



## *City Council Memorandum*

**To:** Mayor Fasbender & City Councilmembers  
**From:** John Hinzman, Community Development Director  
**Date:** December 4, 2023  
**Item:** Authorize Distribution: Environmental Assessment Worksheet (EAW) - Walden at Hastings

### **Council Action Requested:**

Authorize distribution of the attached Environmental Assessment Worksheet (EAW) for the potential development of Walden at Hastings, a 511-unit residential housing development consisting of single family, twin home, town home, apartment, and senior housing. The project is generally located east of TH 316 and Michael Avenue. A simple majority of Council is necessary for action.

Authorization is limited to distribution of the EAW for public comment. The Council will be asked to evaluate the findings of the EAW along with public comment at a later date. The EAW does not authorize approval of the development. Separate applications for land use entitlements including rezoning, plat, and site plan would be considered after the EAW.

### **EAW:**

The environmental assessment worksheet (EAW) is a brief document designed to lay out the basic facts of a project necessary to determine if an environmental impact statement (EIS) is required for the proposed project. In addition to the legal purpose of the EAW in determining the need for an EIS, the EAW also provides permit information, informs the public about the project, and helps identify ways to protect the environment. The EAW is not meant to approve or deny a project, but instead act as a source of information to guide other approvals and permitting decisions. The proposed number of proposed housing units' triggers completion of the EAW per state rules. The EAW was prepared by the developer's engineer SEH and reviewed by City Staff.

### **Next Steps:**

Upon authorization, public review of the document would commence with the EAW being distributed to a variety of local, state, and national authorities for review. The EAW would be published in the EQB Monitor on December 12<sup>th</sup>, with the 30-day public comment period expiring on January 11, 2024. Upon expiration of the review period, responses would be prepared to the public comments. The City Council would then consider adoption of a resolution to determine if further environmental review through and Environmental Impact Statement (EIS) is necessary and review the proposed findings of fact.

**Advisory Commission Discussion:**

N/A

**Council Committee Discussion:**

N/A

**Attachments:**

- EAW

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.egb.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:** [Walden at Hastings](#)

**2. Proposer:** [LandEquity Development](#)

Contact person: [C.S. Beadle](#)

Title: [Founder](#)

Address: [333 Washington Ave](#)

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Phone: [612.614.3020](#)

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**3. RGU:** [City of Hastings](#)

Contact person: [John Hinzman](#)

Title: [Community Development Director](#)

Address: [101 4<sup>th</sup> St East](#)

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**4. Reason for EAW Preparation:** (check one)

Required:

EIS Scoping

Mandatory EAW

Discretionary:

Citizen petition

RGU discretion

Proposer initiated

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

[Subp. 19. Residential development. Subpart D. Proposed development exceeds 250 unattached units](#)

**5. Project Location:**

• County: [Dakota](#)

• City/Township: [Hastings](#)

• PLS Location ( $\frac{1}{4}$ ,  $\frac{1}{4}$ , Section, Township, Range):

○ [SW  \$\frac{1}{4}\$  of SW  \$\frac{1}{4}\$  - Section 2, Township 114, Range 17 - All](#)

○ [SE  \$\frac{1}{4}\$  of SW  \$\frac{1}{4}\$  - Section 2, Township 114, Range 17 - Portion](#)

○ [NW  \$\frac{1}{4}\$  of NW  \$\frac{1}{4}\$  - Section 11, Township 114, Range 17 - Portion](#)

○ [NE  \$\frac{1}{4}\$  of NW  \$\frac{1}{4}\$  - Section 11, Township 114, Range 17 - Portion](#)

• Watershed (81 major watershed scale): [Vermillion River](#)

• GPS Coordinates: [44.703488, -92.828539](#)

• Tax Parcel Number: [190020051012 and 190110027012](#)

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

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

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## 6. Project Description:

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

This 71.1-acre housing project features a phased development plan, commencing in 2024 with a total of 511 proposed housing units. The project also includes a 17.5-acre natural preserve, new infrastructure, and recreational enhancements, transforming farmland into a diverse community over a five-year period.

- 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.

The Project includes the construction of single-family, twin homes, townhomes, apartments, senior and active adult living, and assisted living units as part of a new development in Hastings, Minnesota. The Project aims to incorporate family living in one (1) development. Whether a person is owning their first, having their second child, living their active lives in their senior years or needs assistance and care, they are welcome. The goal is to have families living and thriving in the same development. The proposed Project would construct the following housing units:

### *Phase 1 (2024)*

- 54 Twinhome Units (ITE Land Use: Multifamily Housing– Low-rise)
- 68 Townhome Units (ITE Land Use: Multifamily Housing– Low-rise)
- 170 Apartment Units (ITE Land Use: Multifamily Housing– Mid-rise)
- 24 Senior Units (ITE Land Use: Assisted Living)
- 60 Active Senior Living Units (ITE Land Use: Senior Adult Housing (Single Family))
- 80 Assisted Living Units (ITE Land Use: Assisted Living)

### *Phase 1 (2029)*

- 55 Single Family Homes (ITE Land Use: Single Family Detached Housing)

The property parcel is 71.1 acres of land for the housing units, storm water treatment ponds and play/ open space. A natural area within the parcel will be maintained as a preserve. The preserve will be 17.5 acres of the total 71.1 acres. This protected land encompasses the eastern tree line, steep slopes, and sand coulee prairie.

New public and private roadways will be constructed to provide access to the development from TH 316 (Red Wing Blvd). Sidewalks will be constructed along several roadways to provide pedestrian mobility. Additional trails will be built throughout the development for mobility and recreation.

The land is currently used for row crop agriculture. No existing structures are present that will require modification or removal. All of the proposed work will require grading and earthwork, which can be accomplished with standard construction equipment. The site will be mass graded to provide the lots and roadway alignments, and will level the site to provide buildable conditions. Infrastructure for water, sewer, and storm water management will be constructed in

conjunction with the grading to provide a site suitable for building the multiple living styles listed previously.

The construction will be initiated in 2024 to complete the mass grading and prepare the site for development. The duration of mass grading and installation of the roadways will take approximately four (4) months. Individual lots are expected to be developed over a five-year period.

c. Project magnitude:

Table 2. Project Magnitude Summary

Description	Number
Total Project Acreage	71.10 Acres
Linear project length (Street Length within project area)	2,695 linear feet, 2.44 acres
Number and type of residential units	Single Family home – 55 Twinhomes – 54 Townhomes – 68 Apartment Units – 170 Senior Units – 24 Assisted Living Units – 80 Active Senior Living Units – 60 <b>Total Units - 511</b>
Residential building area (in square feet)	665,524 ft <sup>2</sup> 15.28 acres
Commercial building area (in square feet)	N/A
Industrial building area (in square feet)	N/A
Institutional building area (in square feet)	N/A
Other uses – specify (in square feet)	Recreational (Pickleball Court, Pedestrian Trails) – 75,787 ft <sup>2</sup> 1.74 acres  Preserve Area – 764,029.9 ft <sup>2</sup> 17.54 acres  Common Area (pervious)- 1,485,396 ft <sup>2</sup> 34.10 acres
Maximum Height of Structures (feet):	Single Family, Twinhome and Townhome Units: 2 Stories/ 28 feet  Apartment, Active Adult and Assisted Living: 4 stories/ 56 feet

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

The purpose of the project is to construct 511 residential units of varying sizes and price ranges within the City of Hastings. The need of the project is to expand the number of affordable residential housing opportunities within the City of Hastings and the Twin Cities Metropolitan Area.

This is a private project being completed as a business opportunity to develop and sell lots for commercial gain. It is not being completed by a governmental unit.

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

There are no future phases of development currently proposed, although the layout of the development will accommodate future expansion of development within the City of Hastings.

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

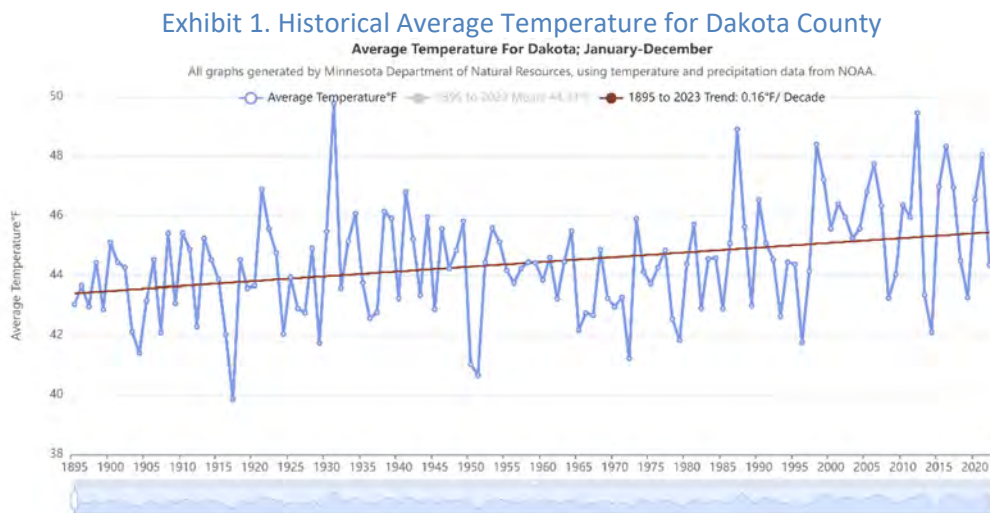
The Walden at Hastings Development Project is not a subsequent stage of an earlier project.

## 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, climate change projections for Minnesota predict a warmer and wetter climate, with more frequent extreme precipitation events. According to the Minnesota DNR, Minnesota has warmed by 3.0 degrees Fahrenheit between 1895 and 2020, and annual precipitation has increased by an average of 3.4 inches across the state<sup>1</sup>.

Climate data available through the Minnesota Climate Explorer<sup>2</sup>, demonstrates that historical average annual temperatures recorded in Dakota County, have increased over the past century (1895 to 2023).



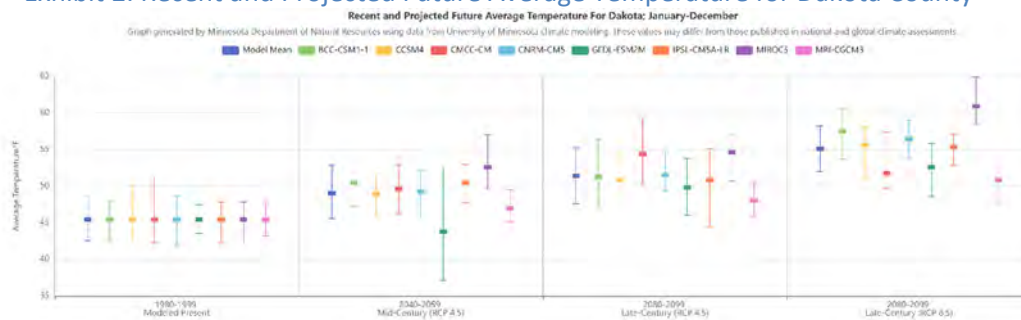
Modelling results from University of Minnesota (as hosted on the Minnesota Climate

<sup>1</sup> [Climate trends | Minnesota DNR \(state.mn.us\)](https://state.mn.us)

<sup>2</sup> [Minnesota Climate Explorer \(state.mn.us\)](https://state.mn.us)

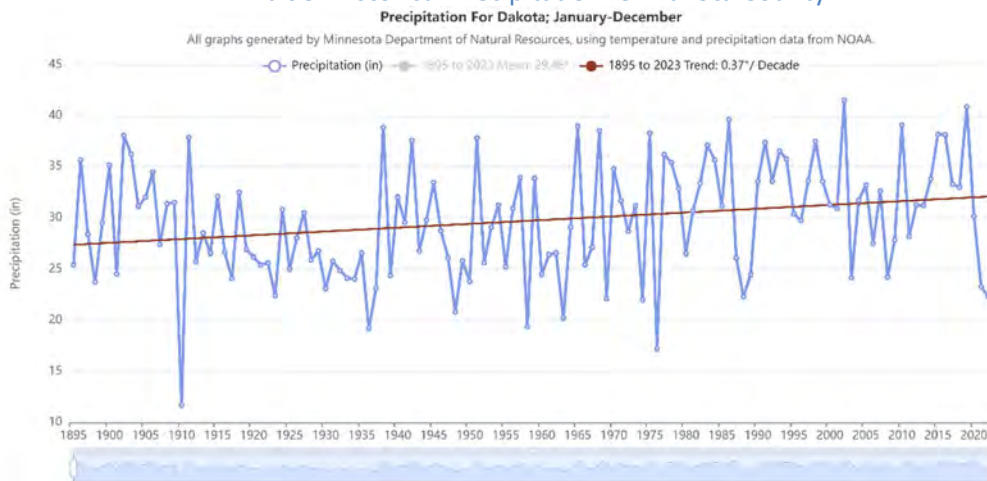
Explorer<sup>2</sup>), predict that average temperatures for Dakota County will continue to warm into the late century (2099).

Exhibit 2. Recent and Projected Future Average Temperature for Dakota County



Climate data available through the Minnesota Climate Explorer<sup>3</sup>, demonstrates precipitation recorded in Dakota County, has increased on average 0.37 inches, over the past century (1895 to 2023).

Exhibit 3. Historical Precipitation for Dakota County



In general, projections for Minnesota predict that the days per year with more than 1-inch of precipitation will increase, but summer precipitation will be lower (i.e., precipitation events will be larger, but more infrequent) by the end of the century, as compared with the historical period of 1981-2010<sup>4</sup>. Climate change impacts at the location of the Project, will likely include warmer temperatures and more periods of drought with periodic flooding.

<sup>3</sup> [Minnesota Climate Explorer \(state.mn.us\)](https://state.mn.us)

<sup>4</sup> [Minnesota Climate Projections | Climate \(umn.edu\)](https://climate.umn.edu)

- 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 3. Resources and Climate Trends

Resource Category	Climate Considerations	Project Information	Adaptations
Project Design	Design should consider increased frequency and duration of heavy rain events; potential for flooding.	The Project will result in an overall increase of impervious surface, through the conversion of an existing agricultural field to a housing development.	Stormwater features will be compliant with NPDES stormwater requirements.
Land Use	Projected increases in frequency and duration of heavy rain events, may increase the risk of localized flooding.	The Project is not located within a Federal Emergency Management Area (FEMA) floodplain.	Natural areas in the eastern portion of the Project will be preserved.
Water Resources	Addressed in item 12		
Contamination/ Hazardous Materials/Wastes	Protect soil and water resources from contamination and hazardous materials.	Construction equipment may require the limited use of potentially hazardous materials, such as gasoline or diesel fuels, motor oils, hydraulic fluids, and other lubricants.	Vehicles equipped with spill kits for rapid response. All hazardous materials will be stored in containment apparatuses, while not in use.
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:

Cover types within the project limits were determined through a combination of aerial imagery, available MLCCS data, and field reconnaissance. Generalized land cover of the project area is mainly agricultural with grassland and woodland located in the northwest portion of the site. The site is generally flat apart from the northwest corner where topography is steep. This portion of the project area will not undergo any development and is proposed as a preserve area, with the intent to donate the land to the State of Minnesota or a similar entity. **Figure 4** illustrates existing generalized landcover in the project area.

Table 4. Land Cover

Cover Types	Before (acres)	After (acres)
Wetlands and shallow lakes (<2 meters deep)	0	0
Deep lakes (>2 meters deep)	0	0
Wooded/forest	0.5	0
Rivers/streams	0	0
Brush/Grassland	17.54	17.54
Cropland	53.06	0
Livestock rangeland/pastureland	0	0
Lawn/landscaping	0	28.86
Green infrastructure TOTAL (from table below*)	0	3.0
Impervious surface	0	19.45
Stormwater Pond (wet sedimentation basin)	0	2.25
Other (describe)	0	0
<b>TOTAL</b>	<b>71.1</b>	<b>71.1</b>

Table 4a. Green Infrastructure

<b>Green Infrastructure*</b>	<b>Before (acreage)</b>	<b>After (acreage)</b>
Constructed infiltration systems (infiltration basins/infiltration trenches/ rainwater gardens/bioretenion areas without underdrains/swales with impermeable check dams)	0	3.0
Constructed tree trenches and tree boxes	0	0
Constructed wetlands	0	0
Constructed green roofs	0	0
Constructed permeable pavements	0	0
Other (describe)	0	0
<b>TOTAL*</b>	<b>0</b>	<b>3.0</b>

Table 4b. Tree Cover

<b><u>Trees</u></b>	<b><u>Percent</u></b>	<b><u>Number</u></b>
Percent tree canopy removed or number of mature trees removed during development	0.7% - only trees removed near the southern entrance to the development	0.5 acres
Number of new trees planted		173 – assumes: one (1) tree per 50 feet of street, one (1) tree per single family lot, twinhome lot, and townhome cluster, five (5) trees at the apartment complex, two (2) at the assisted living complex, and two (2) at the active adult complex.

During the design process, project alternatives were explored, which impacted the amount of green infrastructure and impervious surface. The “curvilinear” plat design was ultimately selected and results in 45% less lineal feet of public roads, 300% more 8-foot wide trail, 24% less street paving (including public roads and private lanes serving the townhomes), and 57% less sidewalk than the “conventional” plat design.

- 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 5. Permit Requirements

Unit of government	Type of application	Status
<b>State</b>		
Minnesota Pollution Control Agency	National Pollutant Discharge Elimination System Construction Wastewater Permit (w/ Storm Water Pollution Prevention Plan)	To be obtained
	Sanitary Sewer Collection System Permit	To be obtained
Minnesota Department of Health	Water Main Permit	To be obtained
Minnesota Department of Natural Resources	Water Appropriations Permit – Dewatering (if needed)	To be obtained
	Endangered Species Takings Permit (if state listed species are impacted)	Avoidance Plan in Progress
Minnesota Department of Transportation	Right of Way Permits	To be obtained
	Traffic Control	To be obtained
	Access/turn lane design review	To be obtained
<b>Local/Other</b>		
City of Hastings	Site Plan Review	To be obtained
	Preliminary and Final Plat	To be obtained
	Land Use/ Conditional Use	To be obtained
	Building Permit	To be obtained
	Mechanical Permit	To be obtained
	Plumbing Permit	To be obtained
	Electrical Permit	To be obtained
	Zoning Permit	To be obtained
	Watershed Management Plan (under Vermillion River JPO)	To be obtained
Comprehensive Plan Amendment (to extend MUSA boundary)	To be obtained	
Dakota County	Highway Permits	To be obtained
	Construction Dewatering	To be obtained
	Water Supply Well	To be obtained

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



**10. Land use:**

## a. Describe:

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

The site is currently used for row crop agricultural purposes, with a small portion of the site in the northeast portion that is grassland and woodland. No parks are present within the subject property, but the nearest public land is the Hastings Wildlife Management Area, operated by the MNDNR and located approximately 0.25 miles north of the property. The applicant is proposing to donate the northeastern portion of the subject property to the MNDNR to become a preserve.

The nearest park is Tuttle park, which is located in the housing development directly north of the subject property.

The Natural Resources Conservation Service (NRCS) Web Soil Survey (WSS), NRCS electronic Field Office Technical Guide (eFOTG), and the Dakota County Soil Survey were referenced to identify prime and unique farmland, and farmland of statewide and/or local importance within the project area. Soils mapped and designated by the NRCS as prime farmland, prime farmland if drained, and farmland of statewide importance are located within the vicinity of the project site as shown on Figure 5. Soils that meet these criteria within the property include:

- Waukegan silt loam, 0 to 1 percent slopes (Map Unit 411A) is classified by the NRCS as "Prime farmland."
  - Waukegan silt loam, 1 to 6 percent slopes (Map Unit 411B) is classified by the NRCS as "Prime farmland."
- ii. Plans. Describe planned land use as identified in comprehensive plan (if available) and any other applicable plan for land use, water, or resources management by a local, regional, state, or federal agency.

According to the Hastings Development Staging Plan of 2040 Comprehensive Plan (Page 4-45), the site is identified as low residential development and park.

The City of Hastings 2040 Comprehensive Plan outlines a strategic framework for the city's development over the next two decades. One of the primary goals of this housing initiative is to address the need for affordable housing options. The city recognizes the importance of accommodating various housing styles and densities to cater to the changing demographics of households.

Given the anticipation of regional growth and the city's responsibility to accommodate its share of this growth, additional residential development is expected up to the year 2040. To ensure successful integration of these developments, the city aims to establish zoning regulations to offer a diverse range of housing options.

The proposed project aims to diversify the housing options within the subject property. This diversification includes the creation of various housing types such as apartments, duplex houses, single-family homes, and senior homes. While Hastings traditionally has predominantly consisted of single-family, detached homes, recent years have witnessed the introduction of more diverse housing options. This diversification has been welcomed as it offers additional choices for the city's residents.

The proposed project aligns with the 2040 comprehensive plan and its goals.

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

The property has been zoned A- Agriculture from the Marshan Township (2023). Neighboring properties are currently zoned as A- Agriculture, R-1 Low Density Residence and R-2 Medium Density Residence. The proposed project is consistent with the adjacent land zone classifications.

The project site is located outside of the 100-year and 500-year floodplains and outside of the shoreland district. The closest wild and Scenic River is the Mississippi River, located 3.6 miles north of the project site.

Project proposers would like to donate the Northeast portion of the site to the MNDNR as a preserve, but it is not currently designated as a critical area or preserve. No critical areas as defined by Minn. Stat., §116G nor agricultural preserves are located within a one (1) mile radius of the project site.

- 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.

No work is proposed within the 100-year or 500-year floodplain.

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

The project site is located adjacent to similar zones, as discussed in section iii, above. The proposed project is compatible with nearby land uses and zoning. The site is zone as A- Agriculture by the City of Hastings.

Similar potential environmental effects are associated with the existing and future uses. Non-significant increases in well water use (Section 11. a. ii), sanitary sewer use (Section 11. b. ii. 1.), air emissions (Section 16) and traffic (Section 18) may result from the proposed project, which are discussed below.

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

The property will require re-zoning due to its current classification as A- Agriculture.

#### **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.

According to the Minnesota Geological Survey Dakota County Map series (1990), depth to underlying bedrock ranges from 50 – 350 feet below the ground surface. The shallowest areas of the bedrock is present in the northern portions of the site. The uppermost bedrock present at the site is Prairie du Chien group and Jordan Sandstone. The Prairie du Chien group is characterized as a dolostone with thinly bedded layers in the upper formation (Shakopee) and massive to thickly bedded layers in the lower formation (Oneota). **Figure 6** shows the geology of the project area.

Surficial geology of the site is characterized as the New Ulm Formation outwash (gravelly sand) and postglacial floodplain alluvium in the northeastern corner. The surface topography within the project limits is described as relatively flat within the area of potential development. In this area, there is a topographic change of less than 10 feet, according to the 2-foot LiDAR Topography for the area (**Figure 7**). To the west, outside of the development area, there is a steep elevation drop from 830 to 750.

A small area in the northeastern portion of the site is designated as an area prone to the development of surficial karst features, shown in **Figure 8**. These mapped areas include locations where karst features can form on the land surface and where karst conditions are present in the subsurface. This feature is located outside of the area of proposed development and because it is located approximately 75-feet lower in elevation than the development site, it is not expected to be influenced by the proposed project. No known karst features (sinkholes, stream sinks, etc.) have been documented within 1000 feet of the site.

- 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.

According to the Minnesota Geological Survey Dakota County Map series (1990), depth to underlying bedrock ranges from 50 – 350 feet below the ground surface. The shallowest areas of the bedrock is present in the northern portions of the site. The uppermost bedrock present at the site is Prairie du Chien. A review of the NRCS Web Soil Survey indicates that most of the site is comprised of silt loam (Figure 5). Soils throughout the project area are mapped as Mollisols, typical to this region of the state.

The portion of the site that will be graded for construction does not contain steep slopes or areas of high erosion potential. Steeper slopes are located in the Northeast portion of the site, but there will be no earth work in this part of the site.

The depth to groundwater ranges from 0 to 50 feet below ground surface. The lowlying northeastern portion of the site has the shallowest groundwater, whereas the western portion of the site (with high elevation) exhibits deeper groundwater. Table 6 summarizes the soil types and texture for those series mapped within the project limits.

Soil Map Unit	Soil Name
1030	Pits, sand and gravel
1815	Zumbro loamy fine sand
411A	Waukegan silt loam, 0 to 1 percent slopes
411B	Waukegan silt loam, 1 to 6 percent slopes
495	Zumbro fine sandy loam
611F	Hawick loamy sand, 20 to 40 percent slopes
7A	Hubbard loamy sand, 0 to 1 percent slopes
7C	Hubbard loamy sand, 6 to 12 percent slopes

Site elevations range from 840 feet above mean sea level (msl) at the western boundary of the site to 780-750 msl in the eastern portion of the site within the preserve area. The project will grade and reshape the majority of the land, except the northwestern portion, to as part of the land development. No disturbance is proposed in the steeply sloped area. Erosion and sediment control related to stormwater runoff is addressed below in Section 11. b. ii.

There are no soil limitations to address. The Soil Survey was reviewed and none of the soils on site are mapped as highly erodible. Erosion control measures will be used during construction to minimize surface erosion and areas of soil disturbance will be revegetated and managed for erosion and weed control. The project will result in a residential development, which will provide long-term erosion control through development of vegetated lawns and landscaping. Treatment for stormwater runoff is discussed in greater detail in section 12.b.ii below.

- NOTE: For silica sand projects, the EAW must include a hydrogeologic investigation assessing the potential groundwater and surface water effects and geologic conditions that could create an increased risk of potentially significant effects on groundwater and surface water. Descriptions of water resources and potential effects from the project in EAW Item 12 must be consistent with the geology, soils and topography/land forms and potential effects described in EAW Item 11.

## 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.

### Watersheds

As defined by the MNDNR, the project area is located within the Mississippi River – Lake Pepin (#38) major watershed, and unnamed DNR Minor Watershed #38028. The project is located within the Vermillion River Watershed Joint Powers Organization.

### Public Waters

The MnDNR public waters dataset was used to identify surface waters within or nearby the project area. The review identified Unnamed Creek (M-049-000.8), as a MnDNR public water within the Project area. The proposed Project boundary includes a portion of Unnamed Creek (M-049-000.8), however the creek is located in the portion of the Project proposed for preservation, and will not be impacted. No other MnDNR public waters are located within a 1-mile radius of the Project. Unnamed Creek (M-049-000.8) flows north to its confluence with the Vermillion River (M-049) at Bullfrog Lake (a designated MnDNR public water wetland). Vermillion River flows east to its confluence with the Mississippi River, approximately 3.5 miles east of the Project area.

Public waters within or adjacent to the project area are shown in **Figure 9**.

### MPCA 303d Impaired Waters

There are no MPCA 303d Impaired Waters within one mile of the Project area.

### MPCA Exceptional Aquatic Life Use Waters or Outstanding Resource Value Waters

There are no MPCA Exceptional Aquatic Life Use Waters or Outstanding Resource Value Waters within a 1-mile radius of the Project area. The St. Croix River is a Outstanding Resource Value Water and is located approximately 3.1 miles north of the Project area, near its confluence with the Mississippi River. No impacts to the St. Croix River will result from the Project.

### Floodway/Floodplain

The Federal Emergency Management Agency (FEMA) National Flood Hazard Layer (NFHL) dataset was used to identify regulated floodways or floodplains located in or adjacent to the Project area. The portion of the Mississippi River adjacent to the Project area is designated as a 100-year Floodplain (**Figure 9**). The Mississippi River is located more than three (3) miles from the Project area; no impacts to the floodplain will result from the Project.

### Wetlands

**Figure 10** depicts wetlands in the Project area mapped by the USFWS National Wetlands Inventory (NWI). No wetlands are present within the Project boundary.

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

#### Groundwater

Regional groundwater flows into the Mississippi River. The depth to groundwater ranges from 0 to 50 feet below ground surface.

#### Water Wells

A review of the Minnesota Well Index identified several wells nearby the proposed project corridor. No wells are located within proposed Project boundary as shown in **Figure 11**.

Wells adjacent to the Project are summarized in **Table 7** below.

**Table 7 - Wells adjacent to the Project**

<b>Unique Well No.</b>	<b>Well Address or Approximate Location</b>	<b>Well Depth (feet)</b>
00821154	17150 Red Wing Blvd	500
00579627	17162 Red Wing Blvd	350
00243739	Martin Ave & Michael Ln	151

The Minnesota Well Index does not represent all wells in the state, but it is the single most complete listing of state wells. If any unused or unsealed wells are discovered in the project area during the design process or construction, they would be addressed following Minnesota Rules, Chapter 4725.

#### Wellhead Protection Areas

Wellhead Protection Areas (WHPAs) are areas around a public water supply well that contribute groundwater to the well. Contamination of water or the land surface in these areas can affect the drinking water supply provided by the well. The purpose of a WHPA is to protect the surface and subsurface area surrounding a public water supply from contaminants entering the drinking water supply.

The Minnesota Department of Health's (MDH) WHPA database was reviewed to identify WHPAs in or near the project corridor. The boundary of the Hastings WHPA is located approximately 300 feet northwest of the Project area.

