Build*. Existing volumes were increased by 1.0 percent per year to account for background growth in the surrounding area. The growth rate was based on historic growth in the area. In addition, trips generated from other nearby developments were also included in the 2040 No-Build volumes as described below.

- *2040 Build*. Trips generated by the proposed development were added to the 2040 No-Build volumes to determine 2040 Build volumes.

Trip Generation for Proposed Project

The expected new development trips were calculated based on data presented in Trip Generation, Eleventh Edition, published by the Institute of Transportation Engineers. These calculations represent total trips that will be generated by the proposed development. The resultant trip generation estimates are shown in Table 4-1.

Table 4-1
Gross Weekday Trip Generation for Proposed Project

Land Use	Size	Weekday AM Peak Hour			Weekday PM Peak Hour			Weekday Daily
Single Family Detached	267 DU	47	140	187	158	93	251	2518
Gas Station	20 VFP	270	271	541	228	227	455	5143
High Turnover Sit-Down Restaurant	5,500 SF	29	24	53	30	20	50	590
Bank/Office	8,400 SF	29	18	47	43	47	90	449
Daycare	5,500 SF	32	29	61	29	32	61	262
Coffee Shop	2,400 SF	105	101	206	47	47	94	1281
Retail	11,880 SF	17	11	28	39	39	78	647
Totals		529	594	1,123	574	505	1,079	10,890

Notes: DU=dwelling units, VFP=vehicle fueling positions, SF=square feet

The gross trip totals were reduced by 10 percent to account for internal trips that will not impact the external roadway system.

Trip Generation for Other Nearby Development

Information on nearby development expected by 2030 was obtained from City staff. The expected nearby development trips were calculated based on data presented in Trip Generation, Eleventh Edition, published by the Institute of Transportation Engineers. These calculations represent total trips that will be generated by the proposed development. The resultant trip generation estimates are shown in Table 4-2.

Table 4-2
Weekday Trip Generation for Nearby Development

Land Use	Size	Weekday AM Peak Hour			Weekday PM Peak Hour			Weekday Daily
Single Family Detached	234 DU	41	123	164	138	82	220	2207
Retail	24,500 SF	35	23	58	81	80	161	1334
Totals		76	146	222	219	162	381	3,541

Notes: DU=dwelling units, VFP=vehicle fueling positions, SF=square feet

The retail trips can be categorized in the following trip types:

- *New Trips.* Trips solely to and from the proposed development.
- *Pass-By Trips.* Trips that are attracted from the traffic volume on roadways immediately adjacent to the site.

Based on information published in the *Trip Generation Handbook*, 3rd Edition, by the Institute of Transportation Engineers, the percentage of each trip type is as follows:

- Gas Station - 50% new, 50% pass-by
- High Turnover Sit-Down Restaurant - 50% new, 50% pass-by
- Bank - 65% new, 35% pass-by
- Coffee Shop - 50% new, 50% pass-by

Trip Distribution Percentages

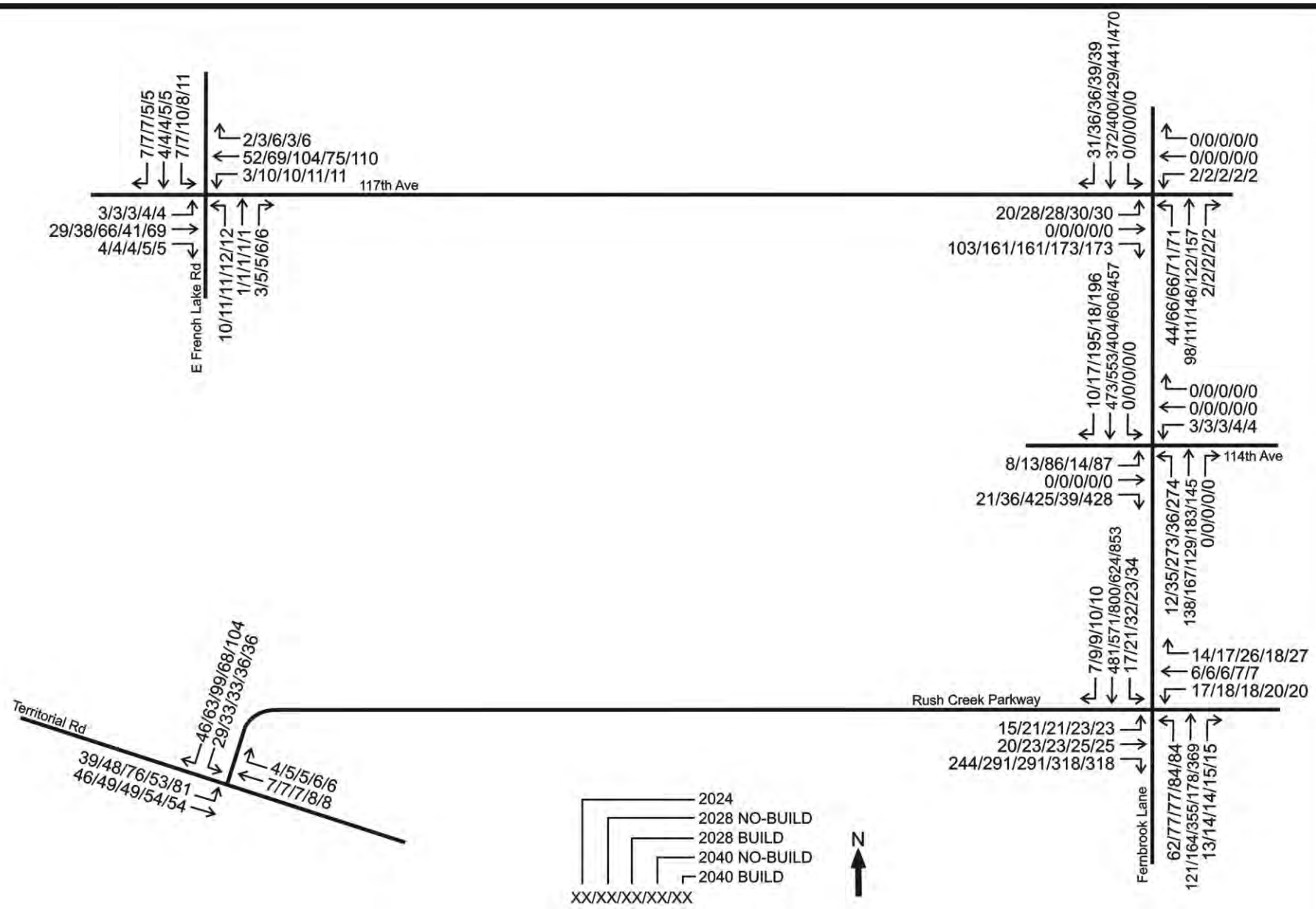
Trip distribution percentages for the subject development trips were established based on the nearby roadway network, existing and expected future traffic patterns, and location of the subject development in relation to major attractions and population concentrations.

The distribution percentages for trips generated by the proposed development are as follows:

- 61 percent to/from the south on Fernbrook Lane
- 10 percent to/from the north on Fernbrook Lane
- 3 percent to/from the east on Elm Creek Road
- 10 percent to/from the west on 117th Avenue
- 10 percent to/from the north on Territorial Road
- 1 percent to/from the north on E. French Lake Road
- 5 percent to/from the south on Territorial Road

Traffic Volumes

Development trips from Tables 4-1 and 4-2 were assigned to the surrounding roadway network using the preceding trip distribution percentages. Traffic volumes were established for all the forecasting scenarios described earlier during the weekday a.m. and p.m. peak hours. The resultant peak hour volumes are shown in Figures 4 and 5.

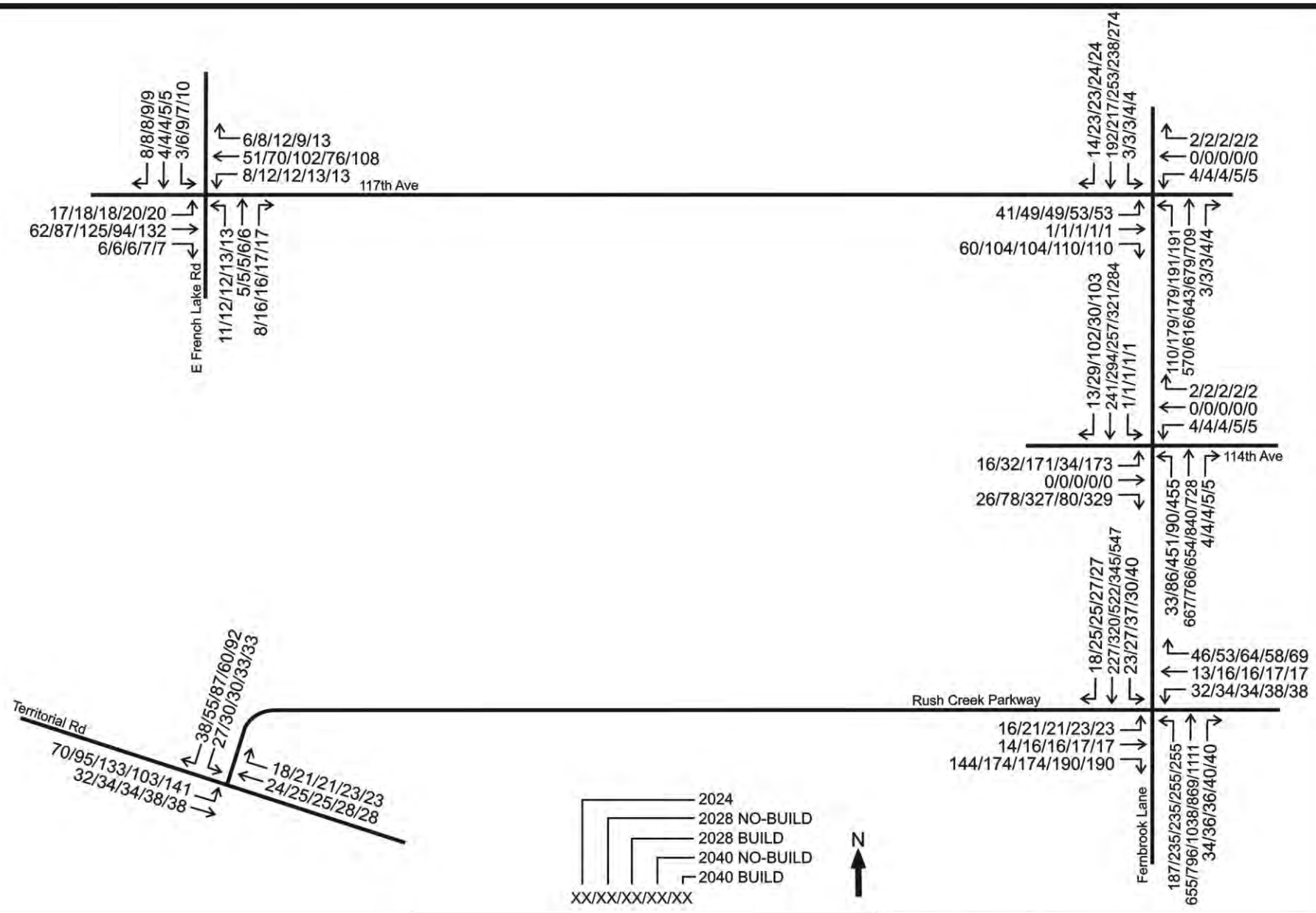


Stantec

TRAFFIC IMPACT STUDY
FOR DCM FARMS
IN DAYTON, MN

FIGURE 4

WEEKDAY AM PEAK HOUR VOLUMES



Stantec

TRAFFIC IMPACT STUDY
FOR DCM FARMS
IN DAYTON, MN

FIGURE 5

WEEKDAY PM PEAK HOUR VOLUMES

5.0 Traffic Analysis

Intersection Level of Service Analysis

Traffic analyses were completed for the subject intersections for all scenarios described earlier during the weekday a.m. and p.m. peak hours using Synchro software. Initial analysis was completed using existing geometrics and intersection control at all intersections except Fernbrook Lane/114th Avenue, which was assumed to have roundabout control.