#### Drinking Water Supply Management Areas

Drinking Water Supply Management Areas (DWSMAs) are areas containing the wellhead protection area. The boundary of the Hastings DWSMA is located approximately 100 feet northwest of the Project area. The Hastings DWSMA is managed in the City of Hastings' Wellhead Protection Plan. The project would meet requirements of the City of Hastings' MS4 permits. Four (4) stormwater infiltration BMPs are proposed adjacent to the DWSMA. During final design, further study would be conducted to determine if infiltration can be safely implemented in accordance with the standards of the DWSMA.

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

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

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

Wastewater from the Project would be discharged to a publicly owned treatment facility (the wastewater treatment facility in Hastings). Wastewater would consist of domestic wastewater typical for residential developments. No pretreatment measures would be necessary. The City of Hastings will review the Project's needs during the Building Permit process.

A new wastewater treatment facility is being constructed to better serve the City.

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.

The Project would result in the conversion of approximately 19.45 acres of cropland to impervious surface (see Item 8, Table 4). As discussed in Item 8, the curvilinear plat design was selected, which results in 45% less lineal feet of public roads, 300% more 8-foot wide trail, 24% less street paving (including public roads and private lanes serving the townhomes), and 57% less sidewalk than the “conventional” plat design.

The Project will be designed to manage runoff and discharge and thereby avoid soil erosion and sedimentation. Four (4) stormwater ponds are planned for the project, which would provide catchment to stormwater runoff. Ponds will be designed based on City (City Ordinance 152) and MPCA standards during preliminary plat design.

The Project will disturb more than one (1) acre of land and therefore will require a National Pollutant Discharge Elimination System (NPDES) Construction Stormwater General Permit from the MPCA. Construction of the Project will require the utilization of best management practices (BMPs) to prevent erosion and sedimentation. BMPs proposed for the Project will be described in the Stormwater Pollution Prevention Plan (SWPPP), which will be submitted to the MPCA for review. The grading and erosion control plans for the Project will be reviewed as part of the City of Hasting’s building permit process.

- iii. Water appropriation - Describe if the project proposes to appropriate surface or groundwater (including dewatering). Describe the source, quantity, duration, use and purpose of the water use and if a DNR water appropriation permit is required. Describe any well abandonment. If connecting to an existing municipal water supply, identify the wells to be used as a water source and any effects on, or required expansion of, municipal water infrastructure. Discuss environmental effects from water appropriation, including an assessment of the water resources available for appropriation. Discuss how the proposed water use is resilient in the event of changes in total precipitation, large precipitation events, drought, increased temperatures, variable surface water flows and elevations, and longer growing seasons. Identify any measures to avoid, minimize, or mitigate environmental effects from the water appropriation. Describe contingency plans should the appropriation volume increase beyond infrastructure capacity or water supply for the project diminish in quantity or quality, such as reuse of water, connections with another water source, or emergency connections.

Not applicable

- 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.



There are no wetlands in the Project area, therefore no impacts to wetland will result.

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

The proposed Project boundary includes a portion of Unnamed Creek (M-049-000.8); however, the creek is located in the portion of the Project proposed for preservation, and will not be impacted.

**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 query of the Minnesota Pollution Control Agency’s (MPCA) “What’s in my Neighborhood” online database (<https://www.pca.state.mn.us/data/whats-my-neighborhood> - accessed August 2023) identified two (2) active sites within 0.5 miles of the Project (Table 8). Both active sites are construction stormwater features.

Table 8 – What’s in my Neighborhood Query Results

Site ID / MPCA ID	Status	Activity
130657 / C00030944	Active	Construction Stormwater
150944 / C00039885	Active	Construction Stormwater

The project does not expect to encounter contaminants during construction. If contaminated soil is encountered the state duty officer would be contacted immediately.

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

Construction wastes are anticipated to be typical of residential developments and would be managed as municipal solid waste (MSW) or construction / demolition debris. Regulated solid wastes generated by construction would be handled and disposed of in a permitted,

licensed solid waste facility or a similarly regulated facility following applicable local, state, and federal regulations. The contractor would be required to manage and dispose of all construction-generated waste 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.

The EPA estimates the total generation of municipal solid waste (MSW) in the United States in 2018 was 4.9 pounds per person per day. The 4.9 pounds per person per day was used as a waste generation rate, for the purposes of estimating waste generation related to the Project. The total number of residents for the 511 housing units, is 1,022 people. An estimated 829 tons of municipal solid waste will be generated by residents of the Project. The collection of MSW would be managed by a licensed waste hauler. The Project would adhere to all MPCA requirements and other regulations 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.

Fuel and lubricants necessary for construction equipment during construction would be present in the proposed Project area. These materials would be used during active construction only, and the contractor would be required to abide by the Pollution Prevention Management Measures (Part IV.F.2) of the NPDES Construction Stormwater Permit. No other toxic or hazardous materials would be present. All toxic or hazardous materials would be removed from the project corridor upon completion of construction. If a spill occurs, appropriate action to remediate would be taken immediately in accordance with the MPCA guidelines and regulations.

No permanent above- or below-ground fuel storage tanks are planned for use in conjunction with this project. Temporary fuel storage tanks would be positioned in the project corridor for construction equipment during construction. Appropriate measures would be taken to avoid leaks and/or spills. If a leak or spill occurs, appropriate action to remediate the leak or spill would be taken immediately in accordance with MPCA guidelines and 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

The Project is not anticipated to generate or require to the storage of hazardous waste during construction. During operations, the Project may generate or require storage of hazardous water, typical for residential developments.

**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 in the Oak Savanna (222Me) ecological subsection of the Minnesota & NE Iowa Morainal (222M) ecological section, within the Eastern Broadleaf Forest ecological province. Prior to settlement, the vegetation in the Oak Savanna ecological subsection was comprised of burr oak, with areas of tallgrass prairie and maple-basswood forest. Presently, most of this ecological subsection has been converted to farmland. The Project area is primarily comprised of existing farmland, with a portion of wooded / forested bluff in the northeast portion.

The Hastings Sand Coulee Scientific and Natural Area (SNA) is located directly north of the Project area. The SNA is named after the Hastings Sand Coulee, a 2.5 mile-long valley once occupied by a glacial stream that now supports the most significant dry prairie in Dakota County. The SNA is home to many rare species, including plants such as James' polanisia, sea-beach needlegrass, and clasping milkweed, and animals such as the regal fritillary butterfly, Ottoa skipper, gopher snake, blue racer and loggerhead shrike. The Hastings Wildlife Management Area (WMA) is directly adjacent to the SNA, and located north of the Project area. The WMA is managed to provide habitat for grassland species, pheasants, and turkey. The Gores Pool #3 WMA is also located approximately 2 miles northeast of the Project. This WMA consists entirely of Mississippi and Vermillion River Flood Plain Forest and backwater marshes. This WMA is managed to provide habitat for forest song birds, furbearers, grassland species, wetland species, migratory waterfowl, raptors, deer, and turkey.

A MnDNR public water course runs through the Project area. Unnamed Creek (M-049-000.8), however the creek is located in the portion of the Project proposed for preservation, and will not be impacted. Unnamed Creek (M-049-000.8) flows north to its confluence with the Vermillion River (M-049). According to the MnDNR, the Vermillion River is the largest stream in Dakota County. A portion of the Vermillion River upstream of the Project area, is a designated trout stream and sustains populations of brown trout and rainbow trout.

The project area is located within the Mississippi Flyway, which is the most heavily used migration corridor for waterfowl and other migratory birds. Approximately 40% of North America's waterfowl and shorebirds, an estimated 760,000 dabbling ducks, use this corridor. The Vermillion Bottoms – Lower Cannon River Important Bird Area (IBA), Mississippi River Twin Cities IBA, and St. Croix Lake IBA are located directly north of the project area. The three (3) IBAs are located at the junction of the St. Croix and the Mississippi rivers are a critical migratory corridor for waterfowl, forest songbirds, raptors, and waterbirds. The Vermillion Bottoms – Lower Cannon River IBA is one (1) of the top four (4) sites in Minnesota for rare forest birds, and highest numbers of two (2) special concern bird species in southeast Minnesota: red-shouldered hawks and cerulean warblers. It also provides important nesting and/or migratory habitat for peregrine falcons, bald eagles, and Acadian flycatchers, and includes a bald eagle winter roost site and two (2) colonial nesting sites for great blue herons and great egrets.

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

### MnDNR Consultation & State-Listed Species

A request for a Natural Heritage Review was submitted through the Minnesota Conservation Explorer. The Review was received on May 10th, 2023, as Correspondence # MCE 2023-00044. The Review identified one (1) state-listed plant species within the vicinity of the project area: *Lechea tenuifolia* – Narrow-leaved Pinweed – State Endangered. A field survey for listed species was August 4th, 2023, by John Thayer. An intuitive meander methodology was utilized while covering as much of the survey area as possible. When unique and/or potential habitats were located, these habitats were thoroughly searched.

A total of 93 vascular plant species were noted during the survey. One state-listed plant species was observed: *Polanisia jamesii* – James’ Polanisia – State Endangered (**Table 9**). James’ polanisia is a distinctive plant that is readily identifiable by its small white flowers that have two erect and fringed petals that are broader than the rest, leaves that are divided into three narrow leaflets, and the presence of odorous glandular hairs on the leaves and stems. A census of James’ polanisia was completed. 82 individuals were counted. The population was restricted to a sloped segment of ATV trail along which sandy soil had been exposed and eroded and was, apart from the presence of James’ polanisia, mostly unvegetated.

**Table 9. State-Listed Species**

Species	Status	Habitat
James’ Polanisia ( <i>Polanisia jamesii</i> )	Endangered	Occurs on sandy or sandy-gravelly soil in dry open setting with sand prairie species. Found on post-glacial stream deposits, in coulees or small valleys.

### Federally-Listed Species

According to a planning-level query of the U.S. Fish and Wildlife Service (USFWS) Information, Planning, and Consultation System (IPaC) requested August 25, 2023, the project area is within the distribution range of federally-listed species. These include the endangered northern long-eared bat (*Myotis septentrionalis*), the proposed endangered tricolored bat (*Perimyotis subflavus*), an experimental population of whooping crane (*Grus americana*), the endangered rusty patched bumble bee (*Bombus affinis*), and the candidate monarch butterfly (*Danaus plexippus*) as summarized in **Table 10** below.

**Table 10. Federally-Listed Species**

Species	Status	Habitat
Northern Long-eared Bat ( <i>Myotis septentrionalis</i> ),	Endangered	Roosts trees in forests during active season from April through October. Hibernate in caves and mines October through April.
Tricolored Bat ( <i>Perimyotis subflavus</i> ).	Proposed Endangered	Roosts trees in forests during active season from April through October. Hibernate in caves and mines October through April.
Whooping Crane ( <i>Grus americana</i> )	Experimental Population	The whooping crane breeds, migrates, winters, and forages in a variety of wetland habitats.
Rusty Patched Bumble Bee ( <i>Bombus affinis</i> )	Endangered	Nest in abandoned rodents nests or mammal burrows in upland grasslands and shrublands during the summer and fall. Overwinter in upland forest and woodlands.
Monarch Butterfly ( <i>Danaus plexippus</i> )	Candidate	Grassland/prairie habitat where milkweeds ( <i>Asclepias</i> spp.) and other forbs are present.

There are no known occurrences of northern long-eared bat or tricolored bat roosts or hibernacula within or adjacent to the Project.

IPaC did not identify any mapped critical habitat within or adjacent to the Project.

#### Native Plant Communities & Minnesota Biological Survey Sites of Biodiversity Significance

The Minnesota DNR Native Plant Community (NPC) data layer identified a Dry Sand – Gravel Prairie (Ups13b) NPC within and adjacent to the Project area. This NPC overlaps the Marshan 11 North SBS, which is ranked as outstanding. However, these areas are not proposed for impact and instead are proposed for preservation.

#### Calcareous Fens

The nearest known calcareous fen is Kelleher Park, located over 20 miles west of the Project.

#### DNR Old Growth Stands

Old-growth forests are natural forests that have developed over a long period of time, generally at least 120 years, without experiencing severe, stand-replacing disturbances such as fires, windstorms, or logging. The nearest old-growth forests is located over 12 miles southeast of the Project.

#### Minnesota Prairie Conservation Plan

The Minnesota Prairie Conservation Plan, a 25-year strategy for accelerating prairie conservation in the state, identifies Core Areas, Corridors, and Corridor Complexes as areas to focus conservation efforts. No Core Areas, Corridors, or Corridor Complexes were identified in the vicinity of Project.

#### Lakes of Biological Significance

Lakes of Biological Significance are high quality lakes as determined by the aquatic plant, fish, bird, or amphibian communities present within the lake. The Mississippi River U.S. Lock & Dam #2 Pool, Mississippi River U.S. Lock & Dam #3 Pool, the Mississippi River – North, and the St. Croix River – Stillwater/Prescott are Lakes of Biological Significance located within a five (5) mile radius of the Project.

- c. Discuss how the identified fish, wildlife, plant communities, rare features and ecosystems may be affected by the project including how current Minnesota climate trends and anticipated climate change in the general location of the project may influence the effects. Include a discussion on introduction and spread of invasive species from the project construction and operation. Separately discuss effects to known threatened and endangered species.

#### Vegetation

Much of the proposed Project area has been previously converted to agriculture or impacted by agriculture. Approximately 11 acres of woodland / forest and 49 acres of cropland would be directly converted to developed area. Areas of grassland would increase from approximately 12 acres to 18 acres as a result of the Project. Temporary construction-related impacts would also be anticipated to occur, and temporary staging areas could impact native vegetation depending on location and duration. Soil disturbances during construction may provide conditions suitable for infestations nonnative and/or invasive plant species.

#### Fish and Wildlife

Although much of the proposed Project spans areas that have been converted to agriculture or impacted by agriculture, it would introduce motorized traffic and other roadway activities into wildlife habitats contributing to habit fragmentation. This could degrade wildlife and fish habitat through soil disturbance and sedimentation, vegetation clearing, noise and light pollution from

motorists, and the introduction of invasive plant species. The project would increase impervious surface in the project area thereby increasing runoff which could impact fish and other aquatic species if not properly treated.

#### Rare Features/Habitats

Invasive plant species could be spread along roadways, expanding their populations and seedbank across the landscape, thereby increasing the likelihood of infestation elsewhere.

#### State-Listed Species

Minnesota's populations of James' Polania are disjunct from its primary range in the south central Great Plains, west of the Mississippi River where it grows on dry, sand prairies. In the Upper Midwest it is rare, restricted to sandy or gravelly prairies and slopes near the Mississippi River. They also risk being dislodged and killed by normal natural erosion on the unstable slopes and sandy places where they occur.

An immediate threat is encroachment by woody plants or taller more aggressive plants that can either shade or crowd out this small species. Wildfires and the action of wind probably kept its sand prairie habitat more open in the past. Residential development limits the possibility of using fire, but hand removal of brush is still a viable management activity that could help spare this plant from further decline.

#### Climate Trends:

Over the upcoming decades, Minnesota's climate is expected to undergo changes, marked by a consistent rise in both average temperatures and precipitation per decade. Given the current scarcity of wildlife habitat in the project area, it is predicted that the effects of climate change on any potentially existing species at the site in the future will likely be minimal or non-existent within the scope of the proposed project. The broader regional climate changes outlined in Section 7, such as altered precipitation patterns and higher temperatures, are anticipated to impact wildlife on a larger scale across their ranges, manifesting with varying degrees of severity.

- 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.

#### Vegetation

Ground disturbance associated with construction would be minimized to the greatest extent practicable. This would include limiting the size of construction staging areas and access routes. Construction staging can be located within agricultural fields to avoid impacts to native vegetation. Re-grading and the re-establishment of appropriate vegetation would be completed post construction. Areas not proposed for turf vegetation would be seeded with an appropriate native seed mix.

#### Fish and Wildlife

Wildlife habitat fragmentation would be mitigated by minimizing vegetation clearing. Tree clearing would occur between November 15<sup>th</sup> to March 31<sup>st</sup>.

See item 12 for details regarding the proposed permanent stormwater treatment solutions to mitigate potential impacts from runoff from impervious surface. Erosion control products with plastic fiber additives would not be utilized in areas connected to Public Waters.

Work Exclusion Dates recognized by the MPCA NDPEs general permit for authorization of



discharge stormwater associated with construction activities (Permit MN R10001) for MnDNR “work in water restrictions” during specified fish migration and spawning timeframes for areas adjacent to water. During the restriction period, all exposed soil areas that are within 200 feet of the water’s edge and drain to these waters must have erosion prevention stabilization activities initiated immediately after construction activity has ceased and be completed within 24 hours. The restriction dates for non-trout streams, i.e., Unnamed Creek (M-049-000.8), in the project area are March 15<sup>th</sup> through June 15<sup>th</sup>.

#### Federally-Listed Species

Tree clearing would be restricted to between November 15<sup>th</sup> and March 31<sup>st</sup> to not coincide with the active season of the northern long-eared bat and the tricolored bat. Trees would be inspected for raptor “stick-nests” prior to cutting and removal.

#### State-Listed Species

The project has potential to impact James' Polansia through direct impact and habitat disturbance or destruction through fill, excavation, and general construction. 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. If any incidental take of state-listed species is planned, an application for a permit for the take of endangered or threatened species incidental to a development project must be submitted. A permit will be considered only when the proposal provides convincing justification that all alternatives have been considered and rejected, and that take is unavoidable.

### **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.

#### MN Office of the State Archeologist Portal Review

A review of publicly available data from the Office of the State Archeologist (OSA) Portal identified one (1) archaeology site within the same section as the project area. This EAW will be filed with the Minnesota Environmental Quality Board (MEQB) and circulated to the required MEQB distribution list, which includes the OSA, for review and comment. Any comments received from the OSA would be disclosed in the project’s Findings of Fact and Conclusions document.

#### MN State Historic Preservation Office

As part of the early coordination efforts for the Project, the MN State Historic Preservation (SHPO) was consulted (SHPO Number 2023-0826). SHPO recommended, but did not require, a Phase 1a literature review and archaeological assessment to be completed.

#### National Register of Historic Places

A query of the properties listed in the National Register of Historic Places identified several historic properties in Dakota County, 17 in the City of Hastings. The Ramsey Mill and Old Mill Park is the closest historic property to the Project, and is located approximately 2.3 miles away. No adverse effects to the Ramsey Mill and Old Mill Park or any other historic properties will result from the proposed Project.

**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.

No scenic views or vistas are located on or near the Project. The Project will not create vapor plumes or glare from intense lights. The Project is a proposed residential development, and would be consistent with the surrounding residential area. Landscaping will be included with the Project and may contribute to the overall visual aesthetics. Plans for the installation of street lighting will be reviewed as part of the building permit review process.

**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 would not construct/introduce stationary emission sources.

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

The project is not located in an area in where conformity requirements apply. Traffic generated by the Project is not anticipated to result in air quality impacts. There will be an increase in vehicle trips associated with the Project (as addressed in Item 20), however this is not anticipated to lead to a high concentration of air pollutants.

Construction-related vehicle emissions may arise from the use of equipment. These emissions are anticipated to be minor and temporary in nature. Therefore, no further air quality analysis is necessary.

- 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 would generate odors during construction. These include exhaust from diesel and gasoline engines and fuel storage. Odor generation during construction would be temporary and sporadic in location and duration.

Dust generated during construction would be minimized through standard dust control measures such as applying water to exposed soils and limiting the extent and duration of exposed soil conditions. Construction contractors would be required to control dust and other airborne particulates in accordance with applicable governmental specifications. Dust would be



visually monitored and recorded with NPDES Construction Stormwater Permit inspections. The post-construction dust levels are anticipated to be minimal as all exposed soil surfaces would be paved or re-vegetated.

## 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.

GHG emissions related to the Project were calculated using emission factors and consumption data<sup>5</sup> from the Environmental Protection Agency (EPA). Table 11, below show the shows the emission categories for project carbon footprint calculations, as provided in the EQB Guidance.

Table 11 - Emission Categories for GHG Assessment				
Emission Category	Scope	Project Phase	Type of Emission	Estimated GHG Emissions per year (metric ton of CO <sub>2</sub> e)
Direct	Scope 1	Construction	Combustion (Mobile and Stationary Sources)	1,238.2
Direct	Scope 1	Construction	Land-Use Conversion	56.5
Direct	Scope 1	Operations	Combustion – Mobile Sources	2,432.7
Direct	Scope 1	Operations	Combustion – Natural Gas	166.9
Indirect	Scope 2	Operations	Electricity	1952.0
Indirect	Scope 3	Operations	Waste Management	575.8
<b>Total</b>				<b>6,422.1</b>

### Construction Emissions

Construction emissions are associated with fuel combustion from mobile vehicles and stationary construction equipment. According to the plans, construction will begin in spring 2024, with Phase 1 infrastructure (i.e., grading and roadway construction) completed by Fall 2024. Individual housing units (Phase 2) are expected to be developed over a five (5) year period. For this assessment, construction GHG emissions included:

- On-road vehicle emissions (dump trucks, semi-trucks, commuting construction workers, etc.)
- Off-road vehicle emissions (earthmoving equipment such as excavators, loaders, cranes, etc.)

Operation of on-road vehicles for Phase 1 is estimated to consist of 20 passenger cars per day, 20 dump trucks per day, and 20 semi-trucks per day. For the purposes of this assessment, Phase 1 construction is assumed to be ongoing May 1 through August 31, 2024, or 120 days. While the number of construction days may ultimately be less than the maximum of 120 days due to weather or other site conditions, this was the number of days used for this GHG assessment to consider the maximum emissions generated from the proposed Project. On-road vehicles are estimated to travel 30 miles per day. Emission factors are based on Table 2, 3, and 4 of the EPA's Emission Factors Hub<sup>6</sup>. An assumed vehicle year of 2007 was used for gas mileage efficiency. Carbon emissions related to the on-road vehicle emissions is estimated to be 252.4 metric tons.

<sup>5</sup> [ce2.3.pdf \(eia.gov\)](#)

<sup>6</sup> [Emission Factors for Greenhouse Gas Inventories \(epa.gov\)](#)

**Table 12 - On-road vehicle Emissions**

Construction Emissions – Mobile Sources								Emission Factors			Annual Emissions			
On-road Vehicle	Veh / Day	Fuel Type	Days	Miles / Day	Miles	Miles / Gal	Est. Gals	CO <sub>2</sub> (kg/gal)	CH <sub>4</sub> (g/mile)	N <sub>2</sub> O (g/mile)	CO <sub>2</sub> (MT)	CH <sub>4</sub> (MT)	N <sub>2</sub> O (MT)	CO <sub>2</sub> e <sup>2</sup> (MT)
Passenger Cars - Workers	20	Gas	120	30	72000	18	4000.0	8.78	0.0072	0.0052	35.1	5.18E-04	3.74E-04	35.2
Dump trucks	20	Diesel	120	30	72000	7.6	9473.7	10.21	0.0095	0.0431	96.7	6.84E-04	3.10E-03	97.7
Semi-trucks	20	Diesel	120	30	72000	6.2	11612.9	10.21	0.0095	0.0431	118.6	6.84E-04	3.10E-03	119.5
Total														252.4

Off-road vehicle emissions include those generated by construction equipment that will remain on the Project site for the duration of construction. There are potential differences in the specific equipment utilized based on the contractor selected to complete the work. For the purposes of this assessment, it is assumed that six (6) diesel-powered off-road construction vehicles (2 earthmovers, 3 excavators, 1 skid steer), would be in operation during the construction period. The default diesel fuel consumption rate of 0.05 gallons per horsepower-hour<sup>7</sup> is used to determine the fuel usage for all equipment. Construction is assumed to be ongoing from 7:00 am to 10:00 pm during this time (i.e., 15 hours per day), resulting in a total of 1,800 hours total. Emission factors are based on Table 2 and 5 of the EPA's Emission Factors Hub<sup>8</sup>. According to this GHG assessment for the Project, carbon emissions related to the off-road vehicle emissions is estimated to be 982.8 metric tons.

**Table 13 - Off-road vehicle Emissions**

Construction Emissions – Stationary Sources						Emission Factors			Annual Emissions			
Off-road Equipment	No. Vehicles	Consumption Rate (gal / hr per hp-hr)	Engine Size (hp)	Hours	Total gals	CO <sub>2</sub> (kg/gal)	CH <sub>4</sub> (g/gal)	N <sub>2</sub> O (g/gal)	CO <sub>2</sub> (MT)	CH <sub>4</sub> (MT)	N <sub>2</sub> O (MT)	CO <sub>2</sub> e <sup>2</sup> (MT)
Loader / Bulldozer	2	0.05	125	1800	22,500	10.21	0.91	0.56	229.73	2.05E-02	1.26E-02	234.0
Excavator	3	0.05	250	1800	67,500	10.21	0.91	0.56	689.18	6.14E-02	3.78E-02	702.0
Skid Steer	1	0.05	50	1800	4,500	10.21	0.91	0.56	45.95	4.10E-03	2.52E-03	46.8
Total												982.8

For the Phase 1 of the Project, the total estimated emissions are **1,238.2 metric tons of CO<sub>2</sub>e per year** for the on-road and off-road mobile sources. Phase 2 will construct the proposed housing units over the course of five (5) years. For the purposes of this assessment, estimates for Phase 1 are assumed to be similar to those for each year of Phase 2. The estimate of 1,238.2 metric tons of CO<sub>2</sub>e, is extrapolated for the subsequent five (5) years, to total 7,411.2 metric tons of CO<sub>2</sub>e for construction of the complete project. Over the Project lifetime, the total construction emissions annualized over 50 years equates to 148.2 metric tons per year.

There is also an annual GHG emission attributable to land use conversion due to the loss of the GHG sink capacity of the existing grassland, cropland, and forest. Acres of pre-project land use type are compared with post-project land use type, to determine the acres lost with carbon sequestration

<sup>7</sup> [Microsoft Word - Guidelines for Calculating Emissions from Internal Combustion Engines - March 2023 - FINAL.docx \(aqmd.gov\)](#)

<sup>8</sup> [Emission Factors for Greenhouse Gas Inventories \(epa.gov\)](#)

potentials. There are not readily available carbon sequestration rates for land use types, so a best-case scenario sequestration rate of 2.6 metric tons of carbon dioxide per acre per year was utilized for the purposes of this assessment. This sequestration rate is based on forested community types; actual sequestration rates for grassland, cropland, and lawn/landscaping are likely much lower. The total loss of carbon sequestration resulting from the Project is **56.5 metric tons per year**.

Table 14 - Loss of Carbon Sequestration

Land Use	Pre-project Acres	Post-project Acres	Acres lost with carbon sequestration potential
Wooded/Forest	11.06	0	11.06
Brush Grassland	11.58	17.54	-5.96
Cropland	48.46	0	48.46
Lawn/Landscaping	0	31.85	-31.85
Impervious Surface	0	19.45	0
Stormwater Pond	0	2.25	0
<b>Total</b>	<b>71.1</b>	<b>71.1</b>	<b>21.71</b>
Best-case Scenario Sequestration Rate <sup>9</sup>			2.6 MT CO <sub>2</sub> / acre / year
Annual potential loss of sequestration			56.45 MT CO <sub>2</sub> / year

#### Operational Emissions – Mobile Sources

To estimate traffic emissions, it was assumed that there is one vehicle per household, and that each vehicle travels 12,000 miles per year<sup>10</sup>. Additionally, it is assumed that each apartment building unit receives 2 delivery trucks per day, and each single family unit receives a delivery truck every third day. Delivery trucks are estimated to travel 20 miles per day per vehicle for 365 days, equating to 7,300 miles per year.

Emissions were calculated using the estimated number of vehicles (i.e., one per household unit) and delivery trucks. It is assumed that residents drive gasoline-powered, light-duty vehicles and deliveries are made by diesel-powered, heavy-duty vehicles. An average gas mileage of 22.8 miles per gallon was used for light duty vehicles<sup>11</sup>. An average gas mileage of 7.5 miles per gallon was used for heavy-duty vehicles<sup>12</sup>. The total annual emissions generated from the Project related to mobile sources is **2,432.7 metric tons per year**. A project lifetime of 50 years equates to a total of **121,636 metric tons**.

<sup>9</sup> [Best Practices for Including Carbon Sinks in Greenhouse Gas Inventories \(epa.gov\)](#)

<sup>10</sup> [State & Urbanized Area Statistics - Our Nation's Highways - 2000 \(dot.gov\)](#)

<sup>11</sup> [Average Fuel Efficiency of U.S. Light Duty Vehicles | Bureau of Transportation Statistics \(bts.gov\)](#)

<sup>12</sup> [Table VM-1 - Highway Statistics 2019 - Policy | Federal Highway Administration \(dot.gov\)](#)

Table 15 – Traffic Emissions

Operational Emissions – Mobile Sources								Emission Factors			Annual Emissions			
On-road Vehicle Type	Veh / day	Miles / day	Miles / gal	Fuel Usage (gal / day, all veh)	Days / yr	Miles / yr	Fuel Usage (gal/yr, all vehicles)	CO <sub>2</sub> (kg/gal)	CH <sub>4</sub> (g/mile)	N <sub>2</sub> O (g/mile)	CO <sub>2</sub> (MT)	CH <sub>4</sub> (MT)	N <sub>2</sub> O (MT)	CO <sub>2</sub> e <sup>2</sup> (MT)
Gasoline Light Duty	511	32.9	22.8	737.4	365	12,000	269,137.9	8.78	0.0072	0.0049	2363	8.64E-05	5.88E-05	2363.1
Diesel Heavy Duty	7	20	7.5	18.7	365	7,300	6,815	10.21	0.0095	0.0431	69.6	6.94E-05	3.15E-04	69.67
														<b>Total</b>
														<b>2432.7</b>

#### Operational Emissions – Natural Gas

Emissions related to natural gas are based on Table 1 of the EPA's Emission Factors Hub<sup>13</sup>. Natural gas consumption was estimated using the U.S. Energy Information Administration (EIA)'s *Annual household site fuel consumption in the Midwest—totals and averages, 2020*. Natural gas consumption estimates are based on housing unit type. The total annual emissions generated from the Project related to natural gas is **166.89 metric tons per year**. A project lifetime of 50 years equates to a total of **8,344.5 metric tons**.

<sup>13</sup> [Emission Factors for Greenhouse Gas Inventories \(epa.gov\)](https://www.epa.gov/emissions-factors-and-intensity)

Table 16 – Natural Gas Emissions

Natural Gas				Emission Factors			Annual Emissions			
Housing Unit Type	No.of Units	Annual MMBtu / unit <sup>2</sup>	Annual MMBtu	CO <sub>2</sub> (kg/ MMBtu)	CH <sub>4</sub> (kg/ MMBtu)	N <sub>2</sub> O (kg/ MMBtu)	CO <sub>2</sub> (MT /yr)	CH <sub>4</sub> (MT/ yr)	N <sub>2</sub> O (MT/yr)	CO <sub>2</sub> e <sup>3</sup> (MT/yr)
Apartments 5 or more units (Apartment Units)	170	32.3	1609.2	53.06	0.001	0.0001	38.7	7.30E-04	7.30E-05	38.76
Single-family detached	55	86.6	1395.9	53.06	0.001	0.0001	33.6	6.33E-04	6.33E-05	33.62
Single-family attached (Twinhome Units)	54	66.3	1049.2	53.06	0.001	0.0001	25.2	4.76E-04	4.76E-05	25.27
Single-family attached (Townhome Units)	68	66.3	1321.3	53.06	0.001	0.0001	31.8	5.99E-04	5.99E-05	31.83
Apartments 5 or more units (Senior Units)	24	32.3	227.2	53.06	0.001	0.0001	5.5	1.03E-04	1.03E-05	5.47
Apartments 5 or more units (Active Senior Units)	60	32.3	568.0	53.06	0.001	0.0001	13.7	2.58E-04	2.58E-05	13.68
Apartments 5 or more units (Assisted Living Units)	80	32.3	757.3	53.06	0.001	0.0001	18.2	3.43E-04	3.43E-05	18.24
									<b>Total</b>	<b>166.89</b>

#### Operational Emissions – Electricity

Emissions related to electricity use are related to the generation of electricity, typically offsite. Electricity estimates were calculated using the EPA’s published emission factors (Table 6 - Electricity) for the Midwest Reliability Organization West (MROW) region. Electricity generation in the MROW region is comprised of ~50% fossil fuels (coal and natural gas), ~9% nuclear, and ~ 40% renewables (hydro, wind, and solar). Electricity consumption was estimated using the U.S. Energy Information Administration (EIA)’s *Annual household site fuel consumption in the Midwest—totals and averages, 2020*. Electricity consumption estimates are based on housing unit type. The total annual emissions generated from the Project related to electricity is **1951.97 metric tons per year**. A project lifetime of 50 years equates to a total of **97,598.5 metric tons**.

Table 17 – Electricity Emissions

Electricity				Emission Factors			Annual Emissions			
Housing Unit Type	No. of Units	Annual MMBtu / unit <sup>2</sup>	Annual MWh	CO <sub>2</sub> (lb/MWh)	CH <sub>4</sub> (lb/MWh)	N <sub>2</sub> O (lb/MWh)	CO <sub>2</sub> (MT/yr)	CH <sub>4</sub> (MT/yr)	N <sub>2</sub> O (MT/yr)	CO <sub>2</sub> e <sup>3</sup> (MT/yr)
Apartments 5 or more units (Apartment Units)	170	18.9	941.6	1239.8	0.138	0.02	529.5	0.059	0.009	533.47
Single-family detached	55	38.2	615.7	1239.8	0.138	0.02	346.2	0.039	0.006	348.84
Single-family attached (Twinhome Units)	54	27.4	433.6	1239.8	0.138	0.02	243.8	0.027	0.004	245.66
Single-family attached (Townhome Units)	68	27.4	546.1	1239.8	0.138	0.02	307.0	0.034	0.005	309.36
Apartments 5 or more units (Senior Units)	24	18.9	132.9	1239.8	0.138	0.02	74.7	0.008	0.001	75.31
Apartments 5 or more units (Active Senior Units)	60	18.9	332.3	1239.8	0.138	0.02	186.9	0.021	0.003	188.28
Apartments 5 or more units (Assisted Living Units)	80	18.9	443.1	1239.8	0.138	0.02	249.2	0.028	0.004	251.04
<b>Total</b>										<b>1951.97</b>

<sup>1</sup>EPA Emission Factors for Greenhouse Gas Inventories Table 6 (updated April 18, 2023)

[https://www.epa.gov/system/files/documents/2023-03/ghg\\_emission\\_factors\\_hub.pdf](https://www.epa.gov/system/files/documents/2023-03/ghg_emission_factors_hub.pdf)

<sup>2</sup><https://www.eia.gov/consumption/residential/data/2020/c&e/pdf/ce2.3.pdf>

<sup>3</sup>CO<sub>2</sub>e emissions calculated using Global Warming Potentials from 40 CFR Part 98 Subpart A Table A-1 (CO<sub>2</sub>e= 1\*CO<sub>2</sub>+25\*CH<sub>4</sub>+298\*N<sub>2</sub>O)

#### Operational Emissions – Waste Management

GHG emissions related to waste management include those generated from waste generation, transport of waste to landfills, landfill operations, and landfill methane emissions. The EPA estimates the total generation of municipal solid waste (MSW) in the United States in 2018 was 4.9 pounds per person per day<sup>14</sup>. The 4.9 pounds per person per day was used as a waste generation rate, for the purposes of estimating waste generation related to the Project. The total number of residents for the 511 housing units, is 1,022 people. The total annual emissions generated from the Project related to waste management is **575.8 metric tons per year**. A project lifetime of 50 years equates to a total of **28,788.6 metric tons**.

Waste Management	Annual Tons	MT CO <sub>2</sub> e / short ton <sup>1</sup>	CO <sub>2</sub> e (MT/yr)
Mixed Municipal Solid Waste	913	0.63	575.8

<sup>1</sup>EPA Emission Factors for Greenhouse Gas Inventories Table 9 (updated April 18, 2023)

[https://www.epa.gov/system/files/documents/2023-03/ghg\\_emission\\_factors\\_hub.pdf](https://www.epa.gov/system/files/documents/2023-03/ghg_emission_factors_hub.pdf)

#### b. GHG Assessment

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

Construction-related emissions will be exempt as *de minimis* and they will meet the conformity requirements under Section 176 (c) of the Clean Air Act, and 40 CFR 93.153. The project sponsor will encourage the selected contractor to reduce GHG emissions from construction, which may include minimizing idling equipment or encouraging carpooling to the site by equipment operators.

There are several design features that are planned to reduce overall energy consumption and emissions. It is the assumption that materials listed below will be used throughout the development. Every building may not have every item, but all would be covered throughout the entire development. These include:

- Use of energy efficient building materials, to reduce need for heating and cooling
- Installation of programmable thermostats
- Use of energy-efficient appliances and electronics
- Use of efficient fluorescent lighting
- Installation of roofing materials, that reflect solar energy
- Low or no VOC paints, adhesives, and solvents
- Reduce and recycle construction waste
- Preservation of natural space

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

The use of the design features listed above will help to mitigate the Project's GHG emissions. It is difficult to quantify the exact reduction in GHG emissions related to the project due to the variability in brands, models, and cost of materials that will be available when the project is constructed. Some general information on GHG reductions is provided below:

- If everyone used an ENERGY STAR programmable thermostat, 13 billion pounds of greenhouse gas emissions each year would be offset.<sup>15</sup>
- An LED light bulb that has earned the ENERGY STAR label uses up to 90% less energy than an incandescent light bulb, while providing the same illumination.<sup>1</sup>
- Energy efficient roofing lowers the amount of heat transferred to the building, which allows it to stay cooler and use less energy for air conditioning. In air-conditioned residential buildings, solar reflectance from a cool roof can reduce peak cooling demand by 11–27%.<sup>16</sup>

- 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 predicted net lifetime of the Project is anticipated to be 266,603 metric tons of CO<sub>2</sub>e, for a Project lifetime of 50 years (Note: mobile and stationary sources of combustion related to construction are divided across the 50 years, versus summed). This equates to 5,332.06 metric tons of CO<sub>2</sub>e annually. The mitigation measures discussed above will likely offset a

<sup>15</sup> [Energystar.gov](http://energystar.gov)

<sup>16</sup> Synnefa, A., M. Santamouris, and H. Akbari. 2007. [Estimating the effect of using cool coatings on energy loads and thermal comfort in residential buildings in various climatic conditions](#). *Energy and Buildings* 39, 1167–1174.

portion of these emissions, however this was not quantified. Overall, the Project is anticipated to have minimal impact on the State of Minnesota's GHG reduction goals.

## 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.

Existing noise sources include vehicle traffic along TH 316 / Red Wing Blvd, and within the City of Hastings. The proposed project corridor spans undeveloped land including forest and grassland and agricultural land. The nearest sensitive receptors include residential neighborhoods located directly north, west and southeast of the Project, and the Hope Lutheran Church, located directly east of the Project.

### Project Construction

Project construction would increase noise levels relative to existing conditions. Increases would be associated with construction equipment and therefore temporary and short in duration over the course of construction. Construction is not planned to occur outside of standard daylight working hours. The contractor would be required to comply with local ordinance requirements regarding noise.

Advanced notice would be provided to affected communities of any planned abnormally loud construction activities. High-impact equipment noise such as pavement sawing or jack-hammering would likely be required. No pile-driving would be required.

The project would conform with all applicable MnDOT and Federal Highway Administration (FHWA) noise standards.

## 20. Transportation

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

*The Institute of Transportation Engineers (ITE) Trip Generation Manual, 11<sup>th</sup> Edition*, was used to estimate the trips generated by the proposed development site. As outlined below, the following plans for both phases were used to calculate traffic impacts:

### Phase 1 (2024):

- 54 Twin home Units (ITE Land Use: Single Family Attached Housing)
- 68 Townhome Units (ITE Land Use: Single Family Attached Housing)
- 170 Apartment Units (ITE Land Use: Multifamily Housing– Mid-rise)
- 24 Senior Units (ITE Land Use: Assisted Living)
- 60 Active Senior Living Units (ITE Land Use: Senior Adult Housing (Single Family))
- 80 Assisted Living Units (ITE Land Use: Assisted Living)



Phase 2 (2029):

- 55 Single Family Homes (ITE Land Use: Single Family Detached Housing)

The proposed development is expected to generate approximately 2,709 new trips each day (180 trips in the AM peak hour (7:15 AM to 8:15 AM) and 226 trips in the PM peak hour (4:00 PM to 5:00 PM) upon full development of the area.

A total of 156 parking stalls are planned on the site to serve the mixed land uses. Currently, there is no mass transit options available directly from the development that would affect the number of trips in and out.

- 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.

The proposed development has undergone a comprehensive traffic impact study, detailed in Attachment D. The study's findings indicate that, five years after the site reaches full capacity in 2034, the generated traffic will not adversely affect the surrounding road network. All examined intersections, including both access points to the site, operate at Level of Service (LOS) A. Additionally, all approaches at each intersection maintain LOS A.

Considering the higher posted speed limit along TH 316, it is recommended to implement turn lanes at each access point. This entails dedicated left and right turn lanes at Michael Avenue and a southbound bypass lane with a dedicated right turn lane for northbound TH 316 traffic at the secondary access point.

While peak hour volumes may be similar for TH 316 and Michael Avenue, average daily volumes will likely differ from both intersections. Presently, the analysis indicates that the TH 316 and Michael Avenue intersection does not meet the volume thresholds required for the installation of roundabout control. However, ongoing discussions with MnDOT reveal that a roundabout is under consideration and will be further evaluated in the future. These discussions are ongoing.

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

Geometric improvements, including dedicated left and right turn lanes at each site access point are being proposed to help improve safety for traffic entering and exiting the proposed development site. By providing dedicated deceleration and storage distance for turning movements improves traffic operations and allows for turning traffic to find an acceptable gap in oncoming traffic while not providing additional delay to through movement traffic. Turn lanes will be required upon year of development completion and before occupancy occurs.

**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.

The geographic scale and timeframes of the project-related environmental effects that could combine with other environmental effects resulting in cumulative potential effects are limited to the resources affected by the proposed Project. The timeframe for considering potential cumulative effects would be the recent past, construction, and the duration of the ongoing use of the Project area. Past actions within the Project area primarily include the conversion of land to agriculture and the clearing of natural vegetation. The Project would convert land from agriculture to a residential development. The Project area is previously disturbed, following the conversion to agricultural land.

- 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 cumulative potential effects analysis requires that a future project be considered if it is planned or if a basis of expectation for it has been laid. MEQB guidance describes a two-part test to aid in identifying whether a future project is reasonably likely to occur and if sufficiently detailed information is available about the future project to contribute to the understanding of cumulative potential effects.

Conversion of land adjacent to the Project for development is reasonably foreseeable. The City of Hastings and the metro area continue to grow, and housing is needed to service future growth. No specific plans for development are known such that sufficiently detailed information is available to contribute to the understanding of cumulative potential effects. The project area is at the southeastern extent of the growth boundary identified in the 2040 Hastings Comprehensive Plan.

- 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.

Resource impacts identified in the above items include farmland conversion, erosion and sedimentation, water quality, habitat fragmentation, and greenhouse gas emissions.

#### Farmland Conversion

Land use in the Project area is primarily agricultural. Approximately 48 acres of prime farmland would be converted and taken out of production. As the City of Hastings grows, conversion of farmland to other land uses, including residential development is anticipated. Future farmland conversion would continue to be evaluated as part of City's planning processes.

#### Erosion and Sedimentation

Construction activities would contribute to soil erosion and sedimentation. The construction of this project is not anticipated to overlap other construction projects. Drainage and erosion control plans would be developed to meet the MPCA NPDES construction stormwater permitting process. Future development projects would also be required to comply with the MPCA NPDES construction stormwater permit program and implement applicable BMPs to control soil erosion and sedimentation. Because of these requirements, the cumulative potential environmental effects because of soil erosion and sedimentation would be anticipated to be minimal.

#### Water Quality

The project would construct approximately 19.45 acres of impervious surface in the Project area. This would result in an increase in runoff, which would be routed into stormwater basins that would provide treatment to the runoff. Treatment would meet or exceed NPDES permanent stormwater management requirements and local stormwater requirements. Any future development projects adjacent to the Project would be required to provide stormwater mitigation in accordance with any permitting requirements at the time of construction. Because of stormwater management requirements and the NPDES permitting process that are currently in place, the cumulative potential effects to water quality would be anticipated to be minimal.

#### Habitat Loss and Fragmentation and Invasive Species

The construction of the Project may contribute to habitat fragmentation. Habitat fragmentations introduces additional stressors to the biodiversity of the region that could increase the vulnerability of habitats to infestation by invasive species, contribute to the isolation of populations, and limit wildlife travel across the landscape.

#### Greenhouse Gas Emissions

Long-term emissions related to converting farmland and undeveloped land to a residential development is anticipated to result in 5,332.06 metric tons of emissions annually. The cumulative potential effect of GHGs would be anticipated to increase as the City of Hastings grows and nearby land is converted from farmland and undeveloped land thereby removing potential carbon sinks from the landscape.

- 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.

There are no known or potential environmental effects that were not addressed in the above EAW items.

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

**I hereby certify that:**

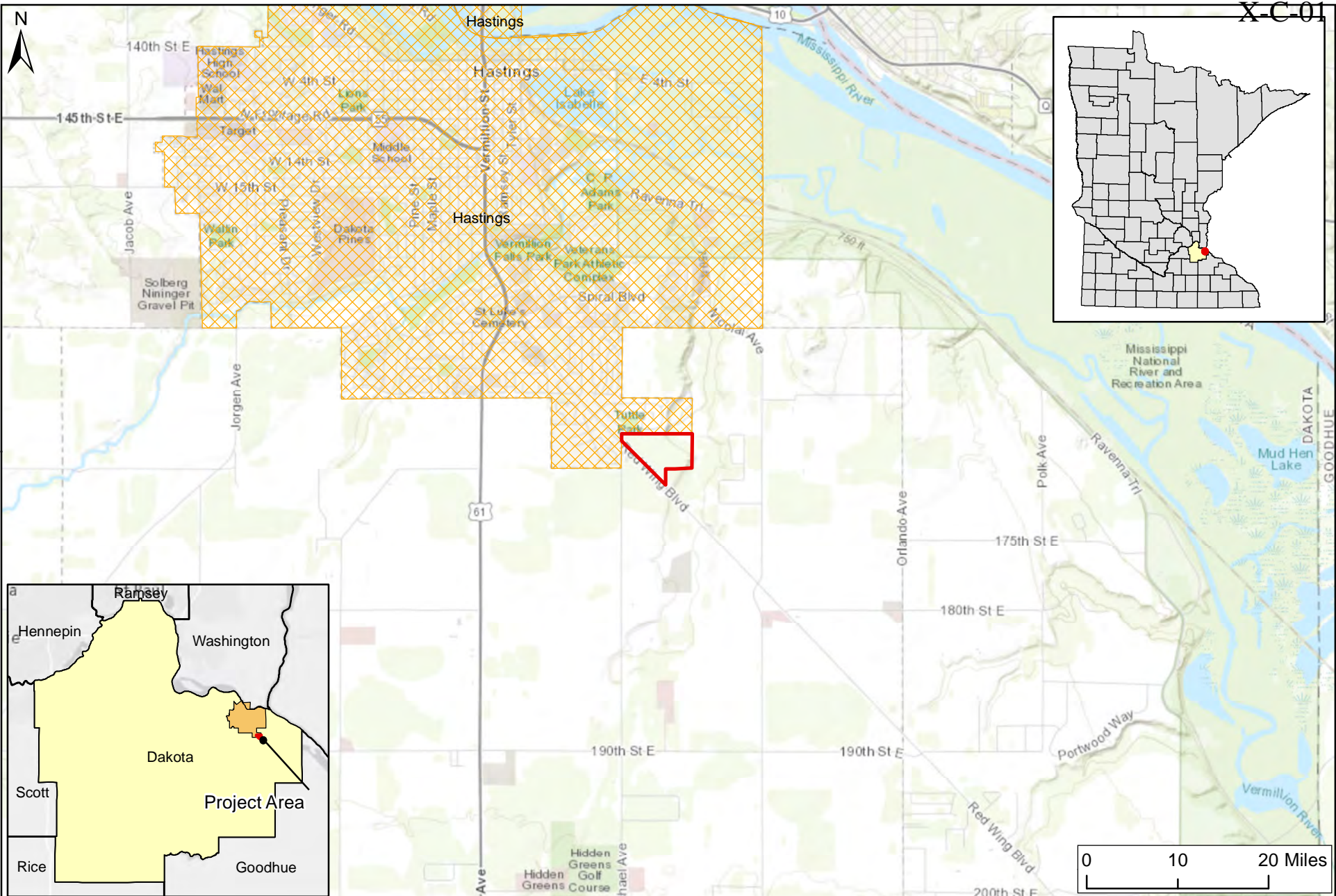
- The information contained in this document is accurate and complete to the best of my knowledge.
- The EAW describes the complete project; there are no other projects, stages or components other than those described in this document, which are related to the project as connected actions or phased actions,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

Signature \_\_\_\_\_

Date \_\_\_\_\_

Title \_\_\_\_\_

<b>List of Figures</b>
Figure 1 – Site Location Map
Figure 2 – Site Topographic Map
Figure 3 – Project Details
Figure 4 – Land Cover
Figure 5 – Soil Survey and Prime Farmland
Figure 6 - Minnesota Geological Survey Dakota County Map series
Figure 7 – 2-ft LiDAR Topography
Figure 8 - Known Karst Features
Figure 9 – Surface Waters
Figure 10 – National Wetlands Inventory
Figure 11 - County Well Index and Wellhead Protection Areas



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 Print Date: 8/22/2023  
 Map by: rbeduhn  
 Projection: UTM NAD 83 Zone 15N  
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 Dakota County

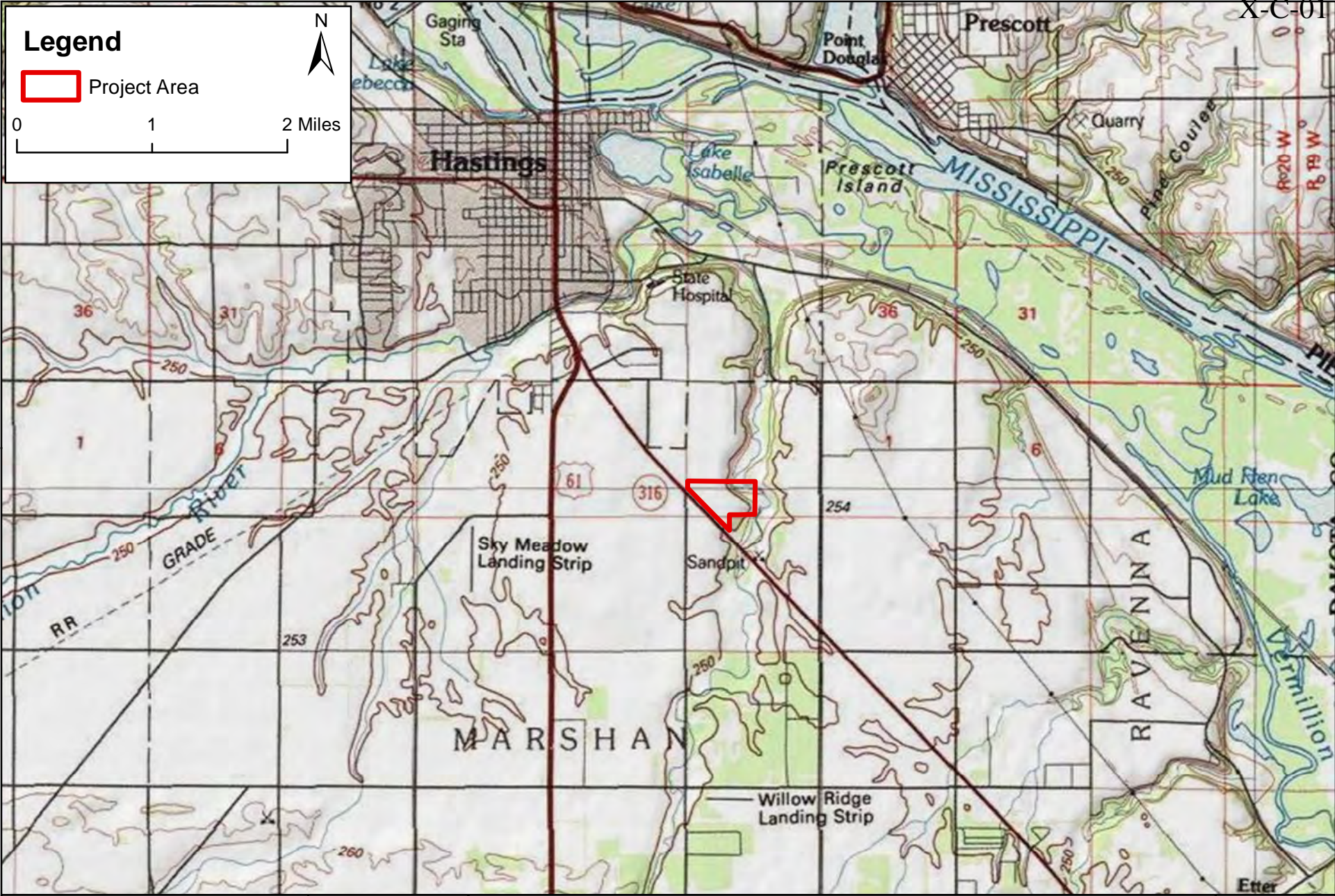
## Site Location Map

### Walden at Hastings Development Hastings, Dakota County, Minnesota

Figure  
1

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**USGS 24K Topographic Map**  
 Walden at Hastings Development  
 Hastings, Dakota County, Minnesota

Figure  
 2

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**PRESERVE**  
**764,029.9 ft<sup>2</sup>**  
**(17.539713 acres)**

Great River Road

**Conceptual Site Plan Study**  
**71.1 Acres in Hastings, MN**

**Land Equity Development**  
 Aberdeen Lane Blaine, MN

**Estimated Unit Breakdown**

Twinhome Units (ITE Land Use: Multifamily Housing- Low-rise)	54
Townhome Units (ITE Land Use: Multifamily Housing- Low-rise)	68
Apartment Units (ITE Land Use: Multifamily Housing- Mid-rise)	170
Senior Units (ITE Land Use: Assisted Living)	24
Active Senior Living Units (ITE Land Use: Senior Adult Housing (Single Family))	60
Assisted Living Units (ITE Land Use: Assisted Living)	80
Single Family Homes (ITE Land Use: Single Family Detached Housing)	55
<b>Total Units</b>	<b>511</b>

Rick Harrison Site Design Studio



**Legend**

Project Area

0 0.05 0.1 Miles

Path: X:\KOLL\LANEQ170747\5-final-dsgn\51-drawings\90-018\EA\W Figure Set\Figure 3 - Project Details.mxd

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 Print Date: 11/14/2023

Map by: rbeduhn  
 Projection: UTM NAD 83 Zone 15N  
 Source: SEHinc, City of Hastings,  
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 Dakota County

**Project Details**  
 Walden at Hastings Development  
 Hastings, Dakota County, Minnesota

**Figure**  
**3**

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**Legend**

- Project Area
- Generalized Cover**
- Impervious
- Woodland
- Prairie/Grassland
- Palustrine open water
- Cropland
- Maintained Lawn/Turf

0 0.125 0.25 Miles

Land Cover Code	MLCCS Detailed Land Cover Classes	Description
1.tt.CD.i10.	4% to 10% impervious cover with deciduous trees	
3.de.UP.nAT.	Altered/non-native deciduous forest	
4.de.UP.nAT.	Altered/non-native deciduous woodland	
4.cd.UP.nAT.	Altered/non-native mixed woodland	
2.tt.CD.pUS.cPD.	Deciduous trees on upland soils	
6.ge.MG.nDP.	Dry prairie	
6.ge.MG.nDP.nDA.	Dry prairie barrens subtype	
4.ce.UP.nRC.	Eastern Red Cedar woodland	
6.gt.GC.nAT.	Grassland with sparse conifer or mixed deciduous/coniferous trees - altered/non-native dominated	
2.ph.CG.pUS.cGL.	Long grasses on upland soils	
6.ge.MG.nAT.	Medium-tall grass altered/non-native dominated grassland	
5.de.UP.nNT.	Native dominated disturbed upland shrubland	
5.de.UP.nNT.	Native dominated disturbed upland shrubland	
1.hh.CG.i10.cGL.	Non-native dominated long grasses with 4-10% impervious cover	
3.de.UP.nOA.nOD.	Oak forest dry subtype	
4.de.UP.nOW.	Oak woodland-brushland	
9.ww.OW.	Palustrine open water	
1.hh.CT.i10.cGS.	Short grasses and mixed trees with 4-10% impervious cover	
2.ch.RC.pUS.	Upland soils - cropland	
2.tt.CM.pUS.	Upland soils with planted, maintained or cultivated mixed coniferous/deciduous trees	
2.tt.CC.pUS.	Upland soils with planted, maintained, or cultivated coniferous trees	