Capacity analysis results are presented in terms of level of service (LOS), which is defined in terms of traffic delay at the intersection. LOS ranges from A to F. LOS A represents the best intersection operation, with little delay for each vehicle using the intersection. LOS F represents the worst intersection operation with excessive delay. In accordance with MnDOT traffic study guidelines, this analysis used the LOS D/E boundary as an indicator of acceptable traffic operations. The following is a detailed description of the conditions described by each LOS designation:

- Level of service A corresponds to a free flow condition with motorists virtually unaffected by the intersection control mechanism. For a signalized or an unsignalized intersection, the average delay per vehicle would be approximately 10 seconds or less.

- Level of service B represents stable flow with a high degree of freedom, but with some influence from the intersection control device and the traffic volumes. For a signalized intersection, the average delay ranges from 10 to 20 seconds. An unsignalized intersection would have delays ranging from 10 to 15 seconds for this level.

- Level of service C depicts a restricted flow which remains stable, but with significant influence from the intersection control device and the traffic volumes. The general level of comfort and convenience changes noticeably at this level. The delay ranges from 20 to 35 seconds for a signalized intersection and from 15 to 25 seconds for an unsignalized intersection at this level.

- Level of service D corresponds to high-density flow in which speed and freedom are significantly restricted. Though traffic flow remains stable, reductions in comfort and convenience are experienced. The control delay for this level is 35 to 55 seconds for a signalized intersection and 25 to 35 seconds for an unsignalized intersection.

- Level of service E represents unstable flow of traffic at or near the capacity of the intersection with poor levels of comfort and convenience. The delay ranges from 55 to 80 seconds for a signalized intersection and from 35 to 50 seconds for an unsignalized intersection at this level.

- Level of service F represents forced flow in which the volume of traffic approaching the intersection exceeds the volume that can be served. Characteristics often experienced include long queues, stop-and-go waves, poor travel times, low comfort and convenience, and increased accident exposure. Delays over 80 seconds for a

signalized intersection and over 50 seconds for an unsignalized intersection correspond to this level of service.

The LOS results are described below. All LOS worksheets are included in the Appendix for further detail.

2024 Existing

Weekday Peak Hour LOS Results

Intersection	Traffic Control	AM Peak Hour LOS	PM Peak Hour LOS
Fernbrook Lane/117th Avenue	EB/WB stop	A/C	A/D
Fernbrook Lane/114th Avenue	Roundabout	A/A	A/A
Fernbrook Lane/Rush Creek Pkwy	EB/WB stop	A/D	B/F
117th Avenue/E. French Lake Rd	All-way stop	A/A	A/A
Territorial Road/Rush Creek Pkwy	WB stop	A/A	A/A

Note: Level of service results presented with overall intersection LOS followed by worst movement LOS.

All intersections operate at LOS A and all movements operate at LOS D or better during the a.m. peak hour. During the p.m. peak hour, all intersections operate at LOS B or better. At Fernbrook Lane/Rush Creek Parkway, the eastbound left turn/through and westbound movements operate at LOS F. All other movements operate at LOS D or better.

2030 No-Build

Weekday Peak Hour LOS Results

Intersection	Traffic Control	AM Peak Hour LOS	PM Peak Hour LOS
Fernbrook Lane/117th Avenue	EB/WB stop	A/C	A/F
Fernbrook Lane/114th Avenue	Roundabout	A/A	A/B
Fernbrook Lane/Rush Creek Pkwy	EB/WB stop	B/F	E/F
117th Avenue/E. French Lake Rd	All-way stop	A/A	A/A
Territorial Road/Rush Creek Pkwy	WB stop	A/A	A/A

Note: Level of service results presented with overall intersection LOS followed by worst movement LOS.

All intersections operate at LOS B or better during the a.m. peak hour. At Fernbrook Lane/Rush Creek Parkway, the westbound movements operate at LOS F. All other movements operate at LOS D or better.

During the p.m. peak hour, all intersections except Fernbrook Lane/Rush Creek Parkway operate at LOS A. Fernbrook Lane/Rush Creek Parkway operates at LOS E. At Fernbrook Lane/Rush Creek Parkway, the eastbound left turn/through and westbound movements operate at LOS F. At Fernbrook Lane/117th Avenue, the eastbound left turn/through operate at LOS F and westbound movements operate at LOS E. All other movements operate at LOS B or better.

2030 Build

Weekday Peak Hour LOS Results

Intersection	Traffic Control	AM Peak Hour LOS	PM Peak Hour LOS
Fernbrook Lane/117th Avenue	EB/WB stop	A/C	A/F
Fernbrook Lane/114th Avenue	Roundabout	A/B	A/B
Fernbrook Lane/Rush Creek Pkwy	EB/WB stop	F/F	F/F
117th Avenue/E. French Lake Rd	All-way stop	A/A	A/A
Territorial Road/Rush Creek Pkwy	WB stop	A/A	A/B

Note: Level of service results presented with overall intersection LOS followed by worst movement LOS.

All intersections except Fernbrook Lane/Rush Creek Parkway operate at LOS A during the a.m. peak hour. Fernbrook Lane/Rush Creek Parkway operates at LOS F. At Fernbrook Lane/Rush Creek Parkway, the eastbound left turn/through and westbound movements operate at LOS F. All other movements operate at LOS C or better.

During the p.m. peak hour, all intersections except Fernbrook Lane/Rush Creek Parkway operate at LOS A. Fernbrook Lane/Rush Creek Parkway operates at LOS F. At Fernbrook Lane/Rush Creek Parkway, the eastbound left turn/through and westbound movements operate at LOS F. At Fernbrook Lane/117th Avenue, the eastbound left turn/through movements operate at LOS F and westbound movements operate at LOS E. All other movements operate at LOS C or better.

2040 No-Build

Weekday Peak Hour LOS Results

Intersection	Traffic Control	AM Peak Hour LOS	PM Peak Hour LOS
Fernbrook Lane/117th Avenue	EB/WB stop	A/C	A/F
Fernbrook Lane/114th Avenue	Roundabout	A/A	A/B
Fernbrook Lane/Rush Creek Pkwy	EB/WB stop	C/F	F/F
117th Avenue/E. French Lake Rd	All-way stop	A/A	A/A
Territorial Road/Rush Creek Pkwy	WB stop	A/A	A/A

Note: Level of service results presented with overall intersection LOS followed by worst movement LOS.

All intersections operate at LOS C or better during the a.m. peak hour. At Fernbrook Lane/Rush Creek Parkway, the eastbound left turn/through movements operate at LOS E and the westbound movements operate at LOS F. All other movements operate at LOS C or better.

During the p.m. peak hour, all intersections except Fernbrook Lane/Rush Creek Parkway operate at LOS A. Fernbrook Lane/Rush Creek Parkway operates at LOS F. At Fernbrook Lane/Rush Creek Parkway, the eastbound left turn/through and westbound movements operate at LOS F. At Fernbrook Lane/117th Avenue, the eastbound left turn/through movements operate at LOS F and westbound movements operate at LOS E. All other movements operate at LOS B or better.

2040 Build

Weekday Peak Hour LOS Results

Intersection	Traffic Control	AM Peak Hour LOS	PM Peak Hour LOS
Fernbrook Lane/117th Avenue	EB/WB stop	A/D	A/F
Fernbrook Lane/114th Avenue	Roundabout	A/B	A/B
Fernbrook Lane/Rush Creek Pkwy	EB/WB stop	F/F	F/F
117th Avenue/E. French Lake Rd	All-way stop	A/A	A/A
Territorial Road/Rush Creek Pkwy	WB stop	A/A	A/B

Note: Level of service results presented with overall intersection LOS followed by worst movement LOS.

All intersections except Fernbrook Lane/Rush Creek Parkway operate at LOS A during the a.m. peak hour. Fernbrook Lane/Rush Creek Parkway operates at LOS F. At Fernbrook Lane/Rush Creek Parkway, the eastbound left turn/through and westbound movements operate at LOS F. All other movements operate at LOS D or better.

During the p.m. peak hour, all intersections except Fernbrook Lane/Rush Creek Parkway operate at LOS A. Fernbrook Lane/Rush Creek Parkway operates at LOS F. At Fernbrook Lane/Rush Creek Parkway, the eastbound left turn/through and westbound movements operate at LOS F. At Fernbrook Lane/117th Avenue, the eastbound left turn/through and westbound movements operate at LOS F. All other movements operate at LOS C or better.

Overall Traffic Impacts

At Fernbrook Lane/Rush Creek Parkway, the eastbound and westbound movements operate at poor levels of service under all future scenarios both without and with the proposed project. The overall intersection also operates poorly under the Build scenarios in the a.m. peak hour and both the No-Build and Build scenarios during the p.m. peak hour.

At Fernbrook Lane/117th Avenue, the eastbound and westbound movements operate at poor levels of service under all future scenarios during the p.m. peak hour both without and with the proposed project. The overall intersection operate at LOS A during all scenarios during the a.m. and p.m. peak hours.

At Fernbrook Lane/114th Avenue, 117th Avenue/E. French Lake Road, and Territorial Road/Rush Creek Parkway, all movements and intersections operate at acceptable levels of service under all scenarios.

Intersection Operations at Fernbrook Lane/Rush Creek Parkway with Traffic Control Change

Potential mitigation measures for the operational issues shown at the Fernbrook Lane/Rush Creek Parkway intersection include roundabout control or traffic signal control. The updated intersection operation results with roundabout control or traffic signal control are shown below.

Weekday A.M. and P.M. Peak Hour LOS Results at
Fernbrook Lane/Rush Creek Parkway with Intersection Control Change

Scenario	AM Peak Hour LOS	PM Peak Hour LOS
With Traffic Signal Control		
2030 No-Build	B/B	B/C
2030 Build	B/C	C/D
2040 No-Build	B/B	B/C
2040 Build	C/D	C/D
With Roundabout Control		
2030 No-Build	A/B	A/A
2030 Build	C/C	A/B
2040 No-Build	A/B	A/A
2040 Build	C/D	B/C

Note: Level of service results presented with overall intersection LOS followed by worst movement LOS.

With traffic signal control, all movements operate at LOS D or better and the overall intersection operates at LOS C or better during the a.m. and p.m. peak hours under all scenarios.

With roundabout control, all movements operate at LOS C or better and the overall intersection operates at LOS C or better during the a.m. and p.m. peak hours under all scenarios.

Recommended Mitigation

Based on the traffic forecasts and operations analysis for each intersection, the following mitigation measures are recommended:

- Fernbrook Lane/117th Avenue - Monitor intersection operations as additional development occurs to determine if intersection control changes are needed.
- Fernbrook Lane/114th Avenue - Construct intersection with roundabout control.
- Fernbrook Lane/Rush Creek Parkway – Install traffic signal control or roundabout control.
- 117th Avenue/E. French Lake Road – No improvements needed.
- Territorial Road/Rush Creek Parkway – No improvements needed.

6.0 Conclusions and Recommendations

The conclusions drawn from the information and analyses presented in this report are as follows:

- The proposed development is expected to generate 1,123 trips during the a.m. peak hour, 1,079 trips during the p.m. peak hour, and 10,890 trips daily.

- Other nearby development is expected to generate 222 trips during the a.m. peak hour, 381 trips during the p.m. peak hour, and 3,541 trips daily.

- At Fernbrook Lane/Rush Creek Parkway, the eastbound and westbound movements operate at poor levels of service under all future scenarios both without and with the proposed project. The overall intersection also operates poorly under the Build scenarios in the a.m. peak hour and both the No-Build and Build scenarios during the p.m. peak hour.

- At Fernbrook Lane/117th Avenue, the eastbound and westbound movements operate at poor levels of service under all future scenarios during the p.m. peak hour both without and with the proposed project. The overall intersection operates at LOS A during all scenarios during the a.m. and p.m. peak hours.

- At Fernbrook Lane/114th Avenue, 117th Avenue/E. French Lake Road, and Territorial Road/Rush Creek Parkway, all movements and intersections operate at acceptable levels of service under all scenarios.

- Based on the traffic forecasts and operations analysis for each intersection, the following mitigation measures are recommended:

    - Fernbrook Lane/117th Avenue - Monitor intersection operations as additional development occurs to determine if intersection control changes are needed.

    - Fernbrook Lane/114th Avenue - Construct intersection with roundabout control.

    - Fernbrook Lane/Rush Creek Parkway – Install traffic signal control or roundabout control.

    - 117th Avenue/E. French Lake Road – No improvements needed.

    - Territorial Road/Rush Creek Parkway – No improvements needed.

7.0 Appendix

- Level of Service worksheets

Intersection	
Intersection Delay, s/veh	7.2
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	3	29	4	3	52	2	10	1	3	7	4	7
Future Vol, veh/h	3	29	4	3	52	2	10	1	3	7	4	7
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	3	33	4	3	58	2	11	1	3	8	4	8
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	7.2	7.3	7.3	7.1
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	71%	8%	5%	39%
Vol Thru, %	7%	81%	91%	22%
Vol Right, %	21%	11%	4%	39%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	14	36	57	18
LT Vol	10	3	3	7
Through Vol	1	29	52	4
RT Vol	3	4	2	7
Lane Flow Rate	16	40	64	20
Geometry Grp	1	1	1	1
Degree of Util (X)	0.018	0.045	0.071	0.022
Departure Headway (Hd)	4.145	3.995	4.017	3.971
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	859	896	892	896
Service Time	2.193	2.022	2.04	2.019
HCM Lane V/C Ratio	0.019	0.045	0.072	0.022
HCM Control Delay	7.3	7.2	7.3	7.1
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.1	0.1	0.2	0.1

Intersection	
Int Delay, s/veh	3.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	20	1	103	2	1	1	44	98	2	1	372	31
Future Vol, veh/h	20	1	103	2	1	1	44	98	2	1	372	31
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	300	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	84	84	84	84	84	84	84	84	84	84	84	84
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	24	1	123	2	1	1	52	117	2	1	443	37

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	687	687	462	748	704	118	480	0	0	119	0	0
Stage 1	464	464	-	222	222	-	-	-	-	-	-	-
Stage 2	223	223	-	526	482	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	361	370	600	329	361	934	1082	-	-	1469	-	-
Stage 1	578	564	-	780	720	-	-	-	-	-	-	-
Stage 2	780	719	-	535	553	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	345	351	600	251	342	934	1082	-	-	1469	-	-
Mov Cap-2 Maneuver	345	351	-	251	342	-	-	-	-	-	-	-
Stage 1	549	563	-	740	683	-	-	-	-	-	-	-
Stage 2	738	682	-	424	552	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	13.1	15.9	2.6	0
HCM LOS	B	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1082	-	-	345	600	334	1469	-	-
HCM Lane V/C Ratio	0.048	-	-	0.072	0.204	0.014	0.001	-	-
HCM Control Delay (s)	8.5	0	-	16.2	12.5	15.9	7.5	0	-
HCM Lane LOS	A	A	-	C	B	C	A	A	-
HCM 95th %tile Q(veh)	0.2	-	-	0.2	0.8	0	0	-	-

Intersection	
Int Delay, s/veh	0.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	3	1	146	1	1	483
Future Vol, veh/h	3	1	146	1	1	483
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	81	81	81	81	81	81
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	4	1	180	1	1	596

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	779	181	0	0	181	0
Stage 1	181	-	-	-	-	-
Stage 2	598	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	364	862	-	-	1394	-
Stage 1	850	-	-	-	-	-
Stage 2	549	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	364	862	-	-	1394	-
Mov Cap-2 Maneuver	364	-	-	-	-	-
Stage 1	850	-	-	-	-	-
Stage 2	548	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13.6	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	425	1394	-
HCM Lane V/C Ratio	-	-	0.012	0.001	-
HCM Control Delay (s)	-	-	13.6	7.6	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0	0	-

Intersection	
Int Delay, s/veh	6.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	15	20	244	17	6	14	62	121	13	17	481	7
Future Vol, veh/h	15	20	244	17	6	14	62	121	13	17	481	7
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	300	-	-	-	300	-	300	300	-	300
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	17	22	271	19	7	16	69	134	14	19	534	8

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	863	858	534	995	852	134	542	0	0	148	0	0
Stage 1	572	572	-	272	272	-	-	-	-	-	-	-
Stage 2	291	286	-	723	580	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	275	294	546	224	297	915	1027	-	-	1434	-	-
Stage 1	505	504	-	734	685	-	-	-	-	-	-	-
Stage 2	717	675	-	417	500	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	249	271	546	99	274	915	1027	-	-	1434	-	-
Mov Cap-2 Maneuver	249	271	-	99	274	-	-	-	-	-	-	-
Stage 1	471	497	-	685	639	-	-	-	-	-	-	-
Stage 2	651	630	-	198	494	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	18.3	31.4	2.8	0.3
HCM LOS	C	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1027	-	-	261	546	177	1434	-	-
HCM Lane V/C Ratio	0.067	-	-	0.149	0.497	0.232	0.013	-	-
HCM Control Delay (s)	8.8	-	-	21.2	17.9	31.4	7.5	-	-
HCM Lane LOS	A	-	-	C	C	D	A	-	-
HCM 95th %tile Q(veh)	0.2	-	-	0.5	2.7	0.9	0	-	-

Intersection	
Int Delay, s/veh	5.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	29	46	7	4	39	46
Future Vol, veh/h	29	46	7	4	39	46
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	82	82	82	82	82	82
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	35	56	9	5	48	56

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	164	12	0	0	14	0
Stage 1	12	-	-	-	-	-
Stage 2	152	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	827	1069	-	-	1604	-
Stage 1	1011	-	-	-	-	-
Stage 2	876	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	801	1069	-	-	1604	-
Mov Cap-2 Maneuver	801	-	-	-	-	-
Stage 1	1011	-	-	-	-	-
Stage 2	849	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.2	0	3.4
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	947	1604	-
HCM Lane V/C Ratio	-	-	0.097	0.03	-
HCM Control Delay (s)	-	-	9.2	7.3	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.3	0.1	-

Intersection	
Intersection Delay, s/veh	7.4
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	3	38	4	10	69	3	11	1	5	7	4	7
Future Vol, veh/h	3	38	4	10	69	3	11	1	5	7	4	7
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	3	43	4	11	78	3	12	1	6	8	4	8
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	7.3	7.5	7.3	7.2
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	65%	7%	12%	39%
Vol Thru, %	6%	84%	84%	22%
Vol Right, %	29%	9%	4%	39%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	17	45	82	18
LT Vol	11	3	10	7
Through Vol	1	38	69	4
RT Vol	5	4	3	7
Lane Flow Rate	19	51	92	20
Geometry Grp	1	1	1	1
Degree of Util (X)	0.022	0.057	0.103	0.023
Departure Headway (Hd)	4.149	4.032	4.043	4.04
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	854	885	885	877
Service Time	2.217	2.07	2.073	2.108
HCM Lane V/C Ratio	0.022	0.058	0.104	0.023
HCM Control Delay	7.3	7.3	7.5	7.2
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.1	0.2	0.3	0.1

Intersection	
Int Delay, s/veh	4.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	28	1	161	2	1	1	66	111	2	1	400	36
Future Vol, veh/h	28	1	161	2	1	1	66	111	2	1	400	36
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	300	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	84	84	84	84	84	84	84	84	84	84	84	84
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	33	1	192	2	1	1	79	132	2	1	476	43