**Generalized Land Cover Types**  
Walden at Hastings Development  
Hastings, Dakota County, Minnesota

**Figure 4**



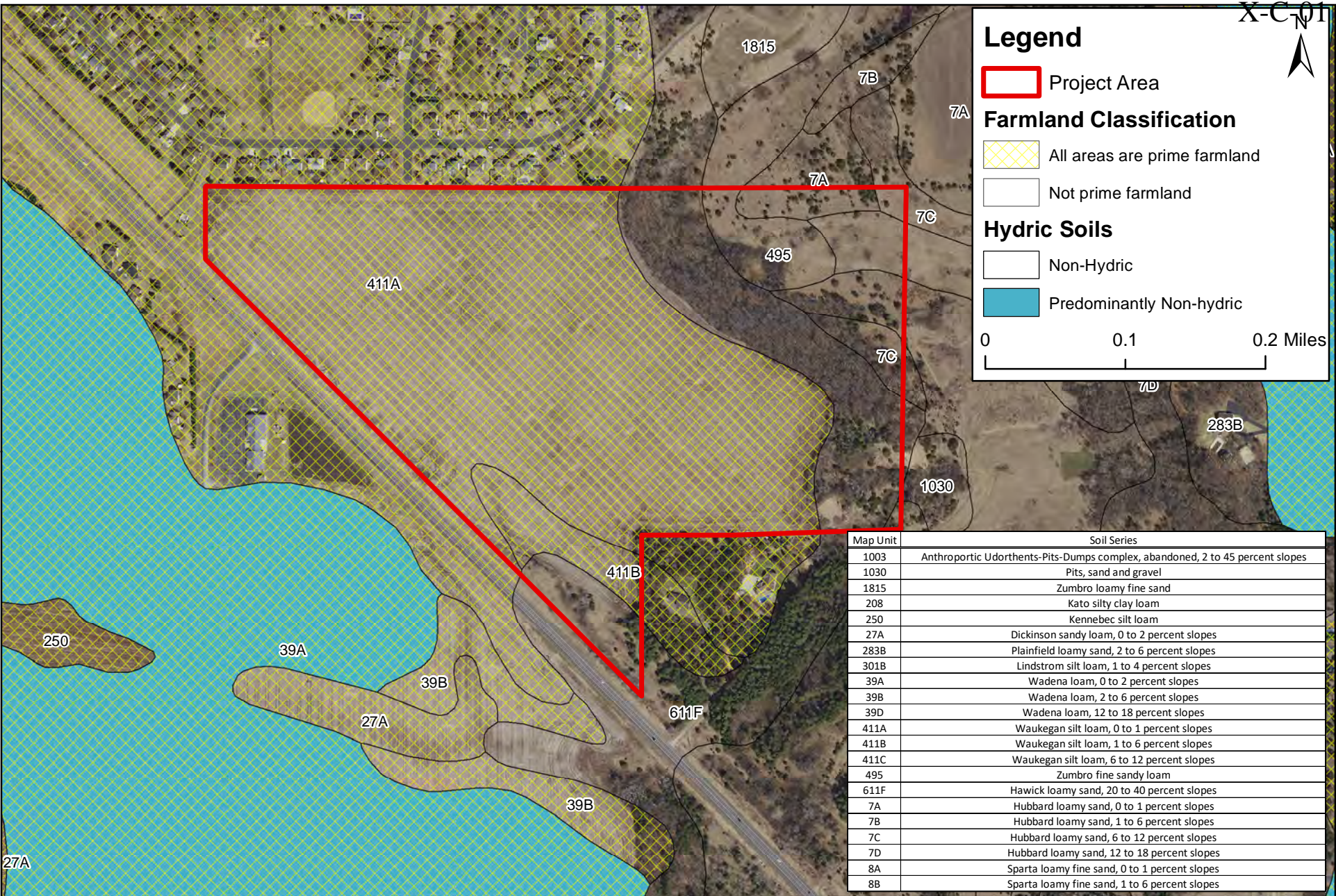
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Projection: UTM NAD 83 Zone 15N  
Source: SEHinc, City of Hastings, MNDNR, MNDOT, USGS Dakota County

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### Legend

- Project Area

### Farmland Classification

- All areas are prime farmland
- Not prime farmland

### Hydric Soils

- Non-Hydric
- Predominantly Non-hydric

0                      0.1                      0.2 Miles

Map Unit	Soil Series
1003	Anthroportic Udorthents-Pits-Dumps complex, abandoned, 2 to 45 percent slopes
1030	Pits, sand and gravel
1815	Zumbro loamy fine sand
208	Kato silty clay loam
250	Kennebec silt loam
27A	Dickinson sandy loam, 0 to 2 percent slopes
283B	Plainfield loamy sand, 2 to 6 percent slopes
301B	Lindstrom silt loam, 1 to 4 percent slopes
39A	Wadena loam, 0 to 2 percent slopes
39B	Wadena loam, 2 to 6 percent slopes
39D	Wadena loam, 12 to 18 percent slopes
411A	Waukegan silt loam, 0 to 1 percent slopes
411B	Waukegan silt loam, 1 to 6 percent slopes
411C	Waukegan silt loam, 6 to 12 percent slopes
495	Zumbro fine sandy loam
611F	Hawick loamy sand, 20 to 40 percent slopes
7A	Hubbard loamy sand, 0 to 1 percent slopes
7B	Hubbard loamy sand, 1 to 6 percent slopes
7C	Hubbard loamy sand, 6 to 12 percent slopes
7D	Hubbard loamy sand, 12 to 18 percent slopes
8A	Sparta loamy fine sand, 0 to 1 percent slopes
8B	Sparta loamy fine sand, 1 to 6 percent slopes

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MNDNR, MNDOT, USGS  
Dakota County

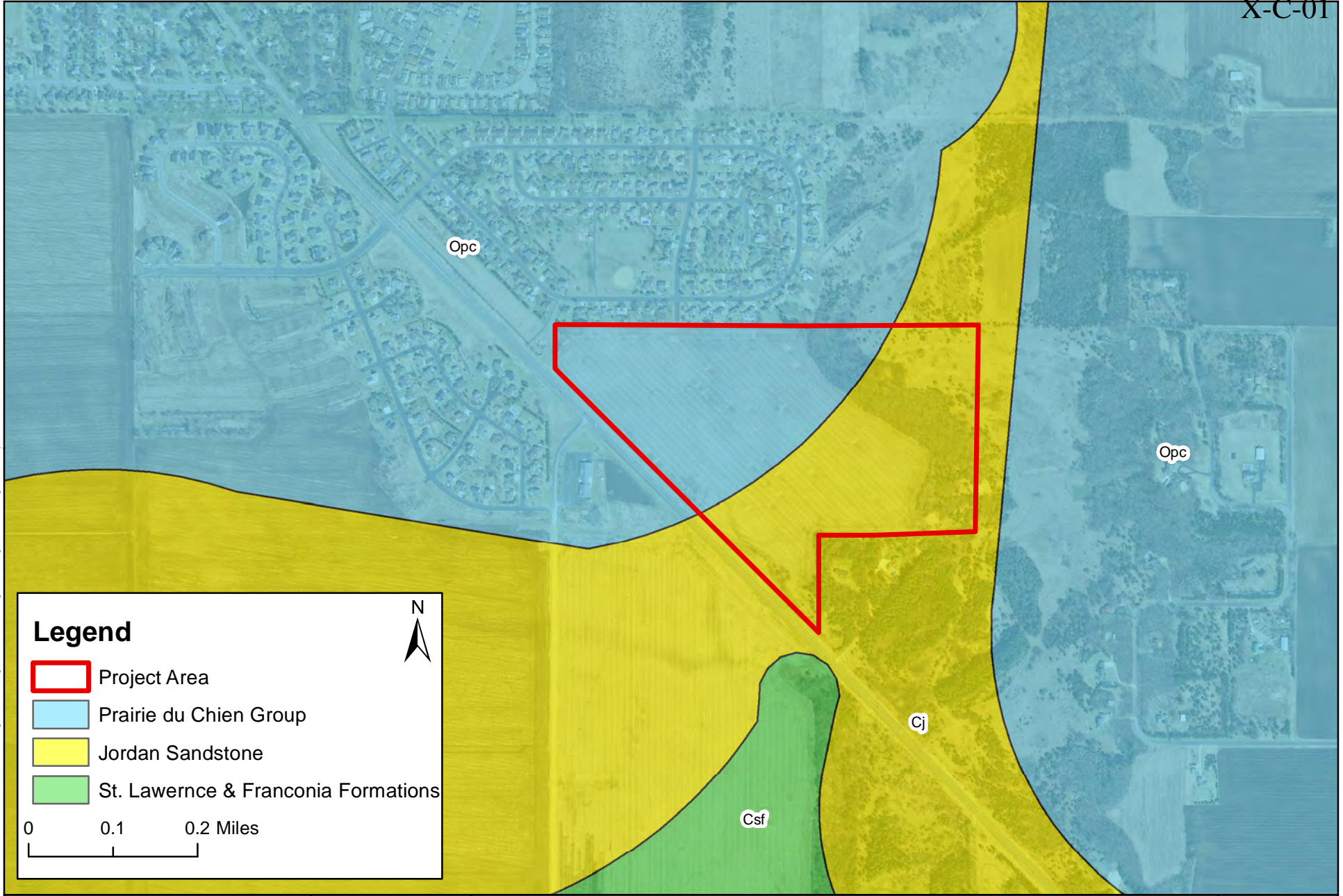
## Dakota County Soil Survey

### Walden at Hastings Development

### Hastings, Dakota County, Minnesota





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**Legend**

-  Project Area
-  Prairie du Chien Group
-  Jordan Sandstone
-  St. Lawrence & Franconia Formations

0 0.1 0.2 Miles

N



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 Projection: UTM NAD 83 Zone 15N  
 Source: SEHinc, City of Hastings,  
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 Dakota County

**Dakota County Bedrock Geology**  
 Walden at Hastings Development Hastings,  
 Dakota County, Minnesota

Figure  
6


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Path: X:\KOLL\LANEQ\170747\5-final-dsgn\5-1-drawings\90-6\SEAW\_Figure\_SettFigure 7 -LIDAR.mxd

**Legend**

 Project Area

**Contour Type**

White Line Index

--- Intermediate

0 0.1 0.2 Miles

N



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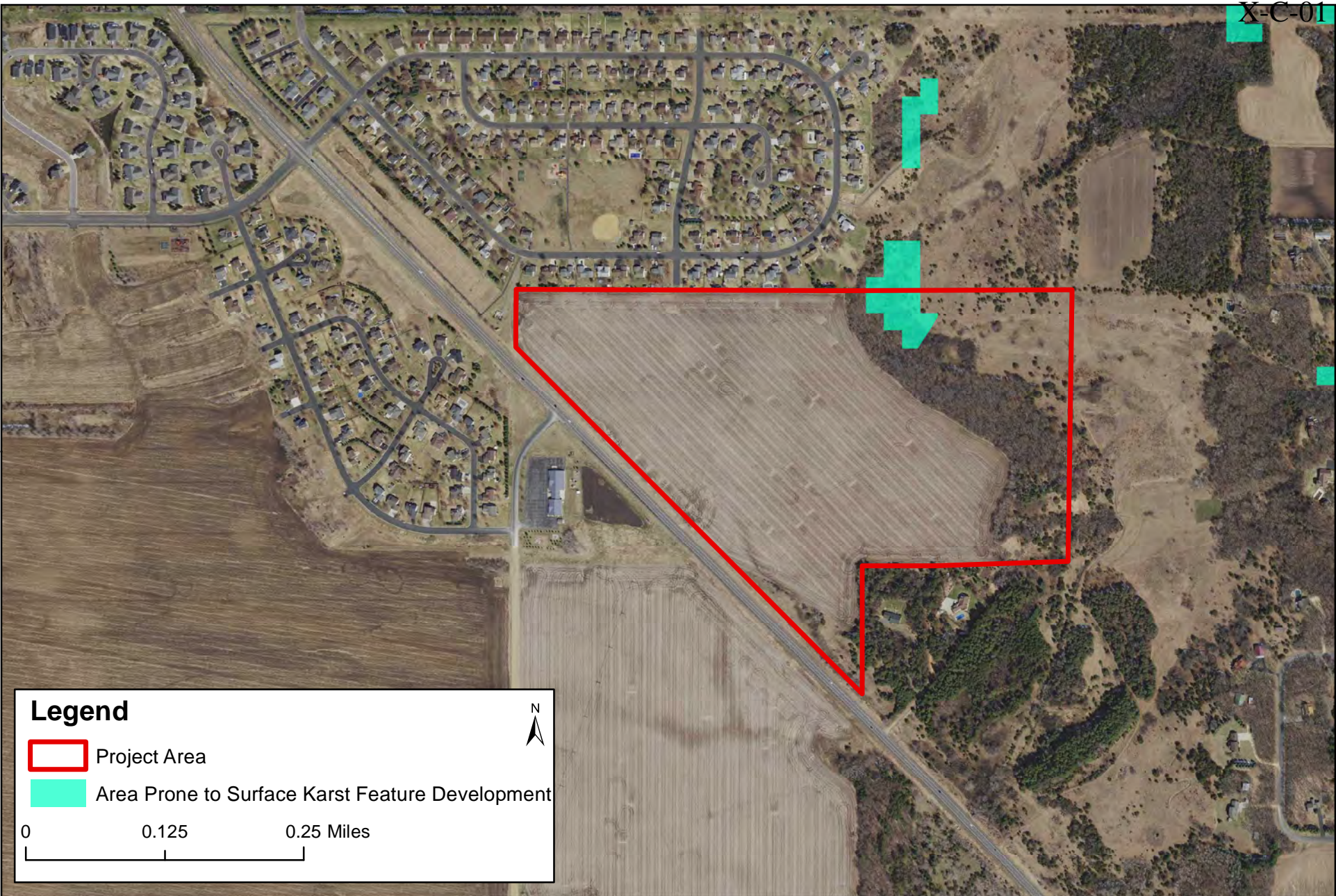
Project: LANEQ 170747  
 Print Date: 8/31/2023  
 Map by: rbeduhn  
 Projection: UTM NAD 83 Zone 15N  
 Source: SEHinc, City of Hastings,  
 MNDNR, MNDOT, USGS  
 Dakota County

**2-foot LiDAR Topography**  
 Walden at Hastings Development  
 Hastings, Dakota County, Minnesota

**Figure 7**

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**Legend**

- Project Area
- Area Prone to Surface Karst Feature Development

0      0.125      0.25 Miles

N

Path: X:\KOD\LANEQ\170747\5-final-dsgn\51-drawings\90-018\EA\W Figure Set\Figure 8 - Karst.mxd



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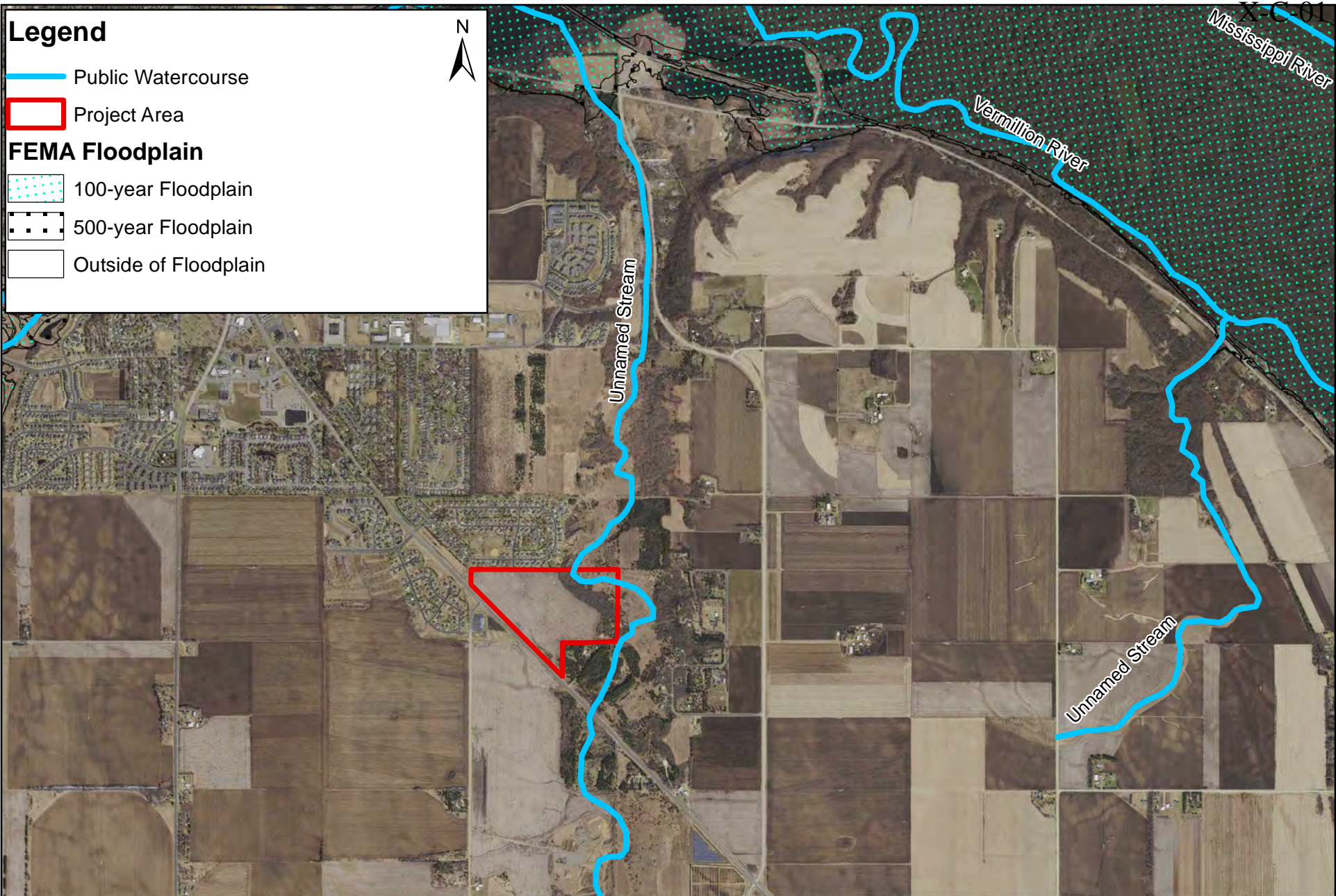
Map by: rbeduhn  
Projection: UTM NAD 83 Zone 15N  
Source: SEHinc, City of Hastings,  
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Dakota County

**Known Karst Features**  
Walden at Hastings Development  
Hastings, Dakota County, Minnesota

Figure  
8

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Projection: UTM NAD 83 Zone 15N  
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**MNDNR PWI & FEMA Floodplain**  
Walden at Hastings Development Hastings,  
Dakota County, Minnesota

Figure  
9

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**Legend**

Project Area

**NWI Type**

Type 1

Type 4

Type 5

0      0.075      0.15 Miles

N



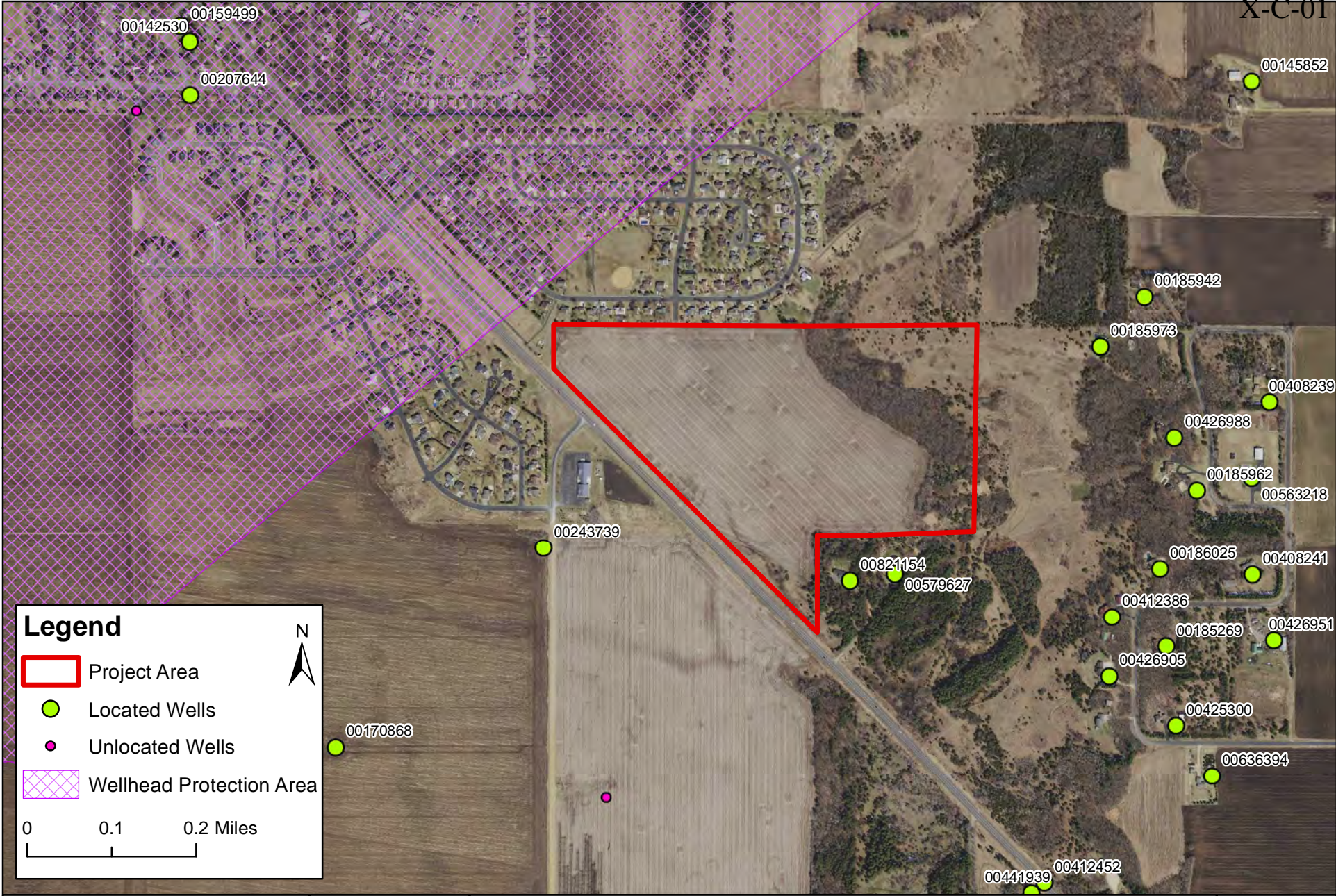
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 Map by: rbeduhn  
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**National Wetlands Inventory**  
 Walden at Hastings Development  
 Hastings, Dakota County, Minnesota

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**Legend**

-  Project Area
-  Located Wells
-  Unlocated Wells
-  Wellhead Protection Area

0 0.1 0.2 Miles

N

Path: X:\KOD\LANEQ\170747\5-final-dsgn\51-drawings\90-618-EAW Figure Set\Figure 11- Wells - Wellhead protection.mxd



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**County Well Inventory and Wellhead Protection Areas**  
 Walden at Hastings Development  
 Hastings, Dakota County, Minnesota

Figure 11

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*Attachment A – MNDNR Natural Heritage Response Letter*



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

May 10, 2023

Correspondence # MCE 2023-00044

Rebecca Beduhn  
Short Elliott Hendrickson, Inc.

RE: Natural Heritage Review of the proposed Hastings Residential Development Site,  
T114N R17W Sections 2, 11; Dakota County

Dear Rebecca Beduhn,

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:

#### *Ecologically Significant Areas*

- The Minnesota Biological Survey (MBS) has identified a Site of *Outstanding* Biodiversity Significance on the east side of much of the proposed project. Sites of Biodiversity Significance have varying levels of native biodiversity and are ranked based on the relative significance of this biodiversity at a statewide level. Sites ranked as *Outstanding* contain the best occurrences of the rarest species, the most outstanding examples of the rarest native plant communities, and/or the largest, most intact functional landscapes present in the state. This Site was mapped by MBS as Dry Sand – Gravel Prairie (Southern), state-ranked as Imperiled. More than 99% of the prairie that was present in the state before settlement has been destroyed, and more than one-third of Minnesota's endangered, threatened, and special concern species are now dependent on the remaining small fragments of Minnesota's prairie ecosystem. Therefore, we feel that all prairie remnants merit protection. We encourage you to consider project alternatives that would avoid or minimize disturbance to this ecologically significant area. Actions to minimize disturbance may include, but are not limited to, the following recommendations:
  - Minimize vehicular disturbance in the MBS Site (allow only vehicles/equipment necessary for construction activities);

- Do not park equipment or stockpile supplies in the MBS Site;
- Do not place spoil within MBS Site or other sensitive areas;
- Retain a buffer between proposed activities and the MBS Site;
- If possible, conduct the work under frozen ground conditions;
- Use effective erosion prevention and sediment control measures;
- Inspect and clean all equipment prior to bringing it to the Site to prevent the introduction and spread of invasive species;
- As much as possible, operate within already-disturbed areas;
- Revegetate disturbed soil with native species suitable to the local habitat as soon after construction as possible; and
- Use only weed-free mulches, topsoils, and seed mixes. Of particular concern are birdsfoot trefoil (*Lotus corniculatus*) and crown vetch (*Coronilla varia*), two invasive species that are sold commercially and are problematic in prairies and disturbed open areas.

MBS Sites of Biodiversity Significance and DNR Native Plant Communities can be viewed using the [Minnesota Conservation Explorer](#) or their GIS shapefiles can be downloaded from the [MN Geospatial Commons](#). Please contact the [NH Review Team](#) if you need assistance accessing the data. Reference the [MBS Site Biodiversity Significance](#) and [Native Plant Community](#) websites for information on interpreting the data.

#### *State-listed Species*

- Several rare plant species, including state-listed Threatened and Endangered species, have been documented near the proposed project in the MBS Site. 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 endangered or threatened plants or animals, including their parts or seeds, without a permit. Therefore, the unplowed portion of the MBS Site should be treated as an avoidance area. Contact me if this is not possible, as further action may be necessary. MBS Sites of Biodiversity Significance and DNR Native Plant Communities can be viewed using the [Minnesota Conservation Explorer](#) or their GIS shapefiles can be downloaded from the [MN Geospatial Commons](#). Please contact the [NH Review Team](#) if you need assistance accessing the data. Reference the [MBS Site Biodiversity Significance](#) and [Native Plant Community](#) websites for information on interpreting the data.
- Narrow-leaved pinweed (*Lechea tenuifolia*), state-listed as endangered, has been documented in the project area. This species is found in dry sandy grasslands and savannas. If there will be disturbance to the unplowed area in T114N R17W Section 11, **a botanical survey is required to be conducted to ensure the protection of this rare species**. Surveys must be conducted by a surveyor on the attached list and follow the standards contained in the [Rare Species Survey Process](#) and [Rare Plant Guidance](#). Project planning should take into account that any botanical

survey needs to be conducted during the appropriate time of the year, which may be limited. Please consult with the NH Review Team at [Reports.NHIS@state.mn.us](mailto:Reports.NHIS@state.mn.us) regarding this process.

- The North American racer (*Coluber constrictor*), gophersnake (*Pituophis catenifer*), and western harvest mouse (*Reithrodontomys megalotis*), all state-listed species of special concern, have been documented in the vicinity of the proposed project and may be encountered on site. The snakes occupy a variety of habitats in the deciduous forest region including forested hillsides, bluff prairies, grasslands, and open woods while the western harvest mouse is found in many upland prairie and old field habitats. Woodland margins and field edges are the preferred summer habitat. North American racers have relatively large home ranges, making long-distance movements to and from their hibernacula each year. Given the presence of these rare animals, the DNR recommends that the use of erosion control mesh, if any, be limited to [wildlife-friendly materials](#).
- 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. For further assistance with these species, please contact the appropriate [DNR Regional Nongame Specialist](#) or [Regional Ecologist](#).

#### *Federally Protected Species*

- The area of interest overlaps with a 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. The [USFWS rusty patched bumble bee 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. If applicable, the DNR also recommends reseeding disturbed soils with native species of grasses and forbs using [BWSR Seed Mixes](#) or [MnDOT Seed Mixes](#). Please visit the [USFWS Rusty Patched Bumble Bee Map](#) for the most current locations of *High Potential Zones*.
- To ensure compliance with federal law, conduct a federal regulatory review using the U.S. Fish and Wildlife Service's (USFWS) online [Information for Planning and Consultation \(IPaC\) tool](#).

#### *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 takings permit 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.

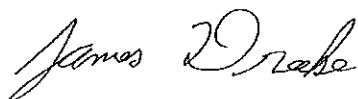
The Natural Heritage Information System (NHIS), a collection of databases that contains information about Minnesota's rare natural features, is maintained by the Division of Ecological and Water Resources, Department of Natural Resources. The NHIS is continually updated as new information becomes available,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

For environmental review purposes, the results of this Natural Heritage Review are valid for one year; the results are only valid for the project location and 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 the [Natural Heritage Review website](#) for additional information regarding this process, survey guidance, and other related information. For information on the environmental review process or other natural resource concerns, you may contact your [DNR Regional Environmental Assessment Ecologist](#).

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

Sincerely,



James Drake  
Natural Heritage Review Specialist  
[James.F.Drake@state.mn.us](mailto:James.F.Drake@state.mn.us)

*Attachment B – USFWS Information, Planning, and Consultation System (IPaC) Letter*

# 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

Dakota County, Minnesota



## Local office

Minnesota-Wisconsin Ecological Services Field Office

☎ (952) 858-0793

📅 (952) 646-2873

3815 American Blvd East

NOT FOR CONSULTATION



# 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<sup>1</sup> 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<sup>2</sup>).

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
<p>Northern Long-eared Bat <i>Myotis septentrionalis</i> Wherever found No critical habitat has been designated for this species. <a href="https://ecos.fws.gov/ecp/species/9045">https://ecos.fws.gov/ecp/species/9045</a></p>	Endangered
<p>Tricolored Bat <i>Perimyotis subflavus</i> Wherever found No critical habitat has been designated for this species. <a href="https://ecos.fws.gov/ecp/species/10515">https://ecos.fws.gov/ecp/species/10515</a></p>	Proposed Endangered

## Birds

NAME	STATUS
<p>Whooping Crane <i>Grus americana</i> No critical habitat has been designated for this species. <a href="https://ecos.fws.gov/ecp/species/758">https://ecos.fws.gov/ecp/species/758</a></p>	<a href="#">EXPN</a>

## Insects

NAME	STATUS
<p>Monarch Butterfly <i>Danaus plexippus</i> Wherever found No critical habitat has been designated for this species. <a href="https://ecos.fws.gov/ecp/species/9743">https://ecos.fws.gov/ecp/species/9743</a></p>	Candidate
<p>Rusty Patched Bumble Bee <i>Bombus affinis</i> Wherever found No critical habitat has been designated for this species. <a href="https://ecos.fws.gov/ecp/species/9383">https://ecos.fws.gov/ecp/species/9383</a></p>	Endangered

# Critical habitats

X-C-01

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

There are no documented cases of eagles being present at this location. However, if you believe eagles may be using your site, please reach out to the local Fish and Wildlife Service office.