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	792	792	498	887	812	133	519	0	0	134	0	0
Stage 1	500	500	-	291	291	-	-	-	-	-	-	-
Stage 2	292	292	-	596	521	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	307	322	572	265	313	916	1047	-	-	1451	-	-
Stage 1	553	543	-	717	672	-	-	-	-	-	-	-
Stage 2	716	671	-	490	532	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	286	295	572	165	287	916	1047	-	-	1451	-	-
Mov Cap-2 Maneuver	286	295	-	165	287	-	-	-	-	-	-	-
Stage 1	508	542	-	658	617	-	-	-	-	-	-	-
Stage 2	655	616	-	325	531	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	15.1	20.3	3.2	0
HCM LOS	C	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1047	-	-	286	572	240	1451	-	-
HCM Lane V/C Ratio	0.075	-	-	0.121	0.335	0.02	0.001	-	-
HCM Control Delay (s)	8.7	0	-	19.3	14.4	20.3	7.5	0	-
HCM Lane LOS	A	A	-	C	B	C	A	A	-
HCM 95th %tile Q(veh)	0.2	-	-	0.4	1.5	0.1	0	-	-

Intersection	
Intersection Delay, s/veh	7.2
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	2	1	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	61	6	250	705
Demand Flow Rate, veh/h	62	6	255	719
Vehicles Circulating, veh/h	702	270	18	49
Vehicles Exiting, veh/h	66	3	746	227
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	5.3	3.2	3.7	8.7
Approach LOS	A	A	A	A

Lane	Left	Right	Left	Left	Right	Left	Right
Designated Moves	LT	R	LTR	L	TR	LT	R
Assumed Moves	LT	R	LTR	L	TR	LT	R
RT Channelized							
Lane Util	0.274	0.726	1.000	0.173	0.827	0.971	0.029
Follow-Up Headway, s	2.667	2.535	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.645	4.328	4.328	4.645	4.328	4.645	4.328
Entry Flow, veh/h	17	45	6	44	211	698	21
Cap Entry Lane, veh/h	708	782	1129	1328	1399	1290	1362
Entry HV Adj Factor	0.999	0.978	0.997	0.977	0.980	0.980	1.000
Flow Entry, veh/h	17	44	6	43	207	684	21
Cap Entry, veh/h	707	765	1125	1297	1371	1265	1362
V/C Ratio	0.024	0.058	0.005	0.033	0.151	0.541	0.015
Control Delay, s/veh	5.3	5.3	3.2	3.0	3.8	8.9	2.8
LOS	A	A	A	A	A	A	A
95th %tile Queue, veh	0	0	0	0	1	3	0

Intersection	
Int Delay, s/veh	10.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	21	23	291	18	6	17	77	164	14	21	571	9
Future Vol, veh/h	21	23	291	18	6	17	77	164	14	21	571	9
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	300	-	-	-	300	-	300	300	-	300
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	23	26	323	20	7	19	86	182	16	23	634	10

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1055	1050	634	1214	1044	182	644	0	0	198	0	0
Stage 1	680	680	-	354	354	-	-	-	-	-	-	-
Stage 2	375	370	-	860	690	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	204	227	479	158	229	861	941	-	-	1375	-	-
Stage 1	441	451	-	663	630	-	-	-	-	-	-	-
Stage 2	646	620	-	351	446	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	179	203	479	43	205	861	941	-	-	1375	-	-
Mov Cap-2 Maneuver	179	203	-	43	205	-	-	-	-	-	-	-
Stage 1	401	443	-	603	573	-	-	-	-	-	-	-
Stage 2	567	564	-	106	438	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	27.2	83.4	2.8	0.3
HCM LOS	D	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	941	-	-	191	479	88	1375	-	-
HCM Lane V/C Ratio	0.091	-	-	0.256	0.675	0.518	0.017	-	-
HCM Control Delay (s)	9.2	-	-	30.2	26.7	83.4	7.7	-	-
HCM Lane LOS	A	-	-	D	D	F	A	-	-
HCM 95th %tile Q(veh)	0.3	-	-	1	5	2.3	0.1	-	-

Intersection	
Int Delay, s/veh	6.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	33	63	7	5	48	49
Future Vol, veh/h	33	63	7	5	48	49
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	82	82	82	82	82	82
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	40	77	9	6	59	60

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	190	12	0	0	15	0
Stage 1	12	-	-	-	-	-
Stage 2	178	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	799	1069	-	-	1603	-
Stage 1	1011	-	-	-	-	-
Stage 2	853	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	769	1069	-	-	1603	-
Mov Cap-2 Maneuver	769	-	-	-	-	-
Stage 1	1011	-	-	-	-	-
Stage 2	821	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.4	0	3.6
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	943	1603	-
HCM Lane V/C Ratio	-	-	0.124	0.037	-
HCM Control Delay (s)	-	-	9.4	7.3	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.4	0.1	-

Intersection	
Intersection Delay, s/veh	7.7
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	3	66	4	10	104	6	11	1	5	10	4	7
Future Vol, veh/h	3	66	4	10	104	6	11	1	5	10	4	7
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	3	74	4	11	117	7	12	1	6	11	4	8
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	7.6	7.8	7.5	7.4
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	65%	4%	8%	48%
Vol Thru, %	6%	90%	87%	19%
Vol Right, %	29%	5%	5%	33%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	17	73	120	21
LT Vol	11	3	10	10
Through Vol	1	66	104	4
RT Vol	5	4	6	7
Lane Flow Rate	19	82	135	24
Geometry Grp	1	1	1	1
Degree of Util (X)	0.023	0.093	0.152	0.028
Departure Headway (Hd)	4.384	4.085	4.057	4.321
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	822	871	880	833
Service Time	2.384	2.139	2.1	2.321
HCM Lane V/C Ratio	0.023	0.094	0.153	0.029
HCM Control Delay	7.5	7.6	7.8	7.4
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.1	0.3	0.5	0.1

Intersection	
Int Delay, s/veh	4.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	28	1	161	2	1	1	66	146	2	1	429	36
Future Vol, veh/h	28	1	161	2	1	1	66	146	2	1	429	36
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	300	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	84	84	84	84	84	84	84	84	84	84	84	84
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	33	1	192	2	1	1	79	174	2	1	511	43

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	869	869	533	964	889	175	554	0	0	176	0	0
Stage 1	535	535	-	333	333	-	-	-	-	-	-	-
Stage 2	334	334	-	631	556	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	272	290	547	235	282	868	1016	-	-	1400	-	-
Stage 1	529	524	-	681	644	-	-	-	-	-	-	-
Stage 2	680	643	-	469	513	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	253	265	547	142	257	868	1016	-	-	1400	-	-
Mov Cap-2 Maneuver	253	265	-	142	257	-	-	-	-	-	-	-
Stage 1	484	523	-	622	589	-	-	-	-	-	-	-
Stage 2	619	588	-	304	512	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	16.1	22.6	2.7	0
HCM LOS	C	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1016	-	-	253	547	209	1400	-	-
HCM Lane V/C Ratio	0.077	-	-	0.136	0.35	0.023	0.001	-	-
HCM Control Delay (s)	8.8	0	-	21.5	15.1	22.6	7.6	0	-
HCM Lane LOS	A	A	-	C	C	C	A	A	-
HCM 95th %tile Q(veh)	0.3	-	-	0.5	1.6	0.1	0	-	-

Intersection	
Intersection Delay, s/veh	8.6
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	2	1	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	632	6	497	741
Demand Flow Rate, veh/h	645	6	507	756
Vehicles Circulating, veh/h	514	614	110	349
Vehicles Exiting, veh/h	591	3	1048	271
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	11.3	4.4	5.0	8.8
Approach LOS	B	A	A	A

Lane	Left	Right	Left	Left	Right	Left	Right
Designated Moves	LT	R	LTR	L	TR	LT	R
Assumed Moves	LT	R	LTR	L	TR	LT	R
RT Channelized							
Lane Util	0.169	0.831	1.000	0.679	0.321	0.675	0.325
Follow-Up Headway, s	2.667	2.535	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.645	4.328	4.328	4.645	4.328	4.645	4.328
Entry Flow, veh/h	109	536	6	344	163	510	246
Cap Entry Lane, veh/h	841	917	843	1220	1293	979	1056
Entry HV Adj Factor	0.981	0.979	0.997	0.980	0.981	0.980	0.980
Flow Entry, veh/h	107	525	6	337	160	500	241
Cap Entry, veh/h	826	899	840	1195	1268	960	1034
V/C Ratio	0.130	0.584	0.007	0.282	0.126	0.521	0.233
Control Delay, s/veh	5.7	12.4	4.4	5.6	3.9	10.4	5.7
LOS	A	B	A	A	A	B	A
95th %tile Queue, veh	0	4	0	1	0	3	1

Intersection	
Int Delay, s/veh	120.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	21	23	291	18	6	29	77	355	14	32	800	9
Future Vol, veh/h	21	23	291	18	6	29	77	355	14	32	800	9
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	300	-	-	-	300	-	300	300	-	300
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	23	26	323	20	7	32	86	394	16	36	889	10

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1555	1543	889	1707	1537	394	899	0	0	410	0	0
Stage 1	961	961	-	566	566	-	-	-	-	-	-	-
Stage 2	594	582	-	1141	971	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	92	115	342	72	116	655	756	-	-	1149	-	-
Stage 1	308	335	-	509	507	-	-	-	-	-	-	-
Stage 2	491	499	-	244	331	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	74	99	342	~ 3	100	655	756	-	-	1149	-	-
Mov Cap-2 Maneuver	74	99	-	~ 3	100	-	-	-	-	-	-	-
Stage 1	273	325	-	451	449	-	-	-	-	-	-	-
Stage 2	408	442	-	~ 12	321	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	74.2	$ 3305.5	1.8	0.3
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	756	-	-	85	342	9	1149	-	-
HCM Lane V/C Ratio	0.113	-	-	0.575	0.945	6.543	0.031	-	-
HCM Control Delay (s)	10.4	-	-	93.5	71.3	$ 3305.5	8.2	-	-
HCM Lane LOS	B	-	-	F	F	F	A	-	-
HCM 95th %tile Q(veh)	0.4	-	-	2.6	9.9	8.8	0.1	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	6.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	33	99	7	5	76	49
Future Vol, veh/h	33	99	7	5	76	49
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	82	82	82	82	82	82
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	40	121	9	6	93	60

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	258	12	0	0	15	0
Stage 1	12	-	-	-	-	-
Stage 2	246	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	731	1069	-	-	1603	-
Stage 1	1011	-	-	-	-	-
Stage 2	795	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	687	1069	-	-	1603	-
Mov Cap-2 Maneuver	687	-	-	-	-	-
Stage 1	1011	-	-	-	-	-
Stage 2	747	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.6	0	4.5
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	939	1603	-
HCM Lane V/C Ratio	-	-	0.171	0.058	-
HCM Control Delay (s)	-	-	9.6	7.4	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.6	0.2	-