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-incident-take-migratory-birds>
- Nationwide conservation measures for birds  
<https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf>

Bald and Golden Eagle information is not available at this time

**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? X-C-01

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<sup>1</sup> and the Bald and Golden Eagle Protection Act<sup>2</sup>.

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

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:

- Birds of Conservation Concern <https://www.fws.gov/program/migratory-birds/species>
- Measures for avoiding and minimizing impacts to birds <https://www.fws.gov/library/collections/avoiding-and-minimizing-incidentals-take-migratory-birds>
- Nationwide conservation measures for birds <https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf>

**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?

X-C-01

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. X.C-01

## 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](#).

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

This location overlaps the following wetlands:

RIVERINE

A full description for each wetland code can be found at the [National Wetlands Inventory website](#)

**NOTE:** This initial screening does **not** replace an on-site delineation to determine whether wetlands occur. Additional information on the NWI data is provided below.

#### **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 tubercid 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.



*Attachment C – SHPO Response Letter*

February 24, 2023

Rebecca Beduhn  
SEH Inc  
3535 Vadnais Center Dr  
St Paul, MN 55110

RE: Land Equity Development  
Proposed residential development  
T114 R17 S2 & S11, Hastings, Dakota County  
SHPO Number: 2023-0826

Dear Rebecca Beduhn:

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

Due to the nature and location of the proposed project, we recommend that a Phase IA literature review and archaeological assessment be completed by a qualified archaeologist to assess the potential for intact archaeological sites in the project area. If, as a result of this assessment, a Phase I archaeological survey is recommended, this survey should be completed. The survey must meet the requirements of the Secretary of the Interior's Standards for Identification and Evaluation and should include an evaluation of National Register eligibility for any properties that are identified. For a list of consultants who have expressed an interest in undertaking this type of research and archaeological surveys, please visit the website [www.mnhs.org/preservation/directory](http://www.mnhs.org/preservation/directory), and select "Archaeologists" in the "Search by Specialties" box.

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

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

If you have any questions regarding our review of this project, please contact me at (651) 201-3285 or [kelly.graggjohnson@state.mn.us](mailto:kelly.graggjohnson@state.mn.us).

Sincerely,

*Kelly Gragg-Johnson*

Kelly Gragg-Johnson  
Environmental Review Program Specialist

*Attachment D - Traffic Impact Study*

Traffic Impact Study

# Walden at Hastings Development

Hastings, MN

LANEQ 170747 | November 13, 2023



Building a Better World  
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Engineers | Architects | Planners | Scientists



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X-C-01

November 13, 2023

RE: Walden at Hastings Development  
Traffic Impact Study  
Hastings, MN  
SEH No. LANEQ 170747 4.00

Mr. Jeff Richter and Mr. Chris Beadle  
Land Equity Development  
12101 Woodhill Lane NE  
Blaine, MN 55449

Dear Mr. Richter and Mr. Beadle,:

The following report provides findings to a traffic impact study completed for the proposed Walden at Hastings residential development located just south of Hastings, Minnesota.

Sincerely,

A handwritten signature in black ink, appearing to read "CMJ", is written over a light blue horizontal line.

Associate | Sr. Traffic Engineer

(Lic. IA, MN, SD)

CMJ

x:\kol\laneq\170747\8-planning\87-rpt-stud\walden at hastings development traffic impact report 082523.docx

Engineers | Architects | Planners | Scientists

Short Elliott Hendrickson Inc., 3535 Vadnais Center Drive, St. Paul, MN 55110-3507

651.490.2000 | 800.325.2055 | 888.908.8166 fax | [sehinc.com](http://sehinc.com)

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# Traffic Impact Study

Walden at Hastings Development  
Hastings, MN

SEH No. LANEQ 170747

November 13, 2023

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

---

Chad M. Jorgenson, PE, PTOE

Date: August 25, 2023

License No.: 55528

Reviewed By: Justin Anibas

Date: August 25, 2023

Short Elliott Hendrickson Inc.  
3535 Vadnais Center Drive  
St. Paul, MN 55110-3507  
651.490.2000



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Appendix C Detailed Warrant Analysis Results

Appendix D Operational MOE Tables



# Traffic Impact Study

## Walden at Hastings Development

Prepared for Land Equity Development

### 1 Background and Introduction

The Walden at Hastings residential development is proposed to be located along the north side of TH 316 (Great River Road) approximately 1/3 of a mile south of Tuttle Drive in the City of Hastings, Minnesota. **Figure 1** shows the development location.

The proposed development is planned to have two access points into TH 316, the main driveway aligning directly across from Michael Avenue and another access point located approximately 1,300 feet to the east. The development site will also have access into the residential neighborhood located directly to the north through Thomas Avenue.

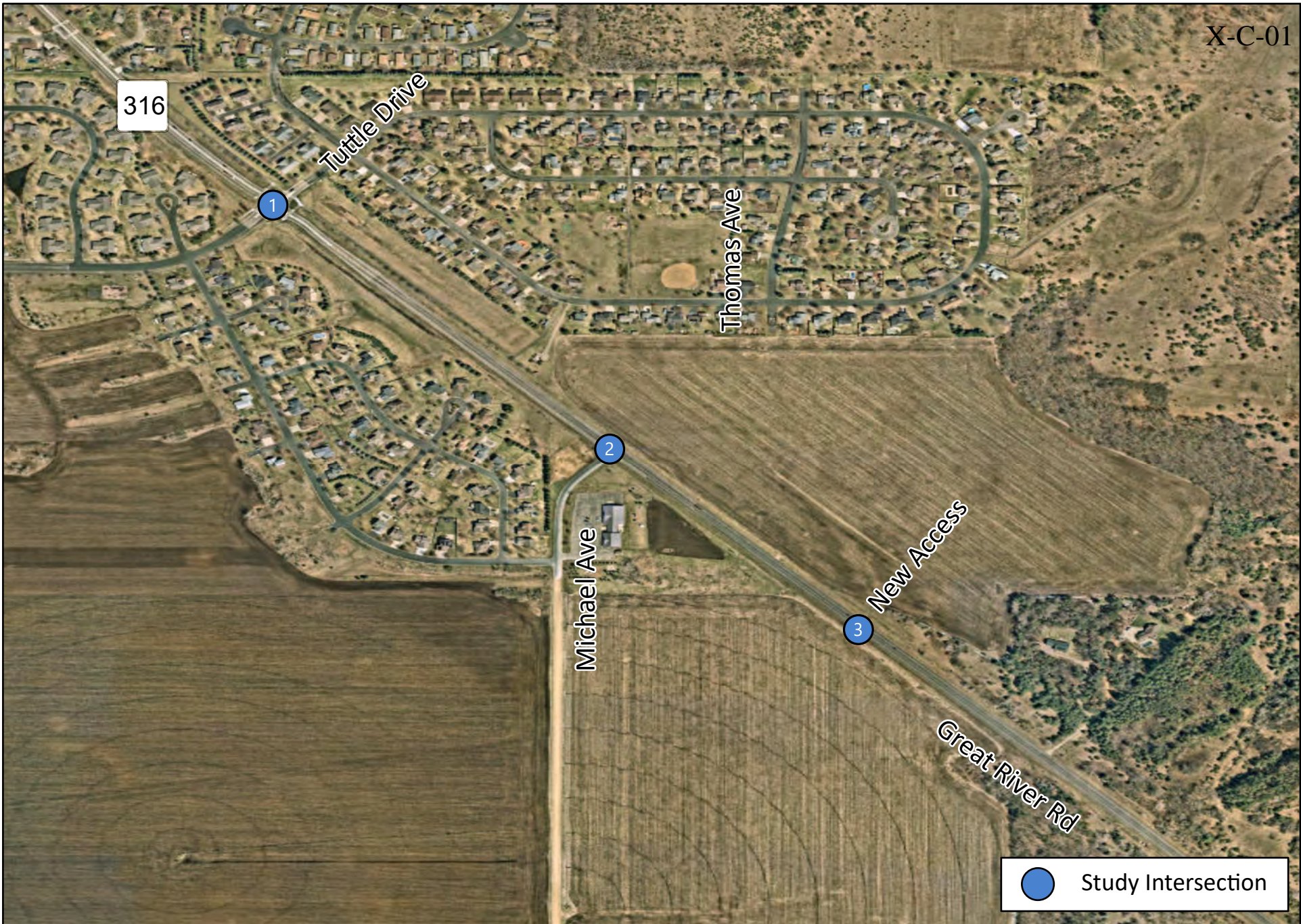
### 2 Existing Conditions

TH 316 is a two-lane roadway designated as a principal arterial roadway. The speed limit through the project area transitions from 60 miles per hour (mph) to 45 mph approximately 700 feet west of Michael Avenue for westbound motorists. In 2022, the Minnesota Department of Transportation (MnDOT) reported an annual average daily traffic (AADT) of 7,502 vehicles per day (vpd).

Both Tuttle Drive and Michael Avenue currently function as local collector roadways primarily serving residential traffic. The posted speed limit on both roadways is 30 mph. The intersection of TH 316 and Tuttle Drive is currently controlled by a single lane roundabout and the intersection of TH 316 with Michael Avenue is under minor street stop control. A westbound by-pass lane and a dedicated eastbound right turn lane are provided at the TH 316 intersection with Michael Avenue.

The site plan provided in **Appendix A** shows the general development plan for the proposed residential development. This study will focus on the impact of both the year of opening - 2024 (Phase 1) and full build out - 2029 (Phase 2) and five years after full build out (2034) to the surrounding roadway network.





Project: LANEQ 170747  
Print Date: 11/13/2023  
Map by: IJohnson  
Source: ESRI

**Project Location**  
Walden at Hastings Development Traffic Impact Analysis  
Hastings, MN

Figure  
1

## 2.1 Existing Traffic Volumes

Vehicle turning movement counts were collected during the AM and PM peak periods at the following intersections in August of 2023:

- TH 316 and Tuttle Drive
- TH 316 and Michael Avenue

Based on the existing turning movement counts, the AM peak hour was determined to be from 7:15 AM to 8:15 AM and the PM peak hour was determined to be from 4:00 PM to 5:00 PM.

**Figure 2** shows the 2023 existing peak hour turning movement counts. Full intersection turning movement counts are provided in **Appendix B**.





- Intersection ID
- Minor Street Stop Control
- Roundabout
- Turning Movement
- AM Peak Hour Volume
- PM Peak Hour Volume

Dakota County, Maxar

## 3 Future Conditions

### 3.1 Background Traffic Growth

Traffic forecasts for the study area were developed using information from Dakota County's Transportation Plan which relies on traffic forecasting information from Metropolitan Council's Regional Travel Demand Model. Based on the traffic forecast information an approximate 0.25% per year increase in traffic volume is expected from 2021 through the 2040 design year.

To be conservative, a 0.5% straight-line annual average growth rate was applied to the existing traffic counts to estimate 2024 No Build, 2029 No Build, and 2034 No Build traffic volumes to compare the impact of the proposed development traffic against. **Figures 3, 5, and 7** show the 2024, 2029, and 2034 No Build traffic volumes, respectively.

### 3.2 Trip Generation

The proposed Walden at Hastings development is approximately 71.1 acres in size and includes townhomes, twin homes, active senior living, assisted living, multi-family residential, and single-family residential land uses. The *Institute of Transportation Engineers (ITE) Trip Generation Manual, 11<sup>th</sup> Edition*, was used to estimate the trips generated by the proposed development site. The site is currently proposed to be developed in two phases outlined below:

#### *Phase 1 (2024):*

- 54 Twin home Units (ITE Land Use: Single Family Attached Housing)
- 68 Townhome Units (ITE Land Use: Single Family Attached Housing)
- 170 Apartment Units (ITE Land Use: Multifamily Housing– Mid-rise)
- 24 Senior Units (ITE Land Use: Assisted Living)
- 60 Active Senior Living Units (ITE Land Use: Senior Adult Housing (Single Family))
- 80 Assisted Living Units (ITE Land Use: Assisted Living)

#### *Phase 2 (2029):*

- 55 Single Family Homes (ITE Land Use: Single Family Detached Housing)

**Table 1** shows the trip generation rates used for each land use type and the entering/existing percentages for trips in the AM and PM peak hours. **Table 2** shows the AM peak hour, PM peak hour, and daily trips generated under full development of the study area.



Table 1 – ITE Trip Generation Rates

Land Use	ITE Code	Units	Daily	AM			PM		
				Rate	Enter	Exit	Rate	Enter	Exit
<b>Phase 1</b>									
Single Family Homes (attached)	215	DU	7.20	0.40	25%	75%	0.57	59%	41%
Multifamily Housing (Mid-rise)	221	DU	4.54	0.37	23%	77%	0.39	61%	39%
Senior Adult Housing (Single Family)	251	DU	4.31	0.24	33%	67%	0.30	61%	39%
Assisted Living	254	Beds	2.60	0.18	60%	40%	0.24	39%	61%
<b>Phase 2</b>									
Single Family Homes (detached)	210	DU	9.43	0.70	25%	75%	0.94	63%	37%
*Note: DU = Dwelling Units									

Table 2 – Trip Generation Estimates

Area	Daily Trips*	AM Peak Hour*			PM Peak Hour*		
		Total	Enter	Exit	Total	Enter	Exit
<b>Phase 1</b>							
Single Family Homes (attached)	878	49	12	37	70	41	29
Multifamily Housing (Mid-rise)	772	63	14	49	66	40	26
Senior Adult Housing (Single Family)	259	14	5	9	18	11	7
Assisted Living	281	15	9	6	20	8	12
<b>Phase 1 Total</b>	<b>2,190</b>	<b>141</b>	<b>40</b>	<b>101</b>	<b>174</b>	<b>100</b>	<b>74</b>
<b>Phase 2</b>							
Single Family Homes	519	39	10	29	52	33	19
<b>Grand Total</b>	<b>2,709</b>	<b>180</b>	<b>50</b>	<b>130</b>	<b>226</b>	<b>133</b>	<b>93</b>

### 3.3 Trip Distribution

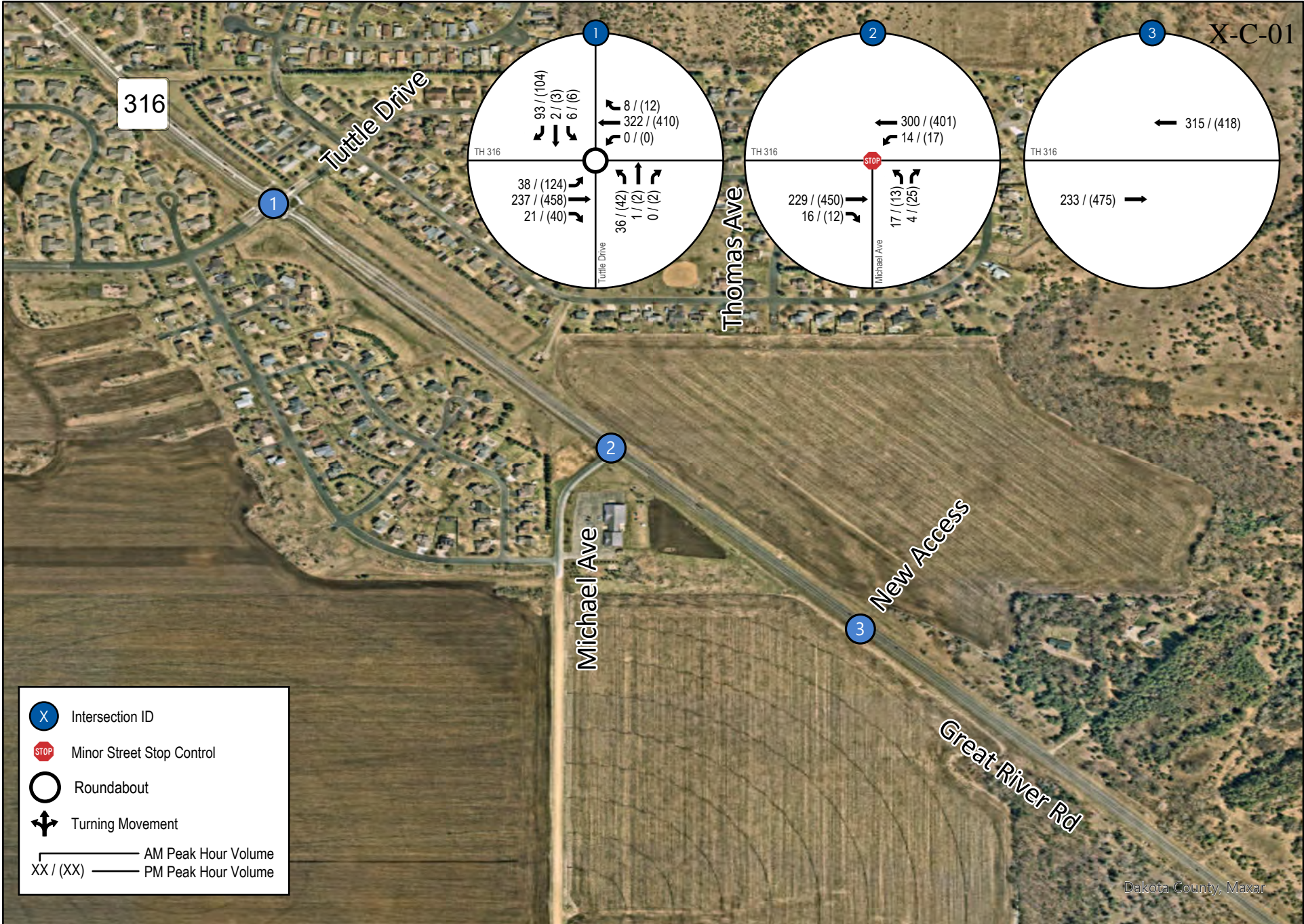
Trips from the proposed development were distributed to the adjacent street network based upon the August 2023 intersection counts, existing average annual daily traffic (AADT) counts from MnDOT's Traffic Mapping Application, and surrounding development. Based upon the collected information, it was determined that 90% of development traffic would travel to and from the north/west and 10% to and from the south/east.

Trips generated within Phase 1 will all use the primary access point at Michael Avenue. With the addition of the 55 single family homes in Phase 2, located near the easternmost access point, all trips generated by the single-family homes were expected to use the secondary access.

To be conservative, no trips were estimated to travel to the north through the existing neighborhood through Thomas Avenue.

**Figures 4, 6, and 8** show the 2024, 2029, and 2034 Build traffic volumes, respectively.

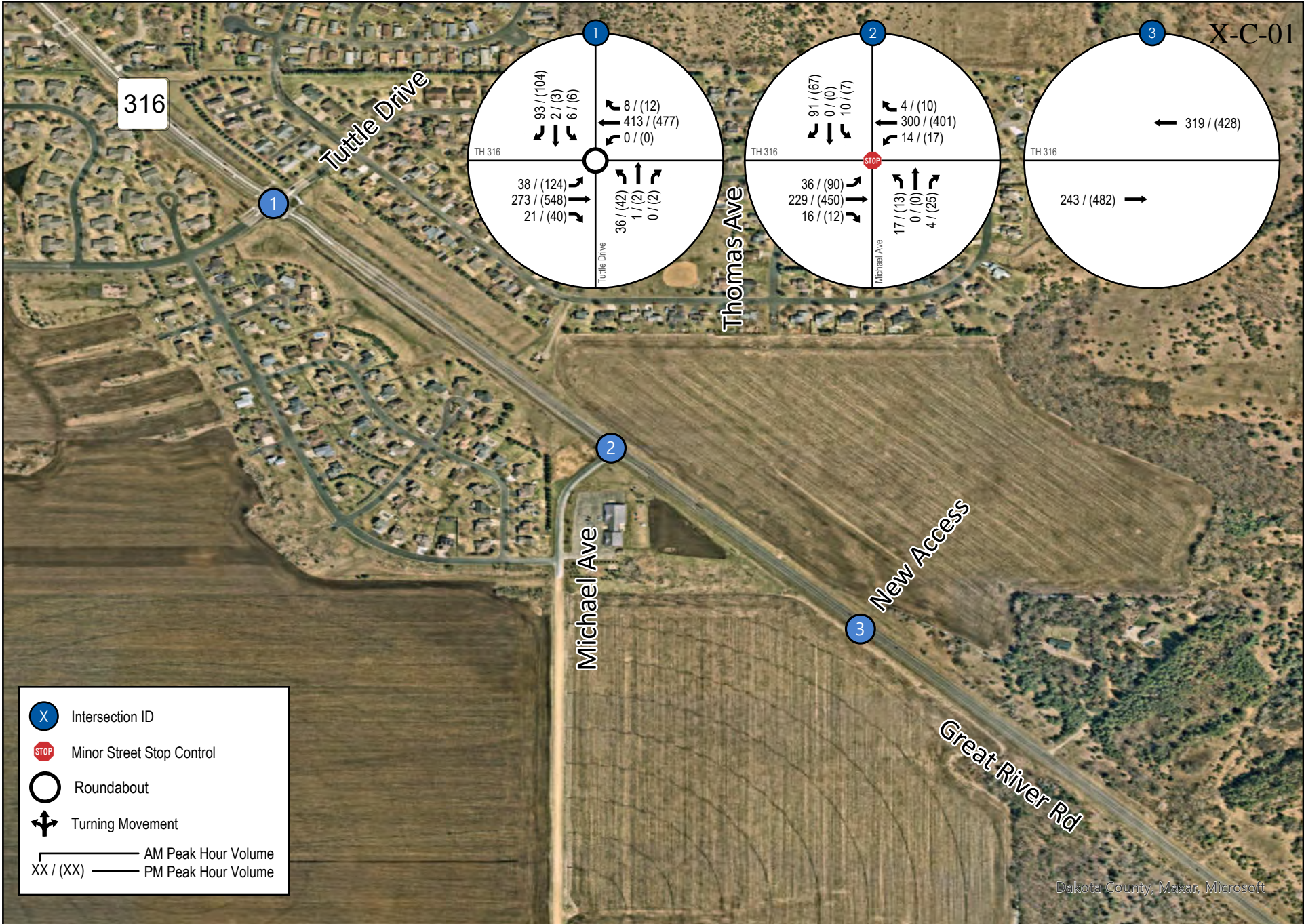




- Intersection ID
- Minor Street Stop Control
- Roundabout
- Turning Movement
- AM Peak Hour Volume
- XX / (XX) — PM Peak Hour Volume

Dakota County, Maxar





Dakota County, Maxar, Microsoft

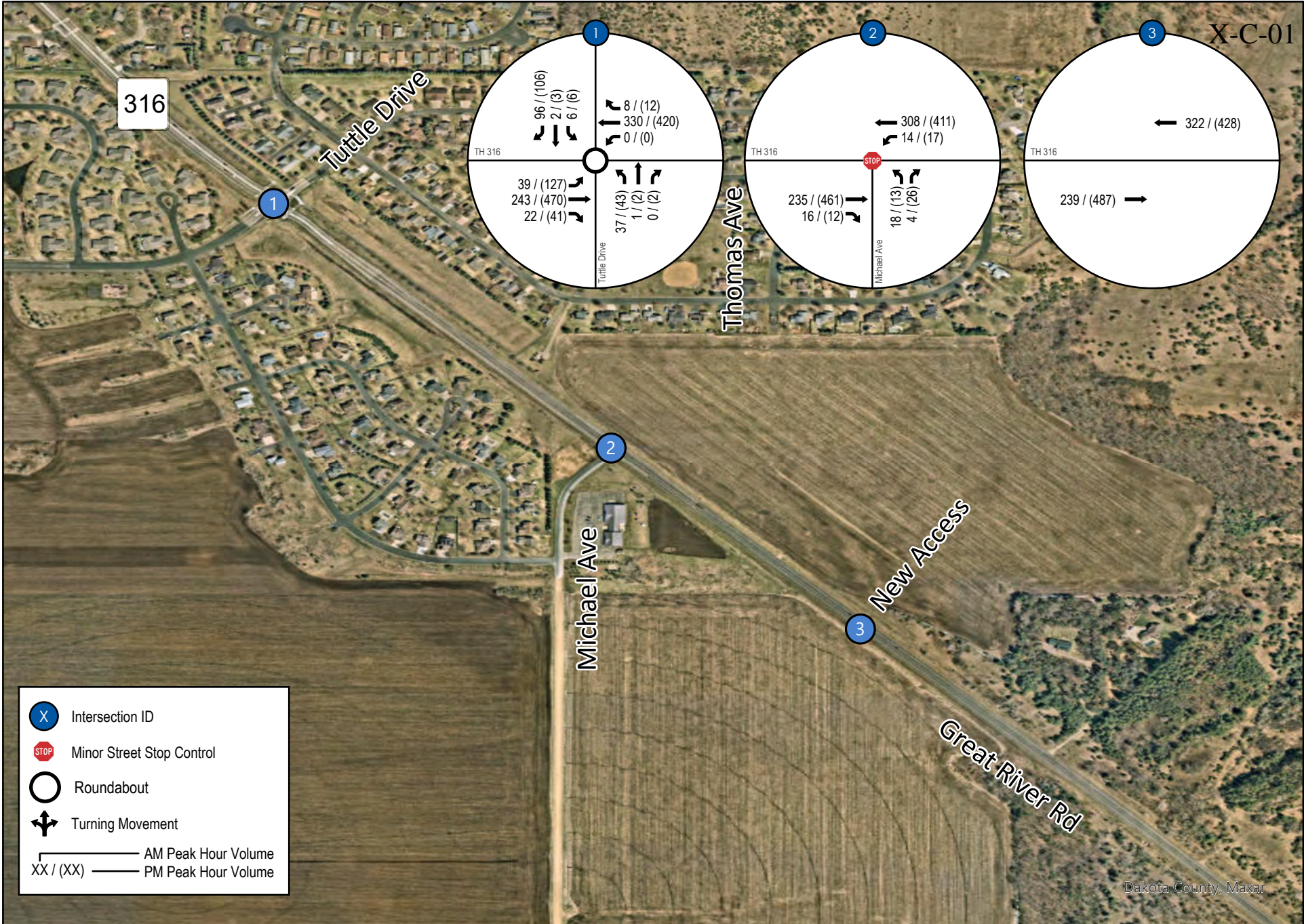


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 Map by: IJohnson  
 Source: ESRI

**2024 Phase 1 Build Volumes**  
 Walden at Hastings Development Traffic Impact Analysis  
 Hastings, MN

Figure 4





Dakota County, Maxar

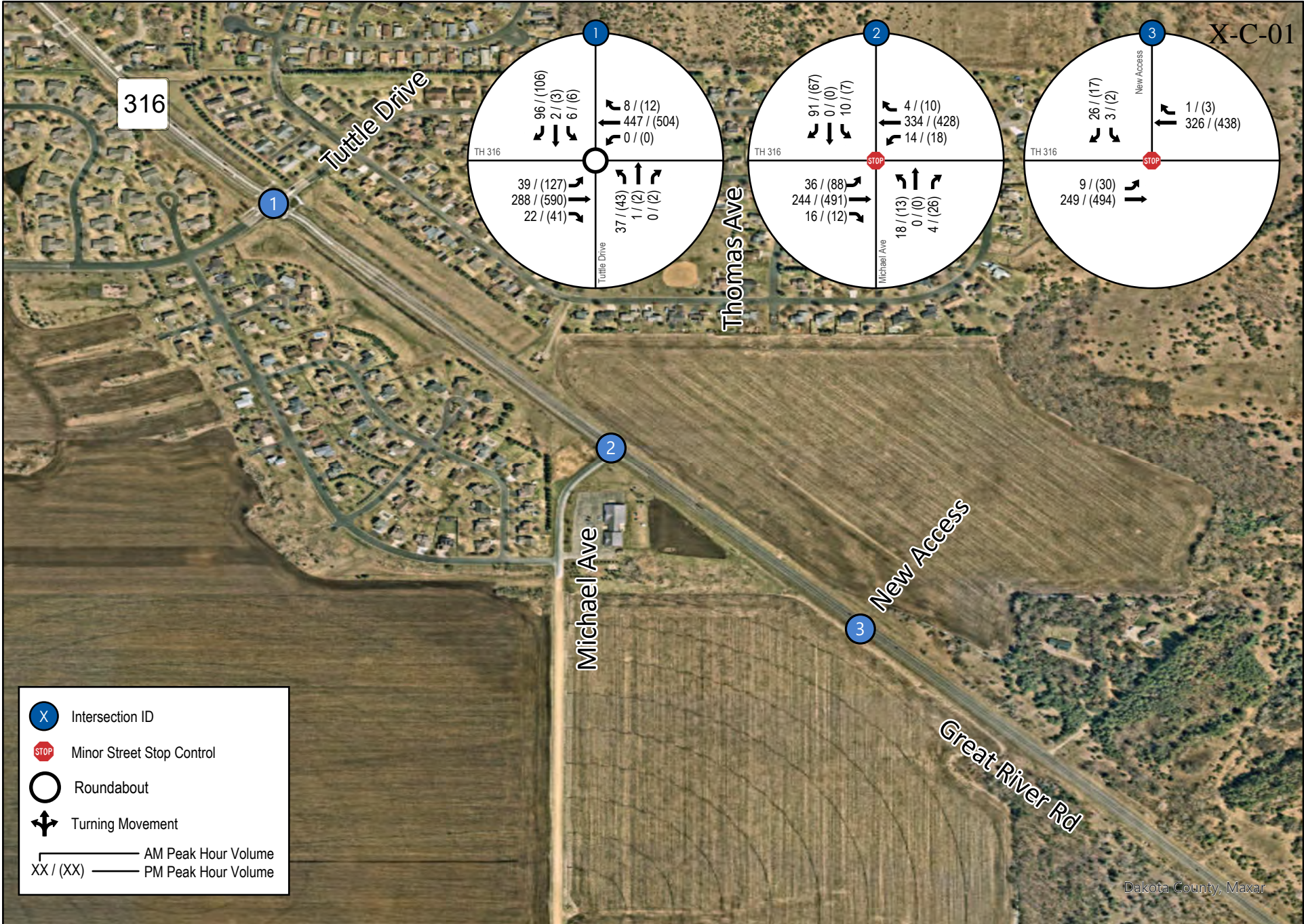


Project: LANEQ 170747  
 Print Date: 11/13/2023  
 Map by: IJohnson  
 Source: ESRI

**2029 No Build Volumes**  
 Walden at Hastings Development Traffic Impact Analysis  
 Hastings, MN

**Figure 5**

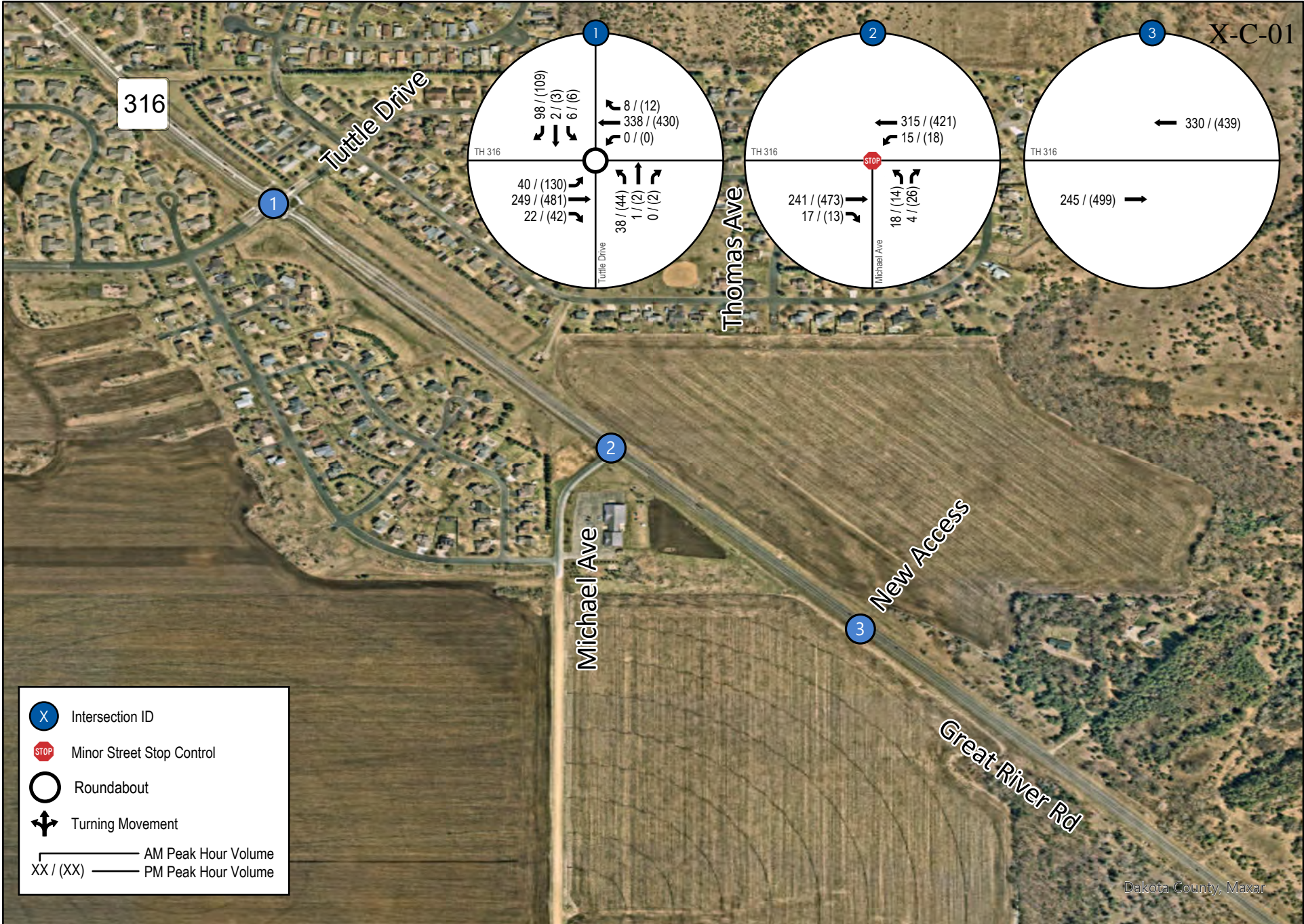




- Intersection ID
- Minor Street Stop Control
- Roundabout
- Turning Movement
- AM Peak Hour Volume
- XX / (XX) — PM Peak Hour Volume

Dakota County, Maxar





Dakota County, Maxar



Project: LANEQ 170747  
 Print Date: 11/13/2023  
 Map by: IJohnson  
 Source: ESRI

**2034 No Build Volumes**  
 Walden at Hastings Development Traffic Impact Analysis  
 Hastings, MN





Dakota County, Maxar, Microsoft



Project: LANEQ 170747  
 Print Date: 11/13/2023  
 Map by: IJohnson  
 Source: ESRI

**2034 Full Build Volumes**  
 Walden at Hastings Development Traffic Impact Analysis  
 Hastings, MN

Figure 8



## 4 Warrant Analysis

To assist in determining the appropriate type of traffic control for the two development access points onto TH 316, all-way stop and traffic signal warrant analyses were completed.

The intersection of TH 316 and Tuttle Drive is expected to remain as a single lane roundabout and has sufficient capacity to serve traffic volumes through the future design year 2034.

Warrant analyses were not conducted for the secondary access point located east of Michael Avenue as traffic volumes are estimated to be lower when compared to Michael Avenue.

The Minnesota Manual on Uniform Traffic Control Devices (MnMUTCD) provides guidance on when it may be appropriate to use all-way stop or signal control at an intersection. This guidance is provided in the form of “warrants”, or criteria, and engineering analysis of the intersection’s design factors to determine when a certain control may be justified. All-way stop or signal control should not be installed at an intersection unless an MnMUTCD warrant is met. Meeting a warrant at an intersection does not in itself require the installation of that traffic control. Installation of an all-way stop or traffic signal also requires an engineering analysis of the intersection’s design for it to be justified. A roundabout is considered to be warranted if traffic volumes meet the criteria for either all-way stop or traffic signal control.

For traffic signal installation, MnDOT typically requires volume thresholds for Warrant 1 to be satisfied, which requires 8-hours of combined major approach volumes and the highest minor street approach volume to meet MnMUTCD thresholds. These thresholds vary with the number of approach lanes on the major and minor streets, as well as vehicle speeds. Other warrants may be used as indicators of a need to consider traffic control change; an engineering study that considers factors, including warrants, should be performed to determine the optimal type of control at an intersection. Warrant 2 (four hour) and Warrant 3 (peak hour) were also included in the analysis for the study intersections.

### 4.1 Warrant Analysis Assumptions

MnMUTCD guidelines suggest that for the purpose of warrant analysis, 100% of right turning traffic from the minor leg should be removed from the traffic signal warrant analysis because right turning vehicles are typically able to enter the traffic stream with minimal delay or conflict; the right turning traffic would not require a traffic signal to reduce delay or improve safety. In certain circumstances (i.e. high right turn volume, minimum mainline gaps, etc.), The procedures outlined in the MnDOT ICE Manual allow for the inclusion of 50% of the minor street right turning traffic in the analysis. The MnDOT guidance states “if right turning volume exceeds 70% of its potential capacity for any hour for each approach, 50% of the right turning volume for all hours should be added back in.”

- Based upon MnMUTCD guidance, the analysis of the study intersections includes the removal of 100% of the right turning traffic on the minor approaches.

MnMUTCD guidelines suggest that the warrant thresholds may also be reduced based on the roadway speeds and population of the city the intersection is within. If either major approach to the intersection has a posted speed, or 85th percentile speed, that exceeds 40 mph, then a

reduction to 70% of the threshold volumes is allowed. If the population of the city is less than 10,000 people, a reduction to 70% threshold volumes is allowed.

- Based upon MnMUTCD guidance, the analysis includes the reduction to 70% of the threshold volumes because the speed limit on TH 316 is 60 mph.

## 4.2 Build Warrant Methodology

To estimate the 2034 Build 13-hour volumes for use in future all-way stop and signal warrant analysis at the intersection of TH 316 and Michael Avenue, the daily trip generation estimates were extrapolated over the 13 hours (6 AM to 7 PM) using the ITE Daily Trip Distributions for each of the respective land uses within the development. The 13-hour development trip estimates were added to the existing traffic counts with the 0.5% per year background growth applied to estimate the hourly volumes for the Michael Avenue intersection with TH 316 under 2034 Build conditions.

## 4.3 Warrant Analysis Results

Based upon the 2034 Build volumes, the intersection of TH 316 and Michael Avenue does not meet either the all-way stop or traffic signal control warrant volume thresholds. The all-way stop warrant is met for 1 hour of the required 8 hours and the intersection does not meet the warrant volume thresholds for traffic signal warrants 1, 2, or 3 for any hour analyzed.

**Table 3** shows the 2034 Build all-way stop and traffic signal warrant results for TH 316 and Michael Avenue. Complete all-way stop and traffic signal warrant analyses can be found in **Appendix C**.

Table 3 – 2034 Build Warrant Analysis Results

Intersection	All-way Stop Warrant	Traffic Signal Warrants		
		Warrant 1 (8 hour)	Warrant 2 (4 hour)	Warrant 3 (peak hour)
TH 316 and Michael Ave	Not Met	Not Met	Not Met	Not Met
	1 of 8 hours	0 of 8 hours	0 of 4 hours	0 of 1 hours

## 5 Operational Analysis

Traffic operations analysis was conducted to determine the level of service (LOS), delay, and queuing information for the AM and PM peak hour conditions.

LOS is a qualitative rating system used to describe the efficiency of traffic operations at an intersection. Six LOS are defined, designated by letters A through F. LOS A represents the best operating conditions (no congestion), and LOS F represents the worst operating conditions (severe congestion). For the study intersection it was assumed that a LOS D or better, for all approaches and the overall intersection, represent acceptable operating conditions.

LOS for intersections is determined by the average control delay per vehicle. The range of control delay for each LOS is different for signalized and unsignalized intersections. The expectation is that a signalized intersection is designed to carry higher traffic volumes and will experience greater delays than an unsignalized intersection. Driver tolerance for delay is greater at a signal than at a stop sign; therefore, the LOS thresholds for each LOS category are lower for unsignalized intersections than for signalized intersections. **Table 4** shows the LOS thresholds for signalized and unsignalized intersections.

Table 4 – Level of Service Thresholds

Level of Service	Average Vehicle Delay (sec/veh)	
	Signalized Intersection	Unsignalized (Stop or Roundabout) Intersection
A	0 to 10	0 to 10
B	> 10 and ≤ 20	> 10 and ≤ 15
C	> 20 and ≤ 35	> 15 and ≤ 25
D	> 35 and ≤ 55	> 25 and ≤ 35
E	> 55 and ≤ 80	> 35 and ≤ 50
F	> 80	> 50

All traffic operations analysis for signalized and stop controlled intersections was performed using the Synchro/SimTraffic (Version 11) software package. The results reported in this analysis are an average of 5 runs in SimTraffic 11. **Appendix D** has the complete traffic operations results.

The following scenarios were analyzed:

- 2023 Existing Conditions (**Figure 2**)
  - Existing traffic volumes, intersection geometry, and traffic control
- 2024 No Build Conditions (**Figure 3**)
  - 2024 No Build traffic volumes (0.5% per year background growth only; no development trips)
- 2024 Build Conditions (**Figure 4**)
  - 2024 Build traffic volumes (0.5% per year background growth and Phase 1 development trips)
- 2029 No Build Conditions (**Figure 5**)

- 2029 No Build traffic volumes (0.5% per year background growth only; no development trips)
- 2029 Build Conditions (**Figure 6**)
  - 2024 Build traffic volumes (0.5% per year background growth and Phase 1 and Phase 2 development trips)
- 2034 No Build Conditions (**Figure 7**)
  - 2034 No Build traffic volumes (0.5% per year background growth only; no development trips)
- 2034 Build Conditions (**Figure 8**)
  - 2034 Build traffic volumes (0.5% per year background growth and Phase 1 and Phase 2 development trips)

## 5.1 2023 Existing Conditions

During the AM peak hour, all study intersections operate acceptably with all approaches operating at LOS A and each intersection also operating at LOS A.

**Table 5** shows the 2023 existing traffic operations at the study intersections during the AM and PM peak hour.

Table 5 – 2023 Existing Traffic Operations

Intersections:	Approach	AM PEAK HOUR		PM PEAK HOUR	
		Approach (sec/LOS)	Intersection (sec/LOS)	Approach (sec/LOS)	Intersection (sec/LOS)
TH 316 at Tuttle Drive (Single Lane Roundabout)	EB	5.6 / A	5.4 / A	7.6 / A	7.1 / A
	WB	6.2 / A		7.5 / A	
	NB	2.9 / A		4.1 / A	
	SB	3.3 / A		3.7 / A	
TH 316 at Michael Ave (Minor Stop Control)	EB	0.2 / A	0.5 / A	0.3 / A	0.5 / A
	WB	0.3 / A		0.5 / A	
	NB	6.1 / A		4.3 / A	
	SB				

## 5.2 2024 No Build Conditions

With minimal traffic growth from the existing 2023 existing conditions, all approaches and study intersections continue to operate acceptably at LOS A in both peak hours.

**Table 6** shows the 2024 No Build traffic operations at the study intersections during the AM and PM peak hour.

Table 6 – 2024 No Build Traffic Operations

Intersections:	Approach	AM PEAK HOUR		PM PEAK HOUR	
		Approach (sec/LOS)	Intersection (sec/LOS)	Approach (sec/LOS)	Intersection (sec/LOS)
TH 316 at Tuttle Drive (Single Lane Roundabout)	EB	5.6 / A	5.4 / A	7.6 / A	7.1 / A
	WB	6.2 / A		7.4 / A	
	NB	3.0 / A		4.1 / A	
	SB	3.2 / A		3.7 / A	
TH 316 at Michael Ave (Minor Stop Control)	EB	0.2 / A	0.5 / A	0.3 / A	0.5 / A
	WB	0.3 / A		0.5 / A	
	NB	5.9 / A		4.5 / A	
	SB				

## 5.3 2024 Phase 1 Build Conditions

Under the Phase 1 build conditions, geometric changes were made based upon guidance received from MnDOT on January 4, 2023 as part of a provided development review memorandum. This memorandum outlined the requirement that left and right turn lanes along TH 316 would need to be provided for the development access points.

Based upon the MnDOT guidance, 300' left and right turn lanes were provided for the eastbound and westbound TH 316 approach to Michael Avenue. At the secondary access point, a westbound 300' right turn lane was provided along with an eastbound by-pass lane.

With these proposed geometric changes all intersections continue to operate at LOS A during each peak hour. All intersection approaches also operate at LOS A during both peak hours.

**Table 7** shows the 2024 Phase 1 Build traffic operations at the study intersections during the AM and PM peak hour.

Table 7 – 2024 Phase 1 Build Traffic Operations

Intersections:	Approach	AM PEAK HOUR		PM PEAK HOUR	
		Approach (sec/LOS)	Intersection (sec/LOS)	Approach (sec/LOS)	Intersection (sec/LOS)
TH 316 at Tuttle Drive (Single Lane Roundabout)	EB	6.0 / A	6.1 / A	8.4 / A	7.8 / A
	WB	7.1 / A		8.2 / A	
	NB	3.1 / A		4.5 / A	
	SB	3.9 / A		4.0 / A	
TH 316 at Michael Ave (Minor Stop Control)	EB	0.3 / A	1.5 / A	0.7 / A	1.5 / A
	WB	1.2 / A		1.3 / A	
	NB	6.4 / A		7.9 / A	
	SB	4.7 / A		5.1 / A	
TH 316 at Secondary Site Access (Minor Stop Control)	EB	0.1 / A	0.1 / A	0.2 / A	0.2 / A
	WB	0.1 / A		0.2 / A	
	NB				
	SB				

## 5.4 2029 No Build Conditions

Under the 2029 No Build Conditions, all study intersections continue to operate at LOS A with all approaches also operating at LOS A during both the AM and PM peak hours.

**Table 8** shows the 2029 No Build traffic operations at the study intersections during the AM and PM peak hour.

Table 8 – 2029 No Build Traffic Operations

Intersections:	Approach	AM PEAK HOUR		PM PEAK HOUR	
		Approach (sec/LOS)	Intersection (sec/LOS)	Approach (sec/LOS)	Intersection (sec/LOS)
TH 316 at Tuttle Drive (Single Lane Roundabout)	EB	5.8 / A	5.6 / A	8.1 / A	7.4 / A
	WB	6.4 / A		7.6 / A	
	NB	3.2 / A		4.2 / A	
	SB	3.4 / A		3.7 / A	
TH 316 at Michael Ave (Minor Stop Control)	EB	0.1 / A	0.4 / A	0.3 / A	0.6 / A
	WB	0.3 / A		0.5 / A	
	NB	5.9 / A		4.9 / A	
	SB				



## 5.5 2029 Full Build Conditions

Under the 2029 full build conditions, the same geometric improvements identified in Section 5.3 were included in the analysis. The full build out of the site includes the addition of 55 single family homes. These homes are anticipated to use the secondary access point given their relative location within the site development.

The 2029 Full Build analysis shows that all study intersections operate at LOS A and all intersection approaches operate at LOS A during both peak hours analyzed.

**Table 9** shows the 2029 Full Build traffic operations at the study intersections during the AM and PM peak hour.

Table 9 – 2029 Full Build Traffic Operations

Intersections:	Approach	AM PEAK HOUR		PM PEAK HOUR	
		Approach (sec/LOS)	Intersection (sec/LOS)	Approach (sec/LOS)	Intersection (sec/LOS)
TH 316 at Tuttle Drive (Single Lane Roundabout)	EB	6.2 / A	6.1 / A	9.6 / A	8.7 / A
	WB	7.2 / A		8.6 / A	
	NB	3.4 / A		5.3 / A	
	SB	3.8 / A		4.1 / A	
TH 316 at Michael Ave (Minor Stop Control)	EB	0.4 / A	1.5 / A	0.8 / A	1.5 / A
	WB	1.3 / A		1.4 / A	
	NB	7.2 / A		8.0 / A	
	SB	4.9 / A		5.2 / A	
TH 316 at Secondary Site Access (Minor Stop Control)	EB	0.2 / A	0.1 / A	0.7 / A	0.6 / A
	WB	0.3 / A		0.4 / A	
	NB				
	SB	3.3 / A		4.5 / A	

## 5.6 2034 No Build Conditions

Under the 2034 No Build Conditions, all study intersections operate at LOS A with all approaches also operating at LOS A during both the AM and PM peak hours.

**Table 10** shows the 2034 No Build traffic operations at the study intersections during the AM and PM peak hour.

Table 10 – 2034 No Build Traffic Operations

Intersections:	Approach	AM PEAK HOUR		PM PEAK HOUR	
		Approach (sec/LOS)	Intersection (sec/LOS)	Approach (sec/LOS)	Intersection (sec/LOS)
TH 316 at Tuttle Drive (Single Lane Roundabout)	EB	5.7 / A	5.6 / A	8.3 / A	7.7 / A
	WB	6.5 / A		8.2 / A	
	NB	3.1 / A		4.3 / A	
	SB	3.4 / A		3.9 / A	
TH 316 at Michael Ave (Minor Stop Control)	EB	0.2 / A	0.5 / A	0.3 / A	0.7 / A
	WB	0.3 / A		0.6 / A	
	NB	6.1 / A		5.3 / A	
	SB				

## 5.7 2034 Build Conditions

The 2034 full build conditions include the full build out of the development site and background traffic growth to project traffic conditions five years after full build out of the development site.

Under the estimated 2034 Build volumes all intersections operate at LOS A and all approaches also operate at LOS A in both peak hours. During the PM peak hour, left turn movements from Michael Avenue onto TH 316 operate at LOS B for northbound and LOS C for southbound.

**Table 11** shows the 2034 Build traffic operations at the study intersections during the AM and PM peak hour.

Table 11 – 2034 Full Build Traffic Operations

Intersections:	Approach	AM PEAK HOUR		PM PEAK HOUR	
		Approach (sec/LOS)	Intersection (sec/LOS)	Approach (sec/LOS)	Intersection (sec/LOS)
TH 316 at Tuttle Drive (Single Lane Roundabout)	EB	6.1 / A	6.2 / A	9.4 / A	8.5 / A
	WB	7.1 / A		8.4 / A	
	NB	3.2 / A		5.1 / A	
	SB	3.5 / A		4.1 / A	
TH 316 at Michael Ave (Minor Stop Control)	EB	0.4 / A	1.6 / A	0.8 / A	1.5 / A
	WB	1.3 / A		1.4 / A	
	NB	6.8 / A		7.3 / A	
	SB	4.9 / A		5.5 / A	
TH 316 at Secondary Site Access (Minor Stop Control)	EB	0.2 / A	0.4 / A	0.8 / A	0.7 / A
	WB	0.3 / A		0.4 / A	
	NB				
	SB	3.3 / A		4.4 / A	

## 6 Conclusion

The proposed Walden at Hastings residential development includes constructing a residential development in two phases with construction set to begin in 2024. The proposed development includes the following land uses:

### *Phase 1 (2024):*

- 54 Twin home Units (ITE Land Use: Single Family Attached Housing)
- 68 Townhome Units (ITE Land Use: Single Family Attached Housing)
- 170 Apartment Units (ITE Land Use: Multifamily Housing– Mid-rise)
- 24 Senior Units (ITE Land Use: Assisted Living)
- 60 Active Senior Living Units (ITE Land Use: Senior Adult Housing (Single Family))
- 80 Assisted Living Units (ITE Land Use: Assisted Living)

### *Phase 2 (2029):*

- 55 Single Family Homes (ITE Land Use: Single Family Detached Housing)

The proposed development is expected to generate approximately 2,709 new trips each day (180 trips in the AM peak hour and 226 trips in the PM peak hour) upon full development of the area.

The primary access points to the development will be at the intersection of Michael Avenue with TH 316 and an additional secondary access point will be provided approximately 1,300 feet to the east of Michael Avenue.

A traffic operations analysis was conducted to determine the impact of the proposed development to the surrounding roadway network. Based upon guidance provided by MnDOT, turn lanes were provided at each development access point along TH 316. With the addition of these geometric changes, all study intersections operate at LOS A and the minor stop-controlled approaches also operate at LOS A under all analyzed scenarios.

## 6.1 Recommendations

Based upon MnDOT guidance the following geometric changes are recommended for the study intersections:

- Provide dedicated 300' left and right turn lanes for both TH 316 approaches to Michael Avenue
- Provide dedicated 300' right turn lane for the westbound TH 316 approach to the secondary development access point.
- Provide eastbound bypass lane along TH 316 at the secondary development access point.

All study intersections operate acceptably under their existing intersection control:

- TH 316 and Tuttle Drive (single lane roundabout control)
- TH 316 and Michael Avenue (minor street stop control)
- TH 316 and Secondary Access Point (minor street stop control)

CMJ

# Appendix A

Site Plan





Phase 2 - Single Family Homes

# Conceptual Site Plan Study 71.1 Acres in Hastings, MN

Land Equity Development  
Aberdeen Lane, Blaine, MN



# Appendix B

August 2023 Traffic Counts



Location: MN 316 at Michael Ave  
 Count Date: 8/10/2023  
 Counted By: CountCloud



**TURNING MOVEMENT COUNT DATA**  
**All Vehicles + Total Peds/Bikes**

Start Time	N/A				MN 316				Michael Ave				MN 316				Int. Total
	Southbound				Westbound				Northbound				Eastbound				
	Left	Thru	Right	Ped/Bike	Left	Thru	Right	Ped/Bike	Left	Thru	Right	Ped/Bike	Left	Thru	Right	Ped/Bike	
6:00	0	0	0	0	0	67	0	0	1	0	0	0	0	42	0	0	110
6:15	0	0	0	0	1	79	0	0	1	0	0	0	0	48	1	0	130
6:30	0	0	0	0	1	89	0	0	2	0	0	0	0	43	0	0	135
6:45	0	0	0	0	2	71	0	0	2	0	2	0	0	43	3	0	123
7:00	0	0	0	0	1	68	0	0	3	0	2	1	0	48	1	0	123
7:15	0	0	0	0	1	86	0	0	3	0	2	0	0	61	3	0	156
7:30	0	0	0	0	2	80	0	0	3	0	1	0	0	55	2	0	143
7:45	0	0	0	0	5	72	0	0	3	0	1	0	0	63	2	0	146
8:00	0	0	0	0	6	61	0	0	8	0	0	0	0	49	9	0	133
8:15	0	0	0	0	2	56	0	0	10	0	7	0	0	56	1	0	132
8:30	0	0	0	0	8	60	0	0	3	0	6	0	0	70	6	0	153
8:45	0	0	0	0	2	52	0	0	5	0	5	0	0	54	4	0	122
9:00	0	0	0	0	7	57	0	0	7	0	2	0	0	58	6	0	137
9:15	0	0	0	0	2	57	0	0	4	0	6	0	0	49	9	0	127
9:30	0	0	0	0	4	71	0	0	8	0	4	0	0	67	11	0	165
9:45	0	0	0	0	3	53	0	0	8	0	4	0	0	62	7	0	137
10:00	0	0	0	0	5	51	0	0	6	0	4	0	0	56	2	0	124
10:15	0	0	0	0	3	65	0	0	6	0	3	0	0	65	5	0	147
10:30	0	0	0	0	4	54	0	0	9	0	6	0	0	62	8	0	143
10:45	0	0	0	2	2	65	0	0	10	0	6	0	0	75	3	0	161
11:00	0	0	0	0	5	63	0	0	5	0	4	0	0	71	5	0	153
11:15	0	0	0	0	4	61	0	0	6	0	6	2	0	67	4	0	148
11:30	0	0	0	0	5	66	0	0	2	0	7	0	0	57	5	0	142
11:45	0	0	0	0	6	72	0	0	5	0	5	0	0	62	4	0	154
12:00	0	0	0	0	5	74	0	0	5	0	4	0	0	85	6	0	179
12:15	0	0	0	0	3	64	0	2	7	0	4	0	0	72	7	0	157
12:30	0	0	0	0	5	53	0	0	3	0	5	0	0	68	3	0	137
12:45	0	0	0	0	4	64	0	0	1	0	3	0	0	79	3	0	154
13:00	0	0	0	0	4	62	0	0	4	0	10	0	0	65	2	0	147
13:15	0	0	0	0	6	68	0	0	1	0	4	0	0	73	3	0	155
13:30	0	0	0	0	3	68	0	0	5	0	5	0	0	93	7	0	181
13:45	0	0	0	0	6	64	0	0	2	0	10	0	0	75	2	0	159
14:00	0	0	0	0	4	73	0	0	3	0	9	0	0	68	4	0	161
14:15	0	0	0	0	5	71	0	0	3	0	4	0	0	97	1	0	181
14:30	0	0	0	0	2	79	0	0	2	0	7	1	0	101	0	0	191
14:45	0	0	0	0	5	72	0	0	1	0	4	0	0	84	9	0	175
15:00	0	0	0	0	6	72	0	0	3	0	7	0	0	103	3	0	194
15:15	0	0	0	0	6	86	0	0	2	0	9	0	0	97	3	0	203
15:30	0	0	0	0	7	104	0	0	3	0	3	0	0	102	7	0	226
15:45	0	0	0	0	5	95	0	0	2	0	4	0	0	102	3	0	211
16:00	0	0	0	0	5	93	0	0	3	0	6	0	0	105	6	0	218
16:15	0	0	0	0	5	110	0	0	4	0	4	0	0	116	3	0	242
16:30	0	0	0	0	3	101	0	0	6	0	7	0	0	105	1	0	223
16:45	0	0	0	0	4	95	0	0	0	0	8	0	0	122	2	0	231
17:00	0	0	0	0	3	67	0	0	1	0	8	0	0	133	2	0	214
17:15	0	0	0	0	3	93	0	0	1	0	1	0	0	110	2	0	210
17:30	0	0	0	0	2	84	0	0	2	0	5	0	0	103	4	0	200
17:45	0	0	0	0	2	69	0	0	1	0	4	0	0	111	3	0	190
18:00	0	0	0	0	3	61	0	0	3	0	2	0	0	69	3	0	141
18:15	0	0	0	0	1	77	0	0	1	0	5	0	0	73	1	0	158
18:30	0	0	0	0	2	49	0	0	0	0	2	0	0	59	1	0	113
18:45	0	0	0	0	0	46	0	0	5	0	3	0	0	72	2	0	128
Total	0	0	0	2	190	3690	0	2	194	0	230	4	0	3925	194	0	8423
Cars+	0	0	0	0	57	3493	0	0	164	0	93	0	0	3689	175	0	7671
Trucks	0	0	0	2	133	197	0	2	30	0	137	4	0	236	19	0	752
% Trucks	0.0	0.0	0.0	100.0	70.0	5.3	0.0	100.0	15.5	0.0	59.6	100.0	0.0	6.0	9.8	0.0	8.9
	0.0				8.5				39.4				6.2				