Intersection	
Intersection Delay, s/veh	7.5
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	4	41	5	11	75	3	12	1	6	8	5	8
Future Vol, veh/h	4	41	5	11	75	3	12	1	6	8	5	8
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	4	46	6	12	84	3	13	1	7	9	6	9
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	7.4	7.6	7.3	7.3
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	63%	8%	12%	38%
Vol Thru, %	5%	82%	84%	24%
Vol Right, %	32%	10%	3%	38%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	19	50	89	21
LT Vol	12	4	11	8
Through Vol	1	41	75	5
RT Vol	6	5	3	8
Lane Flow Rate	21	56	100	24
Geometry Grp	1	1	1	1
Degree of Util (X)	0.025	0.063	0.113	0.027
Departure Headway (Hd)	4.159	4.044	4.059	4.068
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	850	881	881	869
Service Time	2.236	2.088	2.094	2.144
HCM Lane V/C Ratio	0.025	0.064	0.114	0.028
HCM Control Delay	7.3	7.4	7.6	7.3
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.1	0.2	0.4	0.1

Intersection	
Int Delay, s/veh	4.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	30	1	173	2	1	1	71	122	2	1	441	39
Future Vol, veh/h	30	1	173	2	1	1	71	122	2	1	441	39
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	300	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	84	84	84	84	84	84	84	84	84	84	84	84
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	36	1	206	2	1	1	85	145	2	1	525	46

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	867	867	548	970	889	146	571	0	0	147	0	0
Stage 1	550	550	-	316	316	-	-	-	-	-	-	-
Stage 2	317	317	-	654	573	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	273	291	536	233	282	901	1002	-	-	1435	-	-
Stage 1	519	516	-	695	655	-	-	-	-	-	-	-
Stage 2	694	654	-	456	504	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	252	264	536	133	256	901	1002	-	-	1435	-	-
Mov Cap-2 Maneuver	252	264	-	133	256	-	-	-	-	-	-	-
Stage 1	471	515	-	631	595	-	-	-	-	-	-	-
Stage 2	628	594	-	280	503	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	16.7	23.5	3.2	0
HCM LOS	C	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1002	-	-	252	536	199	1435	-	-
HCM Lane V/C Ratio	0.084	-	-	0.146	0.384	0.024	0.001	-	-
HCM Control Delay (s)	8.9	0	-	21.7	15.8	23.5	7.5	0	-
HCM Lane LOS	A	A	-	C	C	C	A	A	-
HCM 95th %tile Q(veh)	0.3	-	-	0.5	1.8	0.1	0	-	-

Intersection	
Intersection Delay, s/veh	11.4
Intersection LOS	B

Approach	EB	WB	NB	SB
Entry Lanes	2	1	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	66	7	271	771
Demand Flow Rate, veh/h	67	7	277	786
Vehicles Circulating, veh/h	769	293	19	51
Vehicles Exiting, veh/h	68	3	817	249
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	6.3	4.0	4.9	14.1
Approach LOS	A	A	A	B

Lane	Left	Right	Left	Left	Right	Left	Right
Designated Moves	LT	R	LTR	L	TR	LT	R
Assumed Moves	LT	R	LTR	L	TR	LT	R
RT Channelized							
Lane Util	0.269	0.731	1.000	0.162	0.838	0.972	0.028
Critical Headway, s	4.293	4.113	4.113	4.293	4.113	4.293	4.113
Entry Flow, veh/h	18	49	7	45	232	764	22
Cap Entry Lane, veh/h	635	660	920	1114	1115	1088	1090
Entry HV Adj Factor	0.999	0.980	0.997	0.978	0.980	0.980	1.000
Flow Entry, veh/h	18	48	7	44	227	749	22
Cap Entry, veh/h	634	646	918	1089	1093	1066	1090
V/C Ratio	0.028	0.074	0.008	0.040	0.208	0.703	0.020
Control Delay, s/veh	6.0	6.4	4.0	3.6	5.2	14.4	3.5
LOS	A	A	A	A	A	B	A
95th %tile Queue, veh	0	0	0	0	1	6	0

Intersection	
Int Delay, s/veh	21.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	23	25	318	20	7	18	84	178	15	23	624	10
Future Vol, veh/h	23	25	318	20	7	18	84	178	15	23	624	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	300	-	-	-	300	-	300	300	-	300
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	26	28	353	22	8	20	93	198	17	26	693	11

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1152	1146	693	1325	1140	198	704	0	0	215	0	0
Stage 1	745	745	-	384	384	-	-	-	-	-	-	-
Stage 2	407	401	-	941	756	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	175	199	443	133	201	843	894	-	-	1355	-	-
Stage 1	406	421	-	639	611	-	-	-	-	-	-	-
Stage 2	621	601	-	316	416	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	150	175	443	~ 22	177	843	894	-	-	1355	-	-
Mov Cap-2 Maneuver	150	175	-	~ 22	177	-	-	-	-	-	-	-
Stage 1	364	413	-	573	547	-	-	-	-	-	-	-
Stage 2	535	538	-	59	408	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	38.1	299.5	2.9	0.3
HCM LOS	E	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	894	-	-	162	443	46	1355	-	-
HCM Lane V/C Ratio	0.104	-	-	0.329	0.798	1.087	0.019	-	-
HCM Control Delay (s)	9.5	-	-	37.8	38.2	299.5	7.7	-	-
HCM Lane LOS	A	-	-	E	E	F	A	-	-
HCM 95th %tile Q(veh)	0.3	-	-	1.3	7.2	4.6	0.1	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	6.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	36	68	8	6	53	54
Future Vol, veh/h	36	68	8	6	53	54
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	82	82	82	82	82	82
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	44	83	10	7	65	66

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	210	14	0	0	17	0
Stage 1	14	-	-	-	-	-
Stage 2	196	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	778	1066	-	-	1600	-
Stage 1	1009	-	-	-	-	-
Stage 2	837	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	745	1066	-	-	1600	-
Mov Cap-2 Maneuver	745	-	-	-	-	-
Stage 1	1009	-	-	-	-	-
Stage 2	802	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.5	0	3.6
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	928	1600	-
HCM Lane V/C Ratio	-	-	0.137	0.04	-
HCM Control Delay (s)	-	-	9.5	7.3	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.5	0.1	-

Intersection	
Intersection Delay, s/veh	7.7
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	4	69	5	11	110	6	12	1	6	12	5	8
Future Vol, veh/h	4	69	5	11	110	6	12	1	6	12	5	8
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	4	78	6	12	124	7	13	1	7	13	6	9
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	7.6	7.9	7.5	7.5
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	63%	5%	9%	48%
Vol Thru, %	5%	88%	87%	20%
Vol Right, %	32%	6%	5%	32%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	19	78	127	25
LT Vol	12	4	11	12
Through Vol	1	69	110	5
RT Vol	6	5	6	8
Lane Flow Rate	21	88	143	28
Geometry Grp	1	1	1	1
Degree of Util (X)	0.026	0.1	0.162	0.034
Departure Headway (Hd)	4.405	4.1	4.075	4.364
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	817	866	875	825
Service Time	2.406	2.162	2.126	2.365
HCM Lane V/C Ratio	0.026	0.102	0.163	0.034
HCM Control Delay	7.5	7.6	7.9	7.5
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.1	0.3	0.6	0.1

Intersection	
Int Delay, s/veh	4.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	30	1	173	2	1	1	71	157	2	1	470	39
Future Vol, veh/h	30	1	173	2	1	1	71	157	2	1	470	39
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	300	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	84	84	84	84	84	84	84	84	84	84	84	84
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	36	1	206	2	1	1	85	187	2	1	560	46

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	944	944	583	1047	966	188	606	0	0	189	0	0
Stage 1	585	585	-	358	358	-	-	-	-	-	-	-
Stage 2	359	359	-	689	608	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	242	262	512	206	255	854	972	-	-	1385	-	-
Stage 1	497	498	-	660	628	-	-	-	-	-	-	-
Stage 2	659	627	-	436	486	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	222	236	512	113	230	854	972	-	-	1385	-	-
Mov Cap-2 Maneuver	222	236	-	113	230	-	-	-	-	-	-	-
Stage 1	448	498	-	595	566	-	-	-	-	-	-	-
Stage 2	592	566	-	260	486	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	17.9	26.5	2.8	0
HCM LOS	C	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	972	-	-	222	512	172	1385	-	-
HCM Lane V/C Ratio	0.087	-	-	0.166	0.402	0.028	0.001	-	-
HCM Control Delay (s)	9.1	0	-	24.4	16.7	26.5	7.6	0	-
HCM Lane LOS	A	A	-	C	C	D	A	A	-
HCM 95th %tile Q(veh)	0.3	-	-	0.6	1.9	0.1	0	-	-

Intersection	
Intersection Delay, s/veh	12.7
Intersection LOS	B

Approach	EB	WB	NB	SB
Entry Lanes	2	1	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	636	7	518	807
Demand Flow Rate, veh/h	649	7	529	823
Vehicles Circulating, veh/h	581	637	111	351
Vehicles Exiting, veh/h	593	3	1119	293
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	17.6	5.1	6.3	13.0
Approach LOS	C	A	A	B

Lane	Left	Right	Left	Left	Right	Left	Right
Designated Moves	LT	R	LTR	L	TR	LT	R
Assumed Moves	LT	R	LTR	L	TR	LT	R
RT Channelized							
Lane Util	0.169	0.831	1.000	0.652	0.348	0.700	0.300
Critical Headway, s	4.293	4.113	4.113	4.293	4.113	4.293	4.113
Entry Flow, veh/h	110	539	7	345	184	576	247
Cap Entry Lane, veh/h	731	752	723	1040	1045	868	884
Entry HV Adj Factor	0.982	0.980	0.997	0.980	0.980	0.980	0.980
Flow Entry, veh/h	108	528	7	338	180	565	242
Cap Entry, veh/h	717	737	721	1019	1025	851	866
V/C Ratio	0.151	0.716	0.010	0.332	0.176	0.663	0.279
Control Delay, s/veh	6.7	19.8	5.1	6.9	5.1	15.5	7.2
LOS	A	C	A	A	A	C	A
95th %tile Queue, veh	1	6	0	1	1	5	1