Location: MN 316 at Michael Ave  
 Count Date: 8/10/2023  
 Counted By: CountCloud



**TURNING MOVEMENT COUNT DATA**  
**Cars + Pedestrians**

Start Time	N/A				MN 316				Michael Ave				MN 316				Int. Total
	Southbound				Westbound				Northbound				Eastbound				
	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	
6:00	0	0	0	0	0	62	0	0	1	0	0	0	0	38	0	0	101
6:15	0	0	0	0	1	79	0	0	1	0	0	0	0	46	1	0	128
6:30	0	0	0	0	0	88	0	0	2	0	0	0	0	38	0	0	128
6:45	0	0	0	0	2	69	0	0	0	0	2	0	0	36	1	0	110
7:00	0	0	0	0	1	64	0	0	1	0	2	0	0	40	0	0	108
7:15	0	0	0	0	1	77	0	0	3	0	2	0	0	58	3	0	144
7:30	0	0	0	0	2	79	0	0	3	0	1	0	0	51	2	0	138
7:45	0	0	0	0	4	69	0	0	2	0	0	0	0	60	2	0	137
8:00	0	0	0	0	0	58	0	0	7	0	0	0	0	41	9	0	115
8:15	0	0	0	0	2	52	0	0	10	0	2	0	0	49	1	0	116
8:30	0	0	0	0	2	55	0	0	2	0	4	0	0	66	6	0	135
8:45	0	0	0	0	1	49	0	0	5	0	0	0	0	50	3	0	108
9:00	0	0	0	0	2	53	0	0	5	0	2	0	0	53	6	0	121
9:15	0	0	0	0	0	54	0	0	4	0	0	0	0	40	7	0	105
9:30	0	0	0	0	0	66	0	0	7	0	2	0	0	60	10	0	145
9:45	0	0	0	0	1	51	0	0	6	0	0	0	0	60	6	0	124
10:00	0	0	0	0	1	42	0	0	4	0	1	0	0	49	2	0	99
10:15	0	0	0	0	0	59	0	0	5	0	0	0	0	58	5	0	127
10:30	0	0	0	0	0	49	0	0	9	0	2	0	0	58	8	0	126
10:45	0	0	0	0	0	62	0	0	10	0	2	0	0	67	2	0	143
11:00	0	0	0	0	1	58	0	0	4	0	1	0	0	66	2	0	132
11:15	0	0	0	0	1	54	0	0	4	0	1	0	0	60	3	0	123
11:30	0	0	0	0	1	63	0	0	2	0	3	0	0	53	5	0	127
11:45	0	0	0	0	2	65	0	0	4	0	2	0	0	55	4	0	132
12:00	0	0	0	0	2	71	0	0	3	0	1	0	0	81	5	0	163
12:15	0	0	0	0	0	62	0	0	6	0	0	0	0	66	7	0	141
12:30	0	0	0	0	2	48	0	0	3	0	2	0	0	65	2	0	122
12:45	0	0	0	0	1	63	0	0	0	0	0	0	0	72	2	0	138
13:00	0	0	0	0	1	56	0	0	2	0	7	0	0	61	2	0	129
13:15	0	0	0	0	2	61	0	0	0	0	1	0	0	67	3	0	134
13:30	0	0	0	0	0	63	0	0	5	0	1	0	0	84	7	0	160
13:45	0	0	0	0	0	58	0	0	2	0	6	0	0	70	1	0	137
14:00	0	0	0	0	0	70	0	0	2	0	4	0	0	61	3	0	140
14:15	0	0	0	0	1	68	0	0	1	0	1	0	0	95	1	0	167
14:30	0	0	0	0	1	72	0	0	2	0	1	0	0	97	0	0	173
14:45	0	0	0	0	3	68	0	0	1	0	2	0	0	79	8	0	161
15:00	0	0	0	0	2	69	0	0	2	0	4	0	0	99	3	0	179
15:15	0	0	0	0	4	76	0	0	2	0	5	0	0	90	3	0	180
15:30	0	0	0	0	4	97	0	0	3	0	0	0	0	98	7	0	209
15:45	0	0	0	0	2	91	0	0	2	0	2	0	0	94	3	0	194
16:00	0	0	0	0	2	87	0	0	3	0	2	0	0	101	6	0	201
16:15	0	0	0	0	2	108	0	0	4	0	3	0	0	114	3	0	234
16:30	0	0	0	0	1	99	0	0	6	0	3	0	0	102	1	0	212
16:45	0	0	0	0	0	95	0	0	0	0	7	0	0	121	2	0	225
17:00	0	0	0	0	1	66	0	0	1	0	3	0	0	132	2	0	205
17:15	0	0	0	0	0	92	0	0	1	0	0	0	0	108	2	0	203
17:30	0	0	0	0	0	82	0	0	2	0	2	0	0	100	4	0	190
17:45	0	0	0	0	0	67	0	0	1	0	2	0	0	109	3	0	182
18:00	0	0	0	0	0	59	0	0	3	0	0	0	0	69	3	0	134
18:15	0	0	0	0	0	75	0	0	1	0	1	0	0	73	1	0	151
18:30	0	0	0	0	1	49	0	0	0	0	2	0	0	58	1	0	111
18:45	0	0	0	0	0	44	0	0	5	0	2	0	0	71	2	0	124
Total	0	0	0	0	57	3493	0	0	164	0	93	0	0	3689	175	0	7671

Location: MN 316 at Michael Ave  
 Count Date: 8/10/2023  
 Counted By: CountCloud



**TURNING MOVEMENT COUNT DATA**  
**Trucks + Bicycles**

Start Time	N/A				MN 316				Michael Ave				MN 316				Int. Total
	Southbound				Westbound				Northbound				Eastbound				
	Left	Thru	Right	Bikes	Left	Thru	Right	Bikes	Left	Thru	Right	Bikes	Left	Thru	Right	Bikes	
6:00	0	0	0	0	0	5	0	0	0	0	0	0	0	4	0	0	9
6:15	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2
6:30	0	0	0	0	1	1	0	0	0	0	0	0	0	5	0	0	7
6:45	0	0	0	0	0	2	0	0	2	0	0	0	0	7	2	0	13
7:00	0	0	0	0	0	4	0	0	2	0	0	1	0	8	1	0	15
7:15	0	0	0	0	0	9	0	0	0	0	0	0	0	3	0	0	12
7:30	0	0	0	0	0	1	0	0	0	0	0	0	0	4	0	0	5
7:45	0	0	0	0	1	3	0	0	1	0	1	0	0	3	0	0	9
8:00	0	0	0	0	6	3	0	0	1	0	0	0	0	8	0	0	18
8:15	0	0	0	0	0	4	0	0	0	0	5	0	0	7	0	0	16
8:30	0	0	0	0	6	5	0	0	1	0	2	0	0	4	0	0	18
8:45	0	0	0	0	1	3	0	0	0	0	5	0	0	4	1	0	14
9:00	0	0	0	0	5	4	0	0	2	0	0	0	0	5	0	0	16
9:15	0	0	0	0	2	3	0	0	0	0	6	0	0	9	2	0	22
9:30	0	0	0	0	4	5	0	0	1	0	2	0	0	7	1	0	20
9:45	0	0	0	0	2	2	0	0	2	0	4	0	0	2	1	0	13
10:00	0	0	0	0	4	9	0	0	2	0	3	0	0	7	0	0	25
10:15	0	0	0	0	3	6	0	0	1	0	3	0	0	7	0	0	20
10:30	0	0	0	0	4	5	0	0	0	0	4	0	0	4	0	0	17
10:45	0	0	0	2	2	3	0	0	0	0	4	0	0	8	1	0	18
11:00	0	0	0	0	4	5	0	0	1	0	3	0	0	5	3	0	21
11:15	0	0	0	0	3	7	0	0	2	0	5	2	0	7	1	0	25
11:30	0	0	0	0	4	3	0	0	0	0	4	0	0	4	0	0	15
11:45	0	0	0	0	4	7	0	0	1	0	3	0	0	7	0	0	22
12:00	0	0	0	0	3	3	0	0	2	0	3	0	0	4	1	0	16
12:15	0	0	0	0	3	2	0	2	1	0	4	0	0	6	0	0	16
12:30	0	0	0	0	3	5	0	0	0	0	3	0	0	3	1	0	15
12:45	0	0	0	0	3	1	0	0	1	0	3	0	0	7	1	0	16
13:00	0	0	0	0	3	6	0	0	2	0	3	0	0	4	0	0	18
13:15	0	0	0	0	4	7	0	0	1	0	3	0	0	6	0	0	21
13:30	0	0	0	0	3	5	0	0	0	0	4	0	0	9	0	0	21
13:45	0	0	0	0	6	6	0	0	0	0	4	0	0	5	1	0	22
14:00	0	0	0	0	4	3	0	0	1	0	5	0	0	7	1	0	21
14:15	0	0	0	0	4	3	0	0	2	0	3	0	0	2	0	0	14
14:30	0	0	0	0	1	7	0	0	0	0	6	1	0	4	0	0	18
14:45	0	0	0	0	2	4	0	0	0	0	2	0	0	5	1	0	14
15:00	0	0	0	0	4	3	0	0	1	0	3	0	0	4	0	0	15
15:15	0	0	0	0	2	10	0	0	0	0	4	0	0	7	0	0	23
15:30	0	0	0	0	3	7	0	0	0	0	3	0	0	4	0	0	17
15:45	0	0	0	0	3	4	0	0	0	0	2	0	0	8	0	0	17
16:00	0	0	0	0	3	6	0	0	0	0	4	0	0	4	0	0	17
16:15	0	0	0	0	3	2	0	0	0	0	1	0	0	2	0	0	8
16:30	0	0	0	0	2	2	0	0	0	0	4	0	0	3	0	0	11
16:45	0	0	0	0	4	0	0	0	0	0	1	0	0	1	0	0	6
17:00	0	0	0	0	2	1	0	0	0	0	5	0	0	1	0	0	9
17:15	0	0	0	0	3	1	0	0	0	0	1	0	0	2	0	0	7
17:30	0	0	0	0	2	2	0	0	0	0	3	0	0	3	0	0	10
17:45	0	0	0	0	2	2	0	0	0	0	2	0	0	2	0	0	8
18:00	0	0	0	0	3	2	0	0	0	0	2	0	0	0	0	0	7
18:15	0	0	0	0	1	2	0	0	0	0	4	0	0	0	0	0	7
18:30	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	2
18:45	0	0	0	0	0	2	0	0	0	0	1	0	0	1	0	0	4
Total	0	0	0	2	133	197	0	2	30	0	137	4	0	236	19	0	752



Location: MN 316 at Michael Ave  
 Count Date: 8/10/2023  
 Counted By: CountCloud



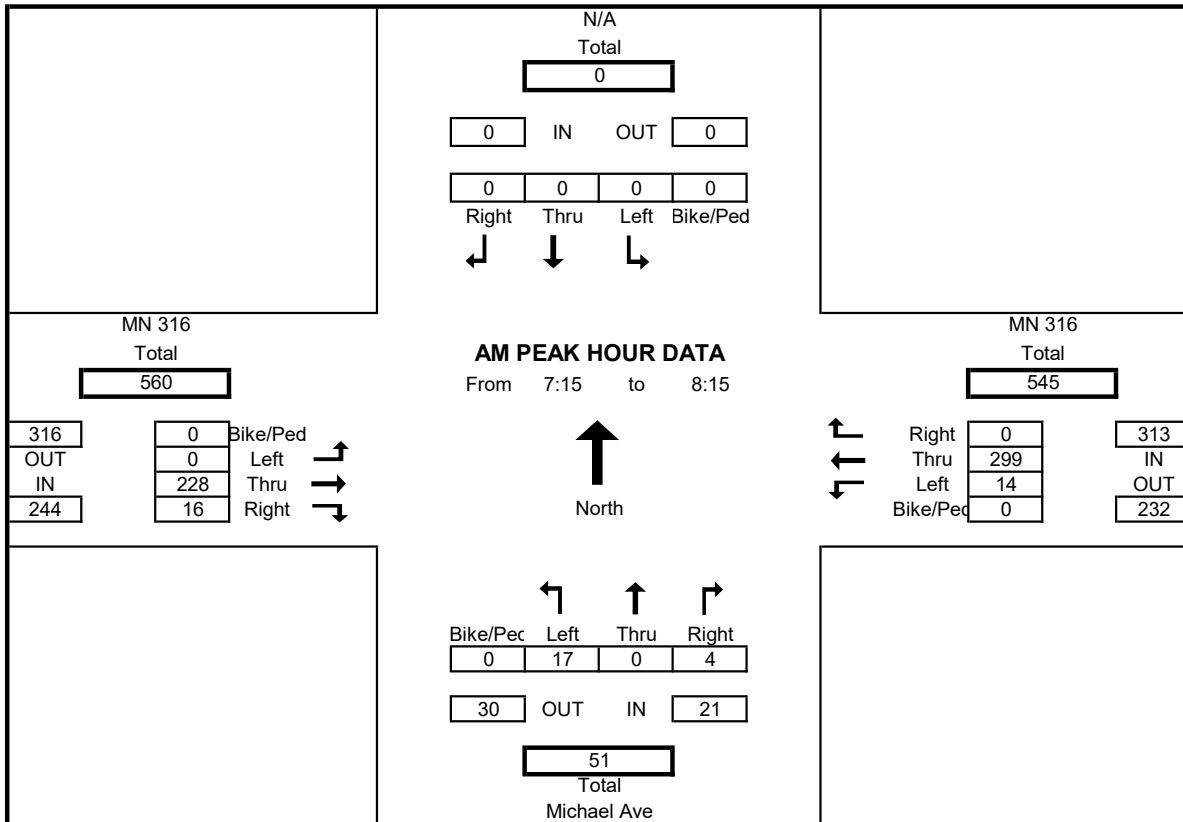
### AM PEAK HOUR TURNING MOVEMENT DATA

All Vehicles

Start Time	N/A				MN 316				Michael Ave				MN 316				Int. Total
	Southbound				Westbound				Northbound				Eastbound				
	Left	Thru	Right	Bike/Ped	Left	Thru	Right	Bike/Ped	Left	Thru	Right	Bike/Ped	Left	Thru	Right	Bike/Ped	
7:15	0	0	0	0	1	86	0	0	3	0	2	0	0	61	3	0	156
7:30	0	0	0	0	2	80	0	0	3	0	1	0	0	55	2	0	143
7:45	0	0	0	0	5	72	0	0	3	0	1	0	0	63	2	0	146
8:00	0	0	0	0	6	61	0	0	8	0	0	0	0	49	9	0	133
Total	0	0	0	0	14	299	0	0	17	0	4	0	0	228	16	0	578
% App. Total	0.0	0.0	0.0		4.5	95.5	0.0		81.0	0.0	19.0		0.0	93.4	6.6		
PHF	0.000	0.000	0.000	0.000	0.583	0.869	0.000	0.000	0.531	0.000	0.500	0.000	0.000	0.905	0.444	0.000	0.926

% Trucks	0.0	0.0	0.0	0.0	50.0	5.4	0.0	0.0	11.8	0.0	25.0	0.0	0.0	7.9	0.0	0.0	7.6
		0.0				7.3				14.3				7.4			



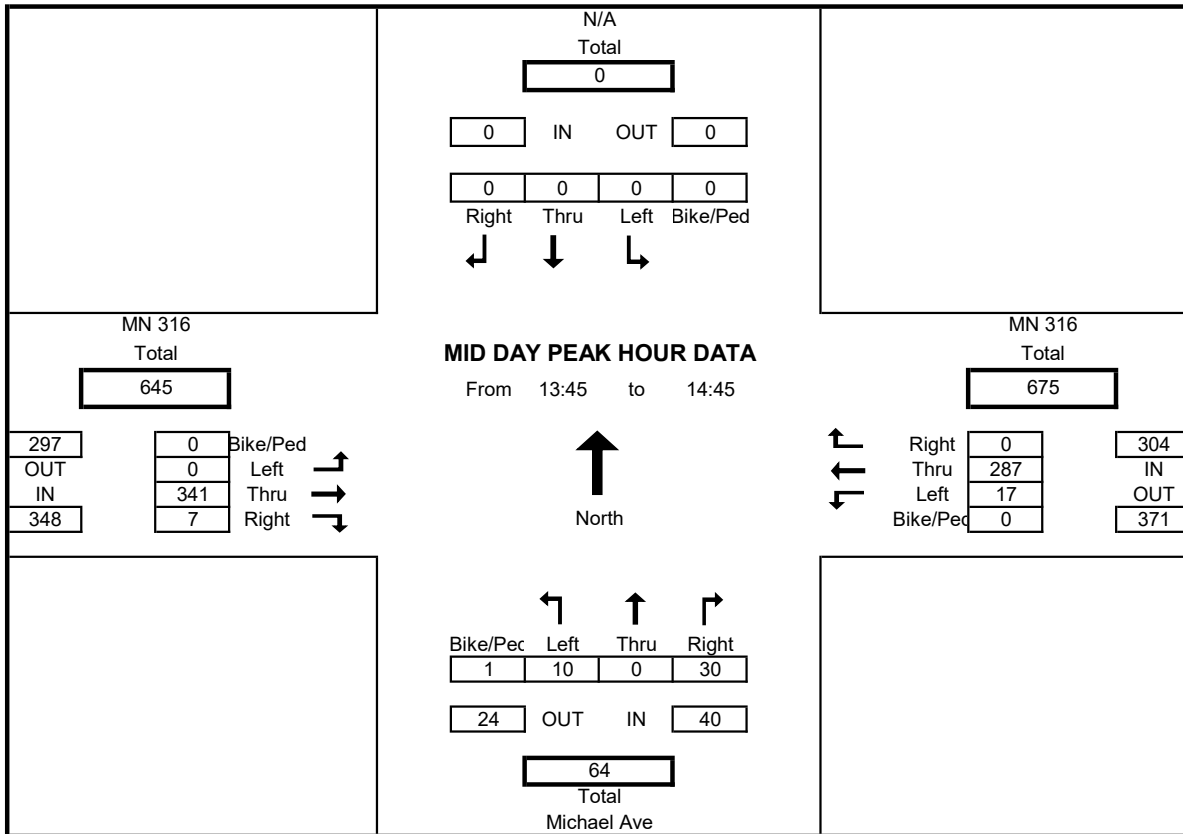
Location: MN 316 at Michael Ave  
 Count Date: 8/10/2023  
 Counted By: CountCloud



### MID DAY PEAK HOUR TURNING MOVEMENT DATA

All Vehicles

Start Time	N/A				MN 316				Michael Ave				MN 316				Int. Total
	Southbound				Westbound				Northbound				Eastbound				
	Left	Thru	Right	Bike/Pec	Left	Thru	Right	Bike/Pec	Left	Thru	Right	Bike/Pec	Left	Thru	Right	Bike/Pec	
13:45	0	0	0	0	6	64	0	0	2	0	10	0	0	75	2	0	159
14:00	0	0	0	0	4	73	0	0	3	0	9	0	0	68	4	0	161
14:15	0	0	0	0	5	71	0	0	3	0	4	0	0	97	1	0	181
14:30	0	0	0	0	2	79	0	0	2	0	7	1	0	101	0	0	191
Total	0	0	0	0	17	287	0	0	10	0	30	1	0	341	7	0	692
% App. Total	0.0	0.0	0.0		5.6	94.4	0.0		25.0	0.0	75.0		0.0	98.0	2.0		
PHF	0.000	0.000	0.000	0.000	0.708	0.908	0.000	0.000	0.833	0.000	0.750	0.250	0.000	0.844	0.438	0.000	0.906
% Trucks	0.0	0.0	0.0	0.0	88.2	6.6	0.0	0.0	30.0	0.0	60.0	100.0	0.0	5.3	28.6	0.0	10.8
	0.0				11.2				52.5				5.7				



Location: MN 316 at Michael Ave  
 Count Date: 8/10/2023  
 Counted By: CountCloud



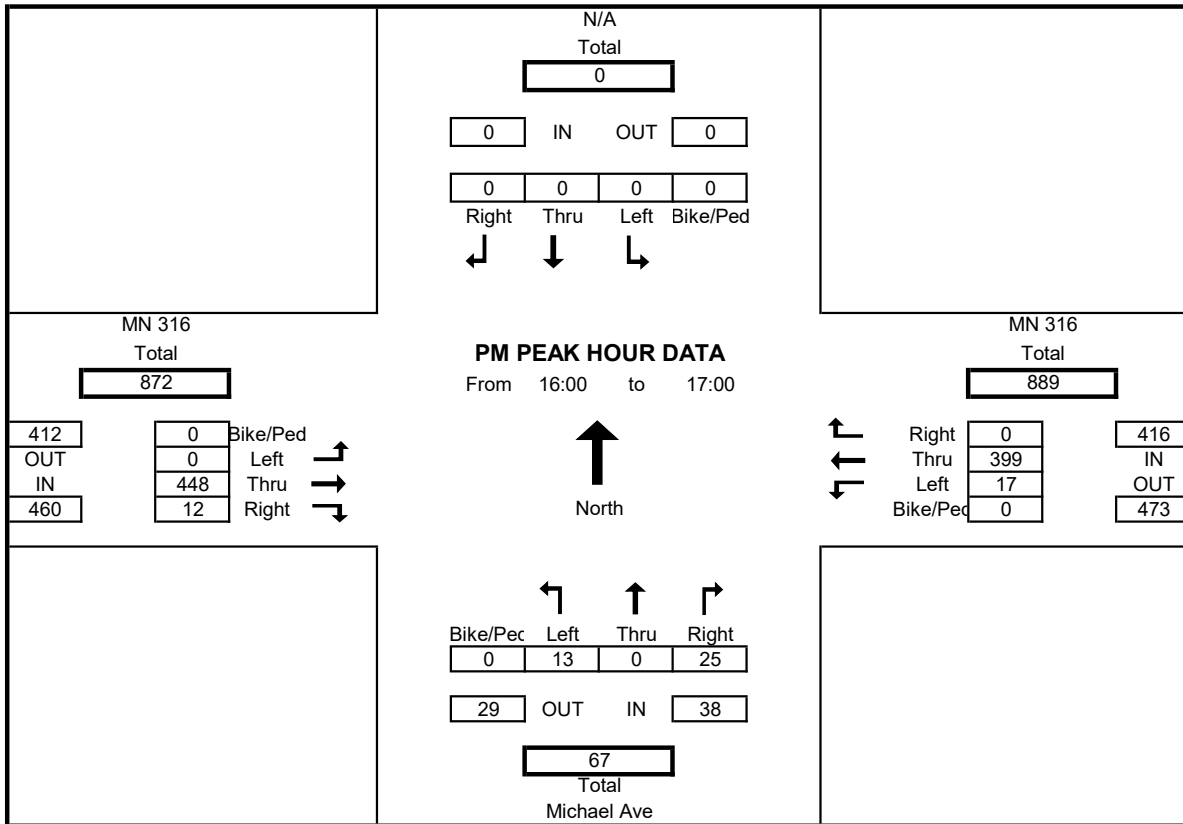
**PM PEAK HOUR TURNING MOVEMENT DATA**

All Vehicles

Start Time	N/A				MN 316				Michael Ave				MN 316				Int. Total
	Southbound				Westbound				Northbound				Eastbound				
	Left	Thru	Right	Bike/Ped	Left	Thru	Right	Bike/Ped	Left	Thru	Right	Bike/Ped	Left	Thru	Right	Bike/Ped	
16:00	0	0	0	0	5	93	0	0	3	0	6	0	0	105	6	0	218
16:15	0	0	0	0	5	110	0	0	4	0	4	0	0	116	3	0	242
16:30	0	0	0	0	3	101	0	0	6	0	7	0	0	105	1	0	223
16:45	0	0	0	0	4	95	0	0	0	0	8	0	0	122	2	0	231
Total	0	0	0	0	17	399	0	0	13	0	25	0	0	448	12	0	914
% App. Total	0.0	0.0	0.0		4.1	95.9	0.0		34.2	0.0	65.8		0.0	97.4	2.6		
PHF	0.000	0.000	0.000	0.000	0.850	0.907	0.000	0.000	0.542	0.000	0.781	0.000	0.000	0.918	0.500	0.000	0.944

% Trucks	0.0	0.0	0.0	0.0	70.6	2.5	0.0	0.0	0.0	0.0	40.0	0.0	0.0	2.2	0.0	0.0	4.6
	0.0				5.3				26.3				2.2				





Location: MN 316 at Michael Ave  
 Count Date: 8/10/2023  
 Counted By: CountCloud



**TURNING MOVEMENT COUNT DATA**  
 All Vehicles + Total Peds/Bikes

Start Time	N/A				MN 316				Michael Ave				MN 316				Int. Total
	Southbound				Westbound				Northbound				Eastbound				
	Left	Thru	Right	Ped/Bike	Left	Thru	Right	Ped/Bike	Left	Thru	Right	Ped/Bike	Left	Thru	Right	Ped/Bike	
6:00	2	0	18	0	0	65	0	0	3	0	0	0	4	40	0	0	132
6:15	2	0	15	0	0	80	2	0	6	0	0	0	4	50	1	0	160
6:30	1	0	19	0	0	91	0	0	5	0	0	0	4	44	1	0	165
6:45	0	0	27	0	0	73	0	0	9	0	0	0	4	42	2	0	157
7:00	3	1	24	0	0	69	1	0	6	1	0	0	4	48	1	1	158
7:15	2	0	24	0	0	92	2	0	9	1	0	0	14	59	4	0	207
7:30	1	1	27	0	0	79	2	0	12	0	0	0	5	58	2	0	187
7:45	0	1	25	0	0	76	1	0	9	0	0	0	11	66	5	2	194
8:00	3	0	17	0	0	73	3	0	6	0	0	0	8	53	10	0	173
8:15	0	1	18	2	0	67	3	0	6	0	1	0	9	57	5	0	167
8:30	5	0	14	0	1	64	1	0	11	0	0	0	8	70	5	1	179
8:45	3	1	18	1	1	53	2	0	14	0	1	0	10	55	12	2	170
9:00	0	0	15	0	0	63	2	0	9	1	0	0	7	63	10	0	170
9:15	1	0	8	0	1	59	0	0	10	1	1	0	9	55	5	0	150
9:30	0	0	11	0	0	76	0	0	8	0	0	0	6	81	8	0	190
9:45	2	0	13	8	0	60	2	0	11	0	0	0	13	64	9	0	174
10:00	0	1	7	3	0	54	2	0	13	1	1	0	9	56	12	0	156
10:15	1	1	9	0	0	70	2	1	10	0	0	0	6	69	10	0	178
10:30	1	0	17	0	0	63	1	0	8	0	0	0	10	71	7	0	178
10:45	2	0	13	1	0	73	3	0	7	0	0	0	11	73	8	0	190
11:00	0	0	12	1	0	68	3	0	13	0	2	0	8	76	7	0	189
11:15	1	1	12	1	2	69	1	0	12	0	0	0	3	68	8	0	177
11:30	2	0	13	0	0	63	3	0	8	1	1	0	11	65	9	0	176
11:45	2	0	7	0	0	79	0	0	13	1	0	0	15	62	7	0	186
12:00	0	0	17	0	0	81	0	0	12	0	0	0	13	85	16	0	224
12:15	1	0	8	1	0	68	0	0	8	1	0	0	14	79	8	0	187
12:30	1	0	11	0	0	59	1	0	15	1	0	0	12	73	12	0	185
12:45	0	0	18	0	1	63	1	1	12	0	1	0	6	78	13	0	193
13:00	1	0	7	0	0	67	1	0	4	1	0	0	14	66	7	0	168
13:15	1	0	11	0	0	70	0	1	4	0	0	0	17	74	11	0	188
13:30	3	1	11	0	2	69	1	0	6	0	0	0	15	99	8	0	215
13:45	0	1	14	0	0	64	1	0	13	0	0	0	11	76	6	0	186
14:00	1	1	8	0	0	78	0	0	13	1	1	0	15	70	13	0	201
14:15	0	1	11	0	0	76	2	0	4	0	1	0	18	97	6	0	216
14:30	3	0	11	0	0	76	4	0	9	0	0	0	16	96	7	0	222
14:45	0	0	14	0	1	67	1	0	7	1	0	0	10	92	10	0	203
15:00	2	0	9	1	0	83	0	0	5	0	0	0	23	112	10	0	244
15:15	4	0	19	0	0	86	4	0	9	0	2	0	15	93	9	0	241
15:30	0	1	12	1	0	99	5	0	3	0	0	0	23	106	11	0	260
15:45	1	0	12	0	0	98	2	0	6	0	0	0	29	106	17	0	271
16:00	3	0	22	0	0	97	2	0	13	1	2	0	35	111	8	0	294
16:15	0	0	22	1	0	108	5	0	9	0	0	0	32	115	10	0	301
16:30	2	1	24	0	0	102	5	0	8	1	0	0	20	102	9	0	274
16:45	1	2	35	0	0	101	0	0	12	0	0	0	36	128	13	0	328
17:00	2	0	23	0	0	65	2	0	15	1	0	0	24	124	9	0	265
17:15	2	1	12	0	0	88	0	0	2	0	0	0	27	110	7	0	249
17:30	0	0	11	4	1	91	1	0	14	1	0	0	18	105	10	0	252
17:45	1	0	13	1	1	66	1	2	4	1	1	0	17	111	7	1	223
18:00	1	0	20	2	0	63	0	0	8	0	0	0	19	74	5	0	190
18:15	1	0	8	0	0	75	5	0	6	1	0	0	15	68	8	2	187
18:30	0	0	16	0	0	48	2	0	6	0	0	0	13	62	5	0	152
18:45	1	0	12	2	1	47	0	0	7	0	0	0	12	72	7	0	159
Total	66	17	794	30	12	3834	82	5	452	18	15	0	712	4029	410	9	10441
Cars+	66	17	792	30	12	3607	80	4	445	18	15	0	712	3771	402	5	9937
Trucks	0	0	2	0	0	227	2	1	7	0	0	0	0	258	8	4	504
% Trucks	0.0	0.0	0.3	0.0	0.0	5.9	2.4	20.0	1.5	0.0	0.0	0.0	0.0	6.4	2.0	44.4	
	0.2				5.8				1.4				5.2				4.8