Intersection	
Int Delay, s/veh	26.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	23	25	318	20	7	27	84	369	15	34	853	10
Future Vol, veh/h	23	25	318	20	7	27	84	369	15	34	853	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	300	-	-	-	300	-	300	300	-	300
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	26	28	353	22	8	30	93	410	17	38	948	11

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1648	1637	948	1816	1631	410	959	0	0	427	0	0
Stage 1	1024	1024	-	596	596	-	-	-	-	-	-	-
Stage 2	624	613	-	1220	1035	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	79	101	~ 316	60	101	642	717	-	-	1132	-	-
Stage 1	284	313	-	490	492	-	-	-	-	-	-	-
Stage 2	473	483	-	220	309	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	62	85	~ 316	-	85	642	717	-	-	1132	-	-
Mov Cap-2 Maneuver	62	85	-	-	85	-	-	-	-	-	-	-
Stage 1	247	302	-	426	428	-	-	-	-	-	-	-
Stage 2	385	420	-	-	298	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	125.2		1.9	0.3
HCM LOS	F	-		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	717	-	-	72	316	-	1132	-	-
HCM Lane V/C Ratio	0.13	-	-	0.741	1.118	-	0.033	-	-
HCM Control Delay (s)	10.8	-	-	138.3	123.2	-	8.3	-	-
HCM Lane LOS	B	-	-	F	F	-	A	-	-
HCM 95th %tile Q(veh)	0.4	-	-	3.5	14.1	-	0.1	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	6.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	36	104	8	6	81	54
Future Vol, veh/h	36	104	8	6	81	54
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	82	82	82	82	82	82
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	44	127	10	7	99	66

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	278	14	0	0	17	0
Stage 1	14	-	-	-	-	-
Stage 2	264	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	712	1066	-	-	1600	-
Stage 1	1009	-	-	-	-	-
Stage 2	780	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	666	1066	-	-	1600	-
Mov Cap-2 Maneuver	666	-	-	-	-	-
Stage 1	1009	-	-	-	-	-
Stage 2	730	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.8	0	4.4
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	923	1600	-
HCM Lane V/C Ratio	-	-	0.185	0.062	-
HCM Control Delay (s)	-	-	9.8	7.4	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.7	0.2	-

Intersection	
Intersection Delay, s/veh	7.5
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	17	62	6	8	51	6	11	5	8	3	4	8
Future Vol, veh/h	17	62	6	8	51	6	11	5	8	3	4	8
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	19	70	7	9	58	7	13	6	9	3	5	9
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	7.6	7.5	7.3	7.1
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	46%	20%	12%	20%
Vol Thru, %	21%	73%	78%	27%
Vol Right, %	33%	7%	9%	53%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	24	85	65	15
LT Vol	11	17	8	3
Through Vol	5	62	51	4
RT Vol	8	6	6	8
Lane Flow Rate	27	97	74	17
Geometry Grp	1	1	1	1
Degree of Util (X)	0.031	0.109	0.083	0.019
Departure Headway (Hd)	4.133	4.064	4.052	3.969
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	855	880	880	889
Service Time	2.213	2.1	2.094	2.052
HCM Lane V/C Ratio	0.032	0.11	0.084	0.019
HCM Control Delay	7.3	7.6	7.5	7.1
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.1	0.4	0.3	0.1

Intersection	
Int Delay, s/veh	3.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	41	1	60	4	1	2	110	570	3	3	192	14
Future Vol, veh/h	41	1	60	4	1	2	110	570	3	3	192	14
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	300	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	45	1	65	4	1	2	120	620	3	3	209	15

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1086	1086	217	1118	1092	622	224	0	0	623	0	0
Stage 1	223	223	-	862	862	-	-	-	-	-	-	-
Stage 2	863	863	-	256	230	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	194	216	823	184	215	487	1345	-	-	958	-	-
Stage 1	780	719	-	350	372	-	-	-	-	-	-	-
Stage 2	349	372	-	749	714	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	172	186	823	151	185	487	1345	-	-	958	-	-
Mov Cap-2 Maneuver	172	186	-	151	185	-	-	-	-	-	-	-
Stage 1	674	716	-	302	321	-	-	-	-	-	-	-
Stage 2	299	321	-	686	711	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	19.5	24.3	1.3	0.1
HCM LOS	C	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1345	-	-	172	823	194	958	-	-
HCM Lane V/C Ratio	0.089	-	-	0.265	0.079	0.039	0.003	-	-
HCM Control Delay (s)	7.9	0	-	33.3	9.8	24.3	8.8	0	-
HCM Lane LOS	A	A	-	D	A	C	A	A	-
HCM 95th %tile Q(veh)	0.3	-	-	1	0.3	0.1	0	-	-

Intersection	
Int Delay, s/veh	0.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	4	2	683	4	1	254
Future Vol, veh/h	4	2	683	4	1	254
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	2	776	5	1	289

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1070	779	0	0	781	0
Stage 1	779	-	-	-	-	-
Stage 2	291	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	245	396	-	-	837	-
Stage 1	452	-	-	-	-	-
Stage 2	759	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	245	396	-	-	837	-
Mov Cap-2 Maneuver	245	-	-	-	-	-
Stage 1	452	-	-	-	-	-
Stage 2	758	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	18.1	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	281	837	-
HCM Lane V/C Ratio	-	-	0.024	0.001	-
HCM Control Delay (s)	-	-	18.1	9.3	0
HCM Lane LOS	-	-	C	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Intersection	
Int Delay, s/veh	10

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	16	14	144	32	13	46	187	655	34	23	227	18
Future Vol, veh/h	16	14	144	32	13	46	187	655	34	23	227	18
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	300	-	-	-	300	-	300	300	-	300
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	17	15	155	34	14	49	201	704	37	25	244	19

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1450	1437	244	1495	1419	704	263	0	0	741	0	0
Stage 1	294	294	-	1106	1106	-	-	-	-	-	-	-
Stage 2	1156	1143	-	389	313	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	109	133	795	101	137	437	1301	-	-	866	-	-
Stage 1	714	670	-	255	286	-	-	-	-	-	-	-
Stage 2	239	275	-	635	657	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	76	109	795	63	112	437	1301	-	-	866	-	-
Mov Cap-2 Maneuver	76	109	-	63	112	-	-	-	-	-	-	-
Stage 1	604	651	-	216	242	-	-	-	-	-	-	-
Stage 2	169	233	-	485	638	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	20.3	96.9	1.8	0.8
HCM LOS	C	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1301	-	-	89	795	125	866	-	-
HCM Lane V/C Ratio	0.155	-	-	0.362	0.195	0.783	0.029	-	-
HCM Control Delay (s)	8.3	-	-	66.8	10.6	96.9	9.3	-	-
HCM Lane LOS	A	-	-	F	B	F	A	-	-
HCM 95th %tile Q(veh)	0.5	-	-	1.4	0.7	4.6	0.1	-	-

Intersection	
Int Delay, s/veh	5.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	27	38	24	18	70	32
Future Vol, veh/h	27	38	24	18	70	32
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	30	42	27	20	78	36

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	229	37	0	0	47	0
Stage 1	37	-	-	-	-	-
Stage 2	192	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	759	1035	-	-	1560	-
Stage 1	985	-	-	-	-	-
Stage 2	841	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	720	1035	-	-	1560	-
Mov Cap-2 Maneuver	720	-	-	-	-	-
Stage 1	985	-	-	-	-	-
Stage 2	798	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.5	0	5.1
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	876	1560	-
HCM Lane V/C Ratio	-	-	0.082	0.05	-
HCM Control Delay (s)	-	-	9.5	7.4	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.3	0.2	-

Intersection	
Intersection Delay, s/veh	7.7
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	18	87	6	12	70	8	12	5	16	6	4	8
Future Vol, veh/h	18	87	6	12	70	8	12	5	16	6	4	8
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	20	99	7	14	80	9	14	6	18	7	5	9
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	7.9	7.7	7.4	7.4
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	36%	16%	13%	33%
Vol Thru, %	15%	78%	78%	22%
Vol Right, %	48%	5%	9%	44%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	33	111	90	18
LT Vol	12	18	12	6
Through Vol	5	87	70	4
RT Vol	16	6	8	8
Lane Flow Rate	38	126	102	20
Geometry Grp	1	1	1	1
Degree of Util (X)	0.044	0.144	0.117	0.024
Departure Headway (Hd)	4.238	4.111	4.103	4.274
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	850	865	866	842
Service Time	2.238	2.168	2.164	2.275
HCM Lane V/C Ratio	0.045	0.146	0.118	0.024
HCM Control Delay	7.4	7.9	7.7	7.4
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.1	0.5	0.4	0.1

Intersection	
Int Delay, s/veh	5.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	49	1	104	4	1	2	179	616	3	3	217	23
Future Vol, veh/h	49	1	104	4	1	2	179	616	3	3	217	23
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	300	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	53	1	113	4	1	2	195	670	3	3	236	25

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1318	1318	249	1374	1329	672	261	0	0	673	0	0
Stage 1	255	255	-	1062	1062	-	-	-	-	-	-	-
Stage 2	1063	1063	-	312	267	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	134	157	790	123	155	456	1303	-	-	918	-	-
Stage 1	749	696	-	270	300	-	-	-	-	-	-	-
Stage 2	270	300	-	699	688	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	108	119	790	85	117	456	1303	-	-	918	-	-
Mov Cap-2 Maneuver	108	119	-	85	117	-	-	-	-	-	-	-
Stage 1	570	693	-	205	228	-	-	-	-	-	-	-
Stage 2	204	228	-	596	685	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	29.1	37.9	1.8	0.1
HCM LOS	D	E		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1303	-	-	108	790	117	918	-	-
HCM Lane V/C Ratio	0.149	-	-	0.503	0.143	0.065	0.004	-	-
HCM Control Delay (s)	8.2	0	-	68.1	10.3	37.9	8.9	0	-
HCM Lane LOS	A	A	-	F	B	E	A	A	-
HCM 95th %tile Q(veh)	0.5	-	-	2.3	0.5	0.2	0	-	-

Intersection	
Intersection Delay, s/veh	8.1
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	2	1	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	124	7	951	360
Demand Flow Rate, veh/h	127	7	970	368
Vehicles Circulating, veh/h	339	1003	39	103
Vehicles Exiting, veh/h	132	6	427	907
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	4.2	6.1	9.7	5.3
Approach LOS	A	A	A	A

Lane	Left	Right	Left	Left	Right	Left	Right
Designated Moves	LT	R	LTR	L	TR	LT	R
Assumed Moves	LT	R	LTR	L	TR	LT	R
RT Channelized							
Lane Util	0.299	0.701	1.000	0.101	0.899	0.910	0.090
Follow-Up Headway, s	2.667	2.535	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.645	4.328	4.328	4.645	4.328	4.645	4.328
Entry Flow, veh/h	38	89	7	98	872	335	33
Cap Entry Lane, veh/h	988	1065	605	1302	1374	1228	1301
Entry HV Adj Factor	0.973	0.978	0.997	0.980	0.980	0.980	0.970
Flow Entry, veh/h	37	87	7	96	855	328	32
Cap Entry, veh/h	962	1041	604	1276	1347	1204	1262
V/C Ratio	0.038	0.084	0.012	0.075	0.635	0.273	0.025
Control Delay, s/veh	4.1	4.2	6.1	3.4	10.4	5.5	3.1
LOS	A	A	A	A	B	A	A
95th %tile Queue, veh	0	0	0	0	5	1	0

Intersection	
Int Delay, s/veh	42.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	21	16	174	34	16	53	235	796	36	27	320	25
Future Vol, veh/h	21	16	174	34	16	53	235	796	36	27	320	25
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	300	-	-	-	300	-	300	300	-	300
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	23	17	187	37	17	57	253	856	39	29	344	27

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1821	1803	344	1880	1791	856	371	0	0	895	0	0
Stage 1	402	402	-	1362	1362	-	-	-	-	-	-	-
Stage 2	1419	1401	-	518	429	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	60	79	699	54	81	357	1188	-	-	758	-	-
Stage 1	625	600	-	183	216	-	-	-	-	-	-	-
Stage 2	170	207	-	541	584	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	32	60	699	~ 25	61	357	1188	-	-	758	-	-
Mov Cap-2 Maneuver	32	60	-	~ 25	61	-	-	-	-	-	-	-
Stage 1	492	577	-	144	170	-	-	-	-	-	-	-
Stage 2	101	163	-	370	562	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	61.5	$ 580.3	1.9	0.7
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1188	-	-	40	699	58	758	-	-
HCM Lane V/C Ratio	0.213	-	-	0.995	0.268	1.91	0.038	-	-
HCM Control Delay (s)	8.8	-	-	294.5	12	$ 580.3	9.9	-	-
HCM Lane LOS	A	-	-	F	B	F	A	-	-
HCM 95th %tile Q(veh)	0.8	-	-	3.8	1.1	10.5	0.1	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	5.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	30	55	25	21	95	34
Future Vol, veh/h	30	55	25	21	95	34
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	33	61	28	23	106	38

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	290	40	0	0	51	0
Stage 1	40	-	-	-	-	-
Stage 2	250	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	701	1031	-	-	1555	-
Stage 1	982	-	-	-	-	-
Stage 2	792	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	652	1031	-	-	1555	-
Mov Cap-2 Maneuver	652	-	-	-	-	-
Stage 1	982	-	-	-	-	-
Stage 2	737	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.7	0	5.5
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	855	1555	-
HCM Lane V/C Ratio	-	-	0.11	0.068	-
HCM Control Delay (s)	-	-	9.7	7.5	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.4	0.2	-

Intersection	
Intersection Delay, s/veh	8
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	18	125	6	12	102	12	12	5	16	9	4	8
Future Vol, veh/h	18	125	6	12	102	12	12	5	16	9	4	8
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	20	142	7	14	116	14	14	6	18	10	5	9
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	8.2	8	7.6	7.7
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	36%	12%	10%	43%
Vol Thru, %	15%	84%	81%	19%
Vol Right, %	48%	4%	10%	38%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	33	149	126	21
LT Vol	12	18	12	9
Through Vol	5	125	102	4
RT Vol	16	6	12	8
Lane Flow Rate	38	169	143	24
Geometry Grp	1	1	1	1
Degree of Util (X)	0.046	0.195	0.164	0.03
Departure Headway (Hd)	4.426	4.148	4.131	4.517
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	814	855	856	797
Service Time	2.427	2.224	2.213	2.519
HCM Lane V/C Ratio	0.047	0.198	0.167	0.03
HCM Control Delay	7.6	8.2	8	7.7
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.1	0.7	0.6	0.1

Intersection	
Int Delay, s/veh	5.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	49	1	104	4	1	2	179	643	3	3	253	23
Future Vol, veh/h	49	1	104	4	1	2	179	643	3	3	253	23
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	300	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	53	1	113	4	1	2	195	699	3	3	275	25

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1386	1386	288	1442	1397	701	300	0	0	702	0	0
Stage 1	294	294	-	1091	1091	-	-	-	-	-	-	-
Stage 2	1092	1092	-	351	306	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	120	143	751	110	141	439	1261	-	-	895	-	-
Stage 1	714	670	-	260	291	-	-	-	-	-	-	-
Stage 2	260	291	-	666	662	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	95	106	751	74	105	439	1261	-	-	895	-	-
Mov Cap-2 Maneuver	95	106	-	74	105	-	-	-	-	-	-	-
Stage 1	533	667	-	194	217	-	-	-	-	-	-	-
Stage 2	192	217	-	563	659	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	34.6	42.7	1.8	0.1
HCM LOS	D	E		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1261	-	-	95	751	103	895	-	-
HCM Lane V/C Ratio	0.154	-	-	0.572	0.151	0.074	0.004	-	-
HCM Control Delay (s)	8.4	0	-	84.5	10.6	42.7	9	0	-
HCM Lane LOS	A	A	-	F	B	E	A	A	-
HCM 95th %tile Q(veh)	0.5	-	-	2.6	0.5	0.2	0	-	-

Intersection	
Intersection Delay, s/veh	8.5
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	2	1	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	554	7	1232	400
Demand Flow Rate, veh/h	565	7	1257	408
Vehicles Circulating, veh/h	297	1447	196	516
Vehicles Exiting, veh/h	627	6	666	938
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	6.2	8.9	9.9	7.5
Approach LOS	A	A	A	A

Lane	Left	Right	Left	Left	Right	Left	Right
Designated Moves	LT	R	LTR	L	TR	LT	R
Assumed Moves	LT	R	LTR	L	TR	LT	R
RT Channelized							
Lane Util	0.345	0.655	1.000	0.407	0.593	0.718	0.282
Follow-Up Headway, s	2.667	2.535	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.645	4.328	4.328	4.645	4.328	4.645	4.328
Entry Flow, veh/h	195	370	7	511	746	293	115
Cap Entry Lane, veh/h	1027	1103	415	1127	1202	840	916
Entry HV Adj Factor	0.979	0.981	0.997	0.980	0.980	0.980	0.983
Flow Entry, veh/h	191	363	7	501	731	287	113
Cap Entry, veh/h	1006	1082	414	1105	1179	823	900
V/C Ratio	0.190	0.335	0.017	0.453	0.621	0.349	0.126
Control Delay, s/veh	5.4	6.7	8.9	8.2	11.0	8.4	5.2
LOS	A	A	A	A	B	A	A
95th %tile Queue, veh	1	1	0	2	5	2	0

Intersection	
Int Delay, s/veh	193.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	21	16	174	34	16	64	235	1038	36	37	522	25
Future Vol, veh/h	21	16	174	34	16	64	235	1038	36	37	522	25
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	300	-	-	-	300	-	300	300	-	300
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	23	17	187	37	17	69	253	1116	39	40	561	27

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	2326	2302	561	2379	2290	1116	588	0	0	1155	0	0
Stage 1	641	641	-	1622	1622	-	-	-	-	-	-	-
Stage 2	1685	1661	-	757	668	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	26	39	527	~ 24	39	253	987	-	-	605	-	-
Stage 1	463	469	-	129	161	-	-	-	-	-	-	-
Stage 2	119	154	-	400	456	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	~ 7	27	527	~ 6	27	253	987	-	-	605	-	-
Mov Cap-2 Maneuver	~ 7	27	-	~ 6	27	-	-	-	-	-	-	-
Stage 1	344	438	-	96	120	-	-	-	-	-	-	-
Stage 2	55	115	-	231	426	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	$ 377.7	$ 3036	1.8	0.7
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	987	-	-	10	527	18	605	-	-
HCM Lane V/C Ratio	0.256	-	-	3.978	0.355	6.81	0.066	-	-
HCM Control Delay (s)	9.9	-	-	$ 2080.9	15.5	$ 3036	11.4	-	-
HCM Lane LOS	A	-	-	F	C	F	B	-	-
HCM 95th %tile Q(veh)	1	-	-	6.1	1.6	16	0.2	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	6.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	30	87	25	21	133	34
Future Vol, veh/h	30	87	25	21	133	34
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	33	97	28	23	148	38

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	374	40	0	0	51	0
Stage 1	40	-	-	-	-	-
Stage 2	334	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	627	1031	-	-	1555	-
Stage 1	982	-	-	-	-	-
Stage 2	725	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	566	1031	-	-	1555	-
Mov Cap-2 Maneuver	566	-	-	-	-	-
Stage 1	982	-	-	-	-	-
Stage 2	655	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10	0	6
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	852	1555	-
HCM Lane V/C Ratio	-	-	0.153	0.095	-
HCM Control Delay (s)	-	-	10	7.6	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.5	0.3	-

Intersection	
Intersection Delay, s/veh	7.8
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	20	94	7	13	76	9	13	6	17	7	5	9
Future Vol, veh/h	20	94	7	13	76	9	13	6	17	7	5	9
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	23	107	8	15	86	10	15	7	19	8	6	10
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	8	7.8	7.5	7.5
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	36%	17%	13%	33%
Vol Thru, %	17%	78%	78%	24%
Vol Right, %	47%	6%	9%	43%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	36	121	98	21
LT Vol	13	20	13	7
Through Vol	6	94	76	5
RT Vol	17	7	9	9
Lane Flow Rate	41	138	111	24
Geometry Grp	1	1	1	1
Degree of Util (X)	0.049	0.158	0.127	0.029
Departure Headway (Hd)	4.294	4.129	4.121	4.333
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	839	861	860	831
Service Time	2.295	2.195	2.194	2.335
HCM Lane V/C Ratio	0.049	0.16	0.129	0.029
HCM Control Delay	7.5	8	7.8	7.5
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.2	0.6	0.4	0.1

Intersection	
Int Delay, s/veh	6.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	53	1	110	5	1	2	191	679	4	4	238	24
Future Vol, veh/h	53	1	110	5	1	2	191	679	4	4	238	24
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	300	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	58	1	120	5	1	2	208	738	4	4	259	26

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1438	1438	272	1497	1449	740	285	0	0	742	0	0
Stage 1	280	280	-	1156	1156	-	-	-	-	-	-	-
Stage 2	1158	1158	-	341	293	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	111	133	767	101	131	417	1277	-	-	865	-	-
Stage 1	727	679	-	239	271	-	-	-	-	-	-	-
Stage 2	239	270	-	674	670	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	86	96	767	66	94	417	1277	-	-	865	-	-
Mov Cap-2 Maneuver	86	96	-	66	94	-	-	-	-	-	-	-
Stage 1	526	675	-	173	196	-	-	-	-	-	-	-
Stage 2	171	195	-	565	666	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	43.1	50.3	1.8	0.1
HCM LOS	E	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1277	-	-	86	767	88	865	-	-
HCM Lane V/C Ratio	0.163	-	-	0.683	0.156	0.099	0.005	-	-
HCM Control Delay (s)	8.4	0	-	109.4	10.6	50.3	9.2	0	-
HCM Lane LOS	A	A	-	F	B	F	A	A	-
HCM 95th %tile Q(veh)	0.6	-	-	3.3	0.6	0.3	0	-	-

Intersection	
Intersection Delay, s/veh	9.3
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	2	1	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	128	9	1039	391
Demand Flow Rate, veh/h	131	9	1060	399
Vehicles Circulating, veh/h	371	1093	41	109
Vehicles Exiting, veh/h	137	8	461	993
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	4.3	6.6	11.3	5.6
Approach LOS	A	A	B	A

Lane	Left	Right	Left	Left	Right	Left	Right
Designated Moves	LT	R	LTR	L	TR	LT	R
Assumed Moves	LT	R	LTR	L	TR	LT	R
RT Channelized							
Lane Util	0.305	0.695	1.000	0.096	0.904	0.915	0.085
Follow-Up Headway, s	2.667	2.535	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.645	4.328	4.328	4.645	4.328	4.645	4.328
Entry Flow, veh/h	40	91	9	102	958	365	34
Cap Entry Lane, veh/h	960	1036	561	1300	1371	1221	1294
Entry HV Adj Factor	0.975	0.978	0.998	0.980	0.981	0.980	0.971
Flow Entry, veh/h	39	89	9	100	939	358	33
Cap Entry, veh/h	935	1013	560	1274	1345	1197	1256
V/C Ratio	0.042	0.088	0.016	0.078	0.699	0.299	0.026
Control Delay, s/veh	4.2	4.3	6.6	3.5	12.1	5.8	3.1
LOS	A	A	A	A	B	A	A
95th %tile Queue, veh	0	0	0	0	6	1	0

Intersection	
Int Delay, s/veh	84.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	23	17	190	38	17	58	255	869	40	30	345	27
Future Vol, veh/h	23	17	190	38	17	58	255	869	40	30	345	27
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	300	-	-	-	300	-	300	300	-	300
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	25	18	204	41	18	62	274	934	43	32	371	29

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1979	1960	371	2043	1946	934	400	0	0	977	0	0
Stage 1	435	435	-	1482	1482	-	-	-	-	-	-	-
Stage 2	1544	1525	-	561	464	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	46	63	675	42	65	322	1159	-	-	706	-	-
Stage 1	600	580	-	156	189	-	-	-	-	-	-	-
Stage 2	144	180	-	512	564	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	~ 21	46	675	~ 16	47	322	1159	-	-	706	-	-
Mov Cap-2 Maneuver	~ 21	46	-	~ 16	47	-	-	-	-	-	-	-
Stage 1	458	554	-	119	144	-	-	-	-	-	-	-
Stage 2	77	138	-	330	539	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	116.2	$ 1169.9	2	0.8
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1159	-	-	27	675	39	706	-	-
HCM Lane V/C Ratio	0.237	-	-	1.593	0.303	3.116	0.046	-	-
HCM Control Delay (s)	9.1	-	-	$ 608.5	12.5	$ 1169.9	10.3	-	-
HCM Lane LOS	A	-	-	F	B	F	B	-	-
HCM 95th %tile Q(veh)	0.9	-	-	5.1	1.3	13.7	0.1	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	33	60	28	23	103	38
Future Vol, veh/h	33	60	28	23	103	38
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	37	67	31	26	114	42

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	314	44	0	0	57	0
Stage 1	44	-	-	-	-	-
Stage 2	270	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	679	1026	-	-	1547	-
Stage 1	978	-	-	-	-	-
Stage 2	775	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	628	1026	-	-	1547	-
Mov Cap-2 Maneuver	628	-	-	-	-	-
Stage 1	978	-	-	-	-	-
Stage 2	717	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.9	0	5.5
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	838	1547	-
HCM Lane V/C Ratio	-	-	0.123	0.074	-
HCM Control Delay (s)	-	-	9.9	7.5	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.4	0.2	-

Intersection	
Intersection Delay, s/veh	8.2
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	20	132	7	13	108	13	13	6	17	10	5	9
Future Vol, veh/h	20	132	7	13	108	13	13	6	17	10	5	9
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	23	150	8	15	123	15	15	7	19	11	6	10
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	8.4	8.1	7.7	7.7
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	36%	13%	10%	42%
Vol Thru, %	17%	83%	81%	21%
Vol Right, %	47%	4%	10%	38%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	36	159	134	24
LT Vol	13	20	13	10
Through Vol	6	132	108	5
RT Vol	17	7	13	9
Lane Flow Rate	41	181	152	27
Geometry Grp	1	1	1	1
Degree of Util (X)	0.051	0.209	0.176	0.035
Departure Headway (Hd)	4.485	4.166	4.151	4.572
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	803	849	850	787
Service Time	2.487	2.254	2.245	2.574
HCM Lane V/C Ratio	0.051	0.213	0.179	0.034
HCM Control Delay	7.7	8.4	8.1	7.7
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.2	0.8	0.6	0.1

Intersection	
Int Delay, s/veh	8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	53	1	110	5	1	2	191	706	4	4	274	24
Future Vol, veh/h	53	1	110	5	1	2	191	706	4	4	274	24
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	300	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	58	1	120	5	1	2	208	767	4	4	298	26

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1506	1506	311	1565	1517	769	324	0	0	771	0	0
Stage 1	319	319	-	1185	1185	-	-	-	-	-	-	-
Stage 2	1187	1187	-	380	332	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	99	121	729	90	119	401	1236	-	-	844	-	-
Stage 1	693	653	-	230	263	-	-	-	-	-	-	-
Stage 2	230	262	-	642	644	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	75	85	729	57	83	401	1236	-	-	844	-	-
Mov Cap-2 Maneuver	75	85	-	57	83	-	-	-	-	-	-	-
Stage 1	489	649	-	162	185	-	-	-	-	-	-	-
Stage 2	160	185	-	533	640	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	54.4	58.4	1.8	0.1
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1236	-	-	75	729	76	844	-	-
HCM Lane V/C Ratio	0.168	-	-	0.783	0.164	0.114	0.005	-	-
HCM Control Delay (s)	8.5	0	-	143	10.9	58.4	9.3	0	-
HCM Lane LOS	A	A	-	F	B	F	A	A	-
HCM 95th %tile Q(veh)	0.6	-	-	3.8	0.6	0.4	0	-	-

Intersection	
Intersection Delay, s/veh	9.5
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	2	1	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	559	9	1321	431
Demand Flow Rate, veh/h	570	9	1347	439
Vehicles Circulating, veh/h	329	1537	198	523
Vehicles Exiting, veh/h	633	8	701	1023
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	6.5	9.7	11.3	8.1
Approach LOS	A	A	B	A

Lane	Left	Right	Left	Left	Right	Left	Right
Designated Moves	LT	R	LTR	L	TR	LT	R
Assumed Moves	LT	R	LTR	L	TR	LT	R
RT Channelized							
Lane Util	0.346	0.654	1.000	0.383	0.617	0.736	0.264
Follow-Up Headway, s	2.667	2.535	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.645	4.328	4.328	4.645	4.328	4.645	4.328
Entry Flow, veh/h	197	373	9	516	831	323	116
Cap Entry Lane, veh/h	997	1074	384	1125	1200	834	910
Entry HV Adj Factor	0.980	0.981	0.998	0.981	0.981	0.980	0.983
Flow Entry, veh/h	193	366	9	506	815	317	114
Cap Entry, veh/h	977	1053	384	1103	1177	818	895
V/C Ratio	0.198	0.347	0.023	0.459	0.692	0.387	0.127
Control Delay, s/veh	5.6	7.0	9.7	8.3	13.1	9.1	5.2
LOS	A	A	A	A	B	A	A
95th %tile Queue, veh	1	2	0	2	6	2	0

Intersection	
Int Delay, s/veh	703.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	23	17	190	38	17	69	255	1111	40	40	547	27
Future Vol, veh/h	23	17	190	38	17	69	255	1111	40	40	547	27
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	300	-	-	-	300	-	300	300	-	300
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	25	18	204	41	18	74	274	1195	43	43	588	29

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	2485	2460	588	2543	2446	1195	617	0	0	1238	0	0
Stage 1	674	674	-	1743	1743	-	-	-	-	-	-	-
Stage 2	1811	1786	-	800	703	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	~ 20	31	509	~ 18	31	227	963	-	-	563	-	-
Stage 1	444	454	-	110	140	-	-	-	-	-	-	-
Stage 2	100	134	-	379	440	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	~ 2	20	509	~ 2	20	227	963	-	-	563	-	-
Mov Cap-2 Maneuver	~ 2	20	-	~ 2	20	-	-	-	-	-	-	-
Stage 1	317	419	-	79	100	-	-	-	-	-	-	-
Stage 2	39	96	-	200	407	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, $	1456.9	$ 10746.6	1.9	0.8
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	963	-	-	3	509	6	563	-	-
HCM Lane V/C Ratio	0.285	-	-	14.337	0.401	22.222	0.076	-	-
HCM Control Delay (s)	10.2	-	-	$ 8298.1	16.7	$ 10746.6	11.9	-	-
HCM Lane LOS	B	-	-	F	C	F	B	-	-
HCM 95th %tile Q(veh)	1.2	-	-	7.2	1.9	18.6	0.2	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	6.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	33	92	28	23	141	38
Future Vol, veh/h	33	92	28	23	141	38
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	37	102	31	26	157	42

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	400	44	0	0	57	0
Stage 1	44	-	-	-	-	-
Stage 2	356	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	606	1026	-	-	1547	-
Stage 1	978	-	-	-	-	-
Stage 2	709	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	543	1026	-	-	1547	-
Mov Cap-2 Maneuver	543	-	-	-	-	-
Stage 1	978	-	-	-	-	-
Stage 2	635	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.2	0	6
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	831	1547	-
HCM Lane V/C Ratio	-	-	0.167	0.101	-
HCM Control Delay (s)	-	-	10.2	7.6	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.6	0.3	-