Location: MN 316 at Michael Ave  
 Count Date: 8/10/2023  
 Counted By: CountCloud



**TURNING MOVEMENT COUNT DATA**  
**Cars + Pedestrians**

Start Time	N/A				MN 316				Michael Ave				MN 316				Int. Total
	Southbound				Westbound				Northbound				Eastbound				
	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	
6:00	2	0	18	0	0	61	0	0	3	0	0	0	4	34	0	0	122
6:15	2	0	15	0	0	79	2	0	6	0	0	0	4	48	1	0	157
6:30	1	0	19	0	0	90	0	0	5	0	0	0	4	38	1	0	158
6:45	0	0	27	0	0	70	0	0	9	0	0	0	4	34	2	0	146
7:00	3	1	24	0	0	62	1	0	6	1	0	0	4	39	1	0	142
7:15	2	0	24	0	0	83	2	0	9	1	0	0	14	56	4	0	195
7:30	1	1	27	0	0	78	2	0	12	0	0	0	5	53	1	0	180
7:45	0	1	25	0	0	72	1	0	9	0	0	0	11	62	5	2	186
8:00	3	0	17	0	0	69	3	0	6	0	0	0	8	45	10	0	161
8:15	0	1	18	2	0	62	3	0	6	0	1	0	9	50	4	0	154
8:30	5	0	14	0	1	58	1	0	10	0	0	0	8	66	5	1	168
8:45	3	1	18	1	1	51	2	0	13	0	1	0	10	50	9	0	159
9:00	0	0	15	0	0	56	2	0	9	1	0	0	7	56	10	0	156
9:15	1	0	8	0	1	57	0	0	10	1	1	0	9	46	5	0	139
9:30	0	0	11	0	0	69	0	0	8	0	0	0	6	73	8	0	175
9:45	2	0	13	8	0	56	2	0	10	0	0	0	13	61	9	0	166
10:00	0	1	7	3	0	47	0	0	12	1	1	0	9	49	11	0	138
10:15	1	1	9	0	0	63	2	0	10	0	0	0	6	62	10	0	164
10:30	1	0	17	0	0	56	1	0	8	0	0	0	10	66	7	0	166
10:45	2	0	13	1	0	69	3	0	7	0	0	0	11	66	8	0	179
11:00	0	0	10	1	0	63	3	0	13	0	2	0	8	68	6	0	173
11:15	1	1	12	1	2	60	1	0	12	0	0	0	3	60	8	0	160
11:30	2	0	13	0	0	60	3	0	8	1	1	0	11	59	9	0	167
11:45	2	0	7	0	0	71	0	0	13	1	0	0	15	57	7	0	173
12:00	0	0	17	0	0	77	0	0	12	0	0	0	13	80	16	0	215
12:15	1	0	8	1	0	63	0	0	8	1	0	0	14	73	8	0	176
12:30	1	0	11	0	0	54	1	0	15	1	0	0	12	69	12	0	176
12:45	0	0	18	0	1	61	1	1	12	0	1	0	6	70	12	0	182
13:00	1	0	7	0	0	59	1	0	4	1	0	0	14	62	7	0	156
13:15	1	0	11	0	0	62	0	1	4	0	0	0	17	67	11	0	173
13:30	3	1	11	0	2	64	1	0	6	0	0	0	15	91	8	0	202
13:45	0	1	14	0	0	59	1	0	12	0	0	0	11	68	6	0	172
14:00	1	1	8	0	0	72	0	0	13	1	1	0	15	65	13	0	190
14:15	0	1	11	0	0	71	2	0	4	0	1	0	18	95	6	0	209
14:30	3	0	11	0	0	69	4	0	9	0	0	0	16	91	7	0	210
14:45	0	0	14	0	1	62	1	0	7	1	0	0	10	87	10	0	193
15:00	2	0	9	1	0	79	0	0	5	0	0	0	23	107	10	0	235
15:15	4	0	19	0	0	76	4	0	8	0	2	0	15	87	9	0	224
15:30	0	1	12	1	0	93	5	0	3	0	0	0	23	102	11	0	250
15:45	1	0	12	0	0	93	2	0	6	0	0	0	29	98	17	0	258
16:00	3	0	22	0	0	91	2	0	13	1	2	0	35	105	8	0	282
16:15	0	0	22	1	0	106	5	0	9	0	0	0	32	114	10	0	298
16:30	2	1	24	0	0	98	5	0	8	1	0	0	20	99	9	0	267
16:45	1	2	35	0	0	101	0	0	12	0	0	0	36	127	13	0	327
17:00	2	0	23	0	0	64	2	0	15	1	0	0	24	123	9	0	263
17:15	2	1	12	0	0	87	0	0	2	0	0	0	27	108	7	0	246
17:30	0	0	11	4	1	91	1	0	13	1	0	0	18	102	10	0	248
17:45	1	0	13	1	1	65	1	2	4	1	1	0	17	109	7	0	220
18:00	1	0	20	2	0	61	0	0	8	0	0	0	19	74	5	0	188
18:15	1	0	8	0	0	74	5	0	6	1	0	0	15	68	8	2	186
18:30	0	0	16	0	0	48	2	0	6	0	0	0	13	61	5	0	151
18:45	1	0	12	2	1	45	0	0	7	0	0	0	12	71	7	0	156
Total	66	17	792	30	12	3607	80	4	445	18	15	0	712	3771	402	5	9937

Location: MN 316 at Michael Ave  
 Count Date: 8/10/2023  
 Counted By: CountCloud



**TURNING MOVEMENT COUNT DATA**  
**Trucks + Bicycles**

Start Time	N/A				MN 316				Michael Ave				MN 316				Int. Total
	Southbound				Westbound				Northbound				Eastbound				
	Left	Thru	Right	Bikes	Left	Thru	Right	Bikes	Left	Thru	Right	Bikes	Left	Thru	Right	Bikes	
6:00	0	0	0	0	0	4	0	0	0	0	0	0	0	6	0	0	10
6:15	0	0	0	0	0	1	0	0	0	0	0	0	0	2	0	0	3
6:30	0	0	0	0	0	1	0	0	0	0	0	0	0	6	0	0	7
6:45	0	0	0	0	0	3	0	0	0	0	0	0	0	8	0	0	11
7:00	0	0	0	0	0	7	0	0	0	0	0	0	0	9	0	1	16
7:15	0	0	0	0	0	9	0	0	0	0	0	0	0	3	0	0	12
7:30	0	0	0	0	0	1	0	0	0	0	0	0	0	5	1	0	7
7:45	0	0	0	0	0	4	0	0	0	0	0	0	0	4	0	0	8
8:00	0	0	0	0	0	4	0	0	0	0	0	0	0	8	0	0	12
8:15	0	0	0	0	0	5	0	0	0	0	0	0	0	7	1	0	13
8:30	0	0	0	0	0	6	0	0	1	0	0	0	0	4	0	0	11
8:45	0	0	0	0	0	2	0	0	1	0	0	0	0	5	3	2	11
9:00	0	0	0	0	0	7	0	0	0	0	0	0	0	7	0	0	14
9:15	0	0	0	0	0	2	0	0	0	0	0	0	0	9	0	0	11
9:30	0	0	0	0	0	7	0	0	0	0	0	0	0	8	0	0	15
9:45	0	0	0	0	0	4	0	0	1	0	0	0	0	3	0	0	8
10:00	0	0	0	0	0	7	2	0	1	0	0	0	0	7	1	0	18
10:15	0	0	0	0	0	7	0	1	0	0	0	0	0	7	0	0	14
10:30	0	0	0	0	0	7	0	0	0	0	0	0	0	5	0	0	12
10:45	0	0	0	0	0	4	0	0	0	0	0	0	0	7	0	0	11
11:00	0	0	2	0	0	5	0	0	0	0	0	0	0	8	1	0	16
11:15	0	0	0	0	0	9	0	0	0	0	0	0	0	8	0	0	17
11:30	0	0	0	0	0	3	0	0	0	0	0	0	0	6	0	0	9
11:45	0	0	0	0	0	8	0	0	0	0	0	0	0	5	0	0	13
12:00	0	0	0	0	0	4	0	0	0	0	0	0	0	5	0	0	9
12:15	0	0	0	0	0	5	0	0	0	0	0	0	0	6	0	0	11
12:30	0	0	0	0	0	5	0	0	0	0	0	0	0	4	0	0	9
12:45	0	0	0	0	0	2	0	0	0	0	0	0	0	8	1	0	11
13:00	0	0	0	0	0	8	0	0	0	0	0	0	0	4	0	0	12
13:15	0	0	0	0	0	8	0	0	0	0	0	0	0	7	0	0	15
13:30	0	0	0	0	0	5	0	0	0	0	0	0	0	8	0	0	13
13:45	0	0	0	0	0	5	0	0	1	0	0	0	0	8	0	0	14
14:00	0	0	0	0	0	6	0	0	0	0	0	0	0	5	0	0	11
14:15	0	0	0	0	0	5	0	0	0	0	0	0	0	2	0	0	7
14:30	0	0	0	0	0	7	0	0	0	0	0	0	0	5	0	0	12
14:45	0	0	0	0	0	5	0	0	0	0	0	0	0	5	0	0	10
15:00	0	0	0	0	0	4	0	0	0	0	0	0	0	5	0	0	9
15:15	0	0	0	0	0	10	0	0	1	0	0	0	0	6	0	0	17
15:30	0	0	0	0	0	6	0	0	0	0	0	0	0	4	0	0	10
15:45	0	0	0	0	0	5	0	0	0	0	0	0	0	8	0	0	13
16:00	0	0	0	0	0	6	0	0	0	0	0	0	0	6	0	0	12
16:15	0	0	0	0	0	2	0	0	0	0	0	0	0	1	0	0	3
16:30	0	0	0	0	0	4	0	0	0	0	0	0	0	3	0	0	7
16:45	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
17:00	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	2
17:15	0	0	0	0	0	1	0	0	0	0	0	0	0	2	0	0	3
17:30	0	0	0	0	0	0	0	0	1	0	0	0	0	3	0	0	4
17:45	0	0	0	0	0	1	0	0	0	0	0	0	0	2	0	1	3
18:00	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	2
18:15	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
18:30	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
18:45	0	0	0	0	0	2	0	0	0	0	0	0	0	1	0	0	3
Total	0	0	2	0	0	227	2	1	7	0	0	0	0	258	8	4	504

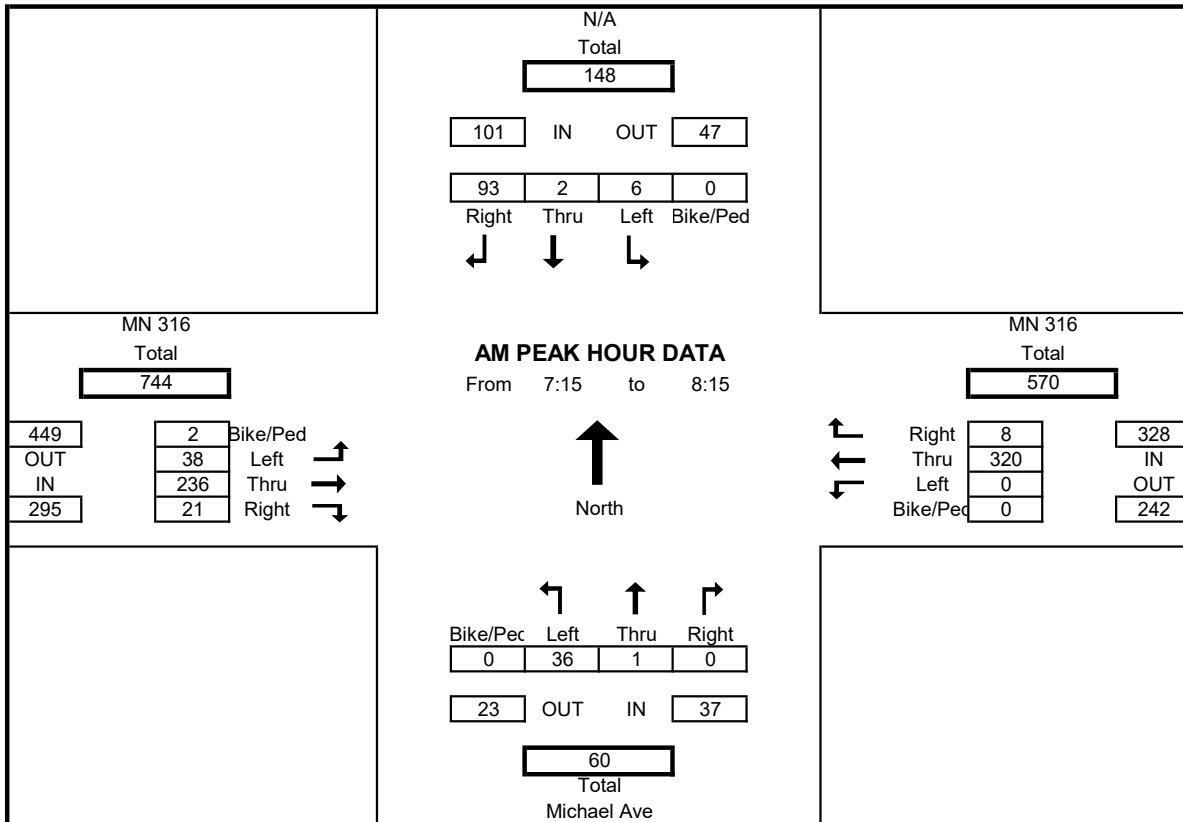
Location: MN 316 at Michael Ave  
 Count Date: 8/10/2023  
 Counted By: CountCloud



### AM PEAK HOUR TURNING MOVEMENT DATA

All Vehicles

Start Time	N/A				MN 316				Michael Ave				MN 316				Int. Total
	Southbound				Westbound				Northbound				Eastbound				
	Left	Thru	Right	Bike/Ped	Left	Thru	Right	Bike/Ped	Left	Thru	Right	Bike/Ped	Left	Thru	Right	Bike/Ped	
7:15	2	0	24	0	0	92	2	0	9	1	0	0	14	59	4	0	207
7:30	1	1	27	0	0	79	2	0	12	0	0	0	5	58	2	0	187
7:45	0	1	25	0	0	76	1	0	9	0	0	0	11	66	5	2	194
8:00	3	0	17	0	0	73	3	0	6	0	0	0	8	53	10	0	173
Total	6	2	93	0	0	320	8	0	36	1	0	0	38	236	21	2	761
% App. Total	5.9	2.0	92.1		0.0	97.6	2.4		97.3	2.7	0.0		12.9	80.0	7.1		
PHF	0.500	0.500	0.861	0.000	0.000	0.870	0.667	0.000	0.750	0.250	0.000	0.000	0.679	0.894	0.525	0.250	0.919
% Trucks	0.0	0.0	0.0	0.0	0.0	5.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.5	4.8	0.0	5.1
	0.0				5.5				0.0				7.1				





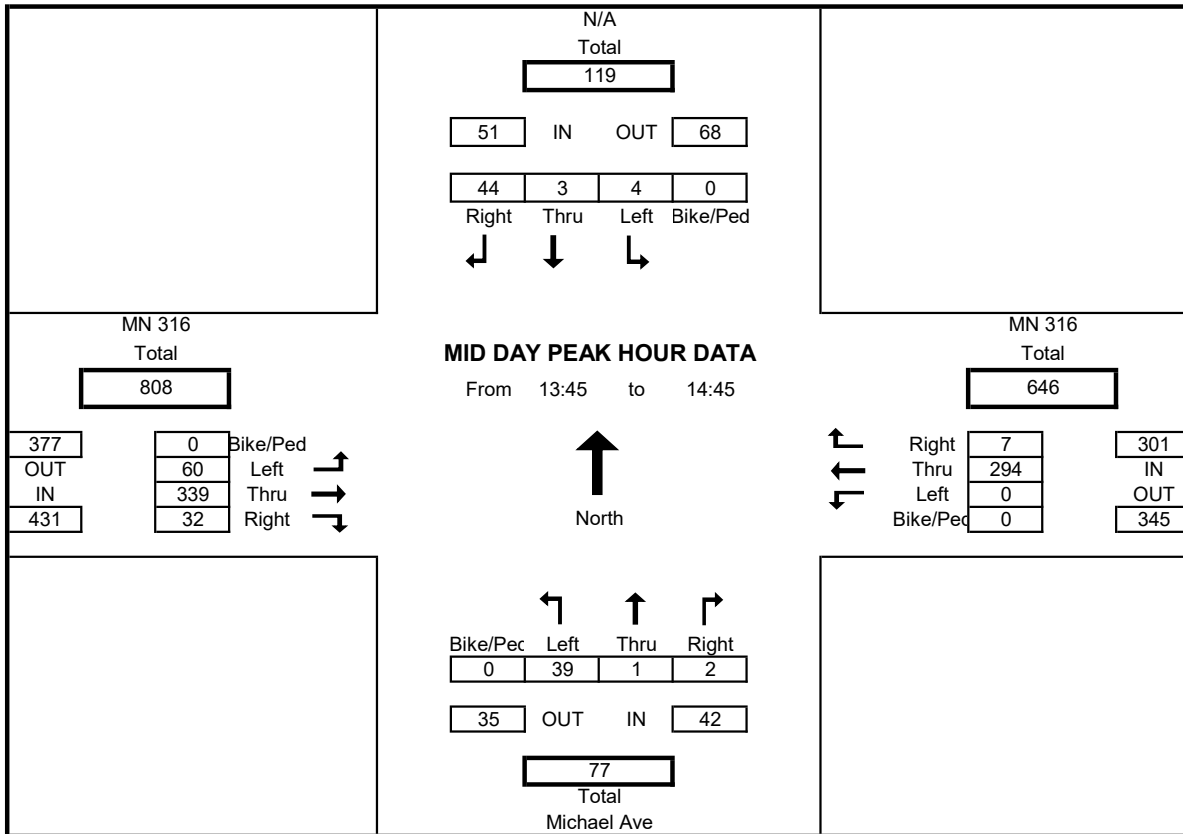
Location: MN 316 at Michael Ave  
 Count Date: 8/10/2023  
 Counted By: CountCloud



### MID DAY PEAK HOUR TURNING MOVEMENT DATA

All Vehicles

Start Time	N/A				MN 316				Michael Ave				MN 316				Int. Total
	Southbound				Westbound				Northbound				Eastbound				
	Left	Thru	Right	Bike/Pec	Left	Thru	Right	Bike/Pec	Left	Thru	Right	Bike/Pec	Left	Thru	Right	Bike/Pec	
13:45	0	1	14	0	0	64	1	0	13	0	0	0	11	76	6	0	186
14:00	1	1	8	0	0	78	0	0	13	1	1	0	15	70	13	0	201
14:15	0	1	11	0	0	76	2	0	4	0	1	0	18	97	6	0	216
14:30	3	0	11	0	0	76	4	0	9	0	0	0	16	96	7	0	222
Total	4	3	44	0	0	294	7	0	39	1	2	0	60	339	32	0	825
% App. Total	7.8	5.9	86.3		0.0	97.7	2.3		92.9	2.4	4.8		13.9	78.7	7.4		
PHF	0.333	0.750	0.786	0.000	0.000	0.942	0.438	0.000	0.750	0.250	0.500	0.000	0.833	0.874	0.615	0.000	0.929
% Trucks	0.0	0.0	0.0	0.0	0.0	7.8	0.0	0.0	2.6	0.0	0.0	0.0	0.0	5.9	0.0	0.0	
	0.0				7.6				2.4				4.6				5.3



Location: MN 316 at Michael Ave  
 Count Date: 8/10/2023  
 Counted By: CountCloud



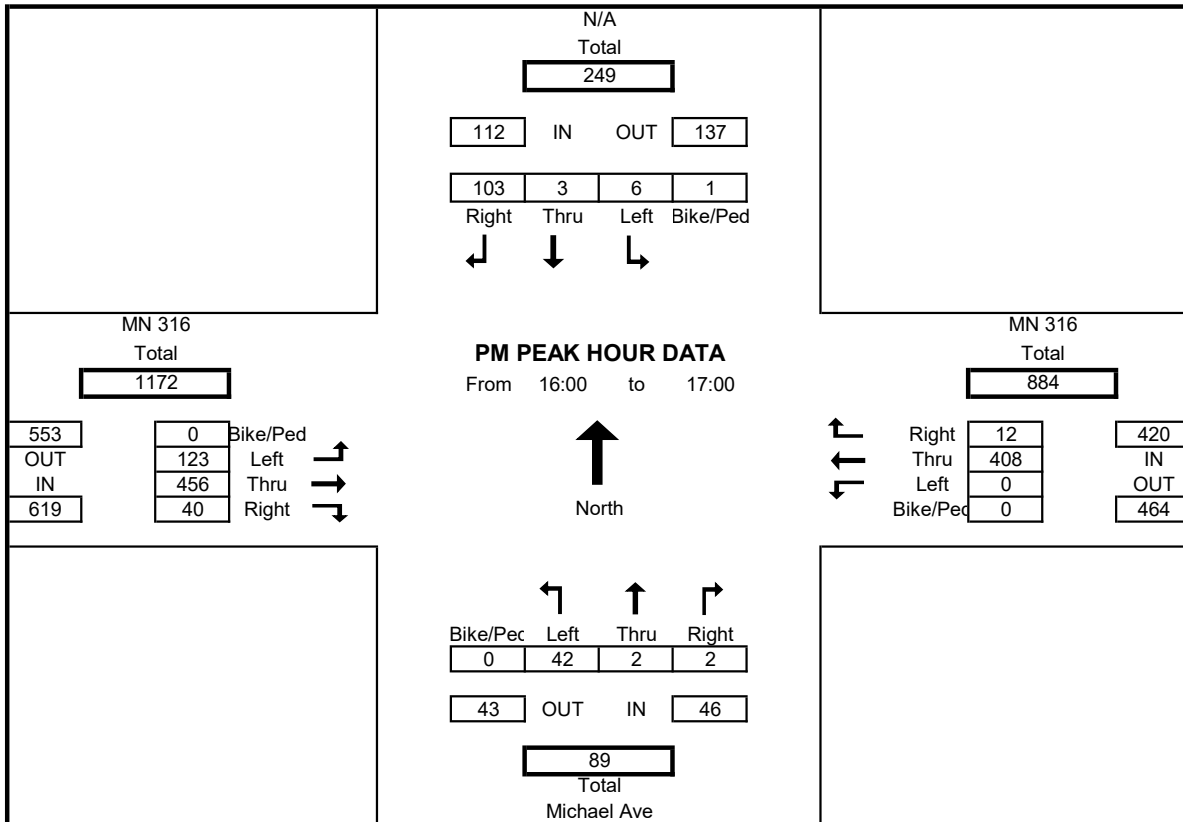
### PM PEAK HOUR TURNING MOVEMENT DATA

All Vehicles

Start Time	N/A				MN 316				Michael Ave				MN 316				Int. Total
	Southbound				Westbound				Northbound				Eastbound				
	Left	Thru	Right	Bike/Ped	Left	Thru	Right	Bike/Ped	Left	Thru	Right	Bike/Ped	Left	Thru	Right	Bike/Ped	
16:00	3	0	22	0	0	97	2	0	13	1	2	0	35	111	8	0	294
16:15	0	0	22	1	0	108	5	0	9	0	0	0	32	115	10	0	301
16:30	2	1	24	0	0	102	5	0	8	1	0	0	20	102	9	0	274
16:45	1	2	35	0	0	101	0	0	12	0	0	0	36	128	13	0	328
Total	6	3	103	1	0	408	12	0	42	2	2	0	123	456	40	0	1197
% App. Total	5.4	2.7	92.0		0.0	97.1	2.9		91.3	4.3	4.3		19.9	73.7	6.5		
PHF	0.500	0.375	0.736	0.250	0.000	0.944	0.600	0.000	0.808	0.500	0.250	0.000	0.854	0.891	0.769	0.000	0.912

% Trucks	0.0	0.0	0.0	0.0	0.0	2.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.4	0.0	0.0	1.9
	0.0				2.9				0.0				1.8				



# Appendix C

Detailed Warrant Analysis Results

**TH 316 at Michael Avenue - 2034 Full Build  
ALL WAY STOP  
WARRANT ANALYSIS**

X-C-01

**LOCATION:** TH 316 at Michael Avenue  
**COUNTY:** Dakota  
**REF. POINT:** 0  
**DATE:** 8/27/2023

**OPERATOR:** BA

85 <sup>th</sup> % Speed	Approach Description	Lanes	Approach Total
60	Major App1: TH 316 EB	2	5129
60	Major App3: TH 316 WB	2	4139
30	Minor App2: Michael Avenue NB	1	442
30	Minor App4: Michael Avenue SB	1	898

0.70 SPEED FACTOR USED? **Yes**

**Minimum Volume Requirement  
210 140**

HOUR	MAJOR	MAJOR	MINOR	MINOR	MAJOR APPROACH TOTAL	MINOR APPROACH TOTAL	WARRANT MET
	APP. 1	APP. 3	APP. 2	APP. 4	Σ (APP.1 + APP. 3)	Σ (APP.2 + APP. 4)	MAJOR / MINOR
0:00 - 1:00	0	0	0	0	0	0	NO / NO
1:00 - 2:00	0	0	0	0	0	0	NO / NO
2:00 - 3:00	0	0	0	0	0	0	NO / NO
3:00 - 4:00	0	0	0	0	0	0	NO / NO
4:00 - 5:00	0	0	0	0	0	0	NO / NO
5:00 - 6:00	0	0	0	0	0	0	NO / NO
6:00 - 7:00	207	329	8	66	536	74	YES / NO
7:00 - 8:00	289	337	18	117	626	135	YES / NO
8:00 - 9:00	299	265	46	98	564	144	<b>YES / YES</b>
9:00 - 10:00	317	272	46	68	589	114	YES / NO
10:00 - 11:00	326	267	53	56	593	109	YES / NO
11:00 - 12:00	338	303	42	56	641	98	YES / NO
12:00 - 13:00	397	294	33	62	691	95	YES / NO
13:00 - 14:00	393	303	44	54	696	98	YES / NO
14:00 - 15:00	440	334	34	56	774	90	YES / NO
15:00 - 16:00	554	371	35	57	925	92	YES / NO
16:00 - 17:00	579	449	39	67	1028	106	YES / NO
17:00 - 18:00	603	352	23	75	955	98	YES / NO
18:00 - 19:00	387	263	21	66	650	87	YES / NO
19:00 - 20:00	0	0	0	0	0	0	NO / NO
20:00 - 21:00	0	0	0	0	0	0	NO / NO
21:00 - 22:00	0	0	0	0	0	0	NO / NO
22:00 - 23:00	0	0	0	0	0	0	NO / NO
23:00 - 24:00	0	0	0	0	0	0	NO / NO
<b>Daily</b>	<b>5129</b>	<b>4139</b>	<b>442</b>	<b>898</b>			

**Hours met for warrant:** Met (Hr) **1** Required (Hr) **8**

**All-way Stop Warrant:** **Not satisfied**

REMARKS: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



## TH 316 at Michael Avenue - 2034 Full Build SIGNAL WARRANT ANALYSIS Warrant 1 and Summary

X-C-01

LOCATION: TH 316 at Michael Avenue

COUNTY: Dakota

REF. POINT: 0

DATE: 8/27/2023

OPERATOR: BA

85 <sup>th</sup> Speed	Approach Description		Lanes	Approach
60	Major App1:	TH 316 EB	2	5129
60	Major App3:	TH 316 WB	2	4139
30	Minor App2:	Michael Avenue NB	1	196
30	Minor App4:	Michael Avenue SB	1	92

40 MPH OR FASTER? YES  
 POPULATION < 10,000? NO  
 VOLUME REQ. AT 70%? YES

CORRECTABLE CRASHES: 0  
 (12-month period)

	Minimum Volume Requirement		
	1A	1B	1A&B (80%)
Major Total	420	630	504
Minor Approach	105	53	84

HOUR	MAJOR	MAJOR	MINOR	MINOR	MAJOR APPROACH TOTAL	MAX MINOR APPROACH	WARRANT 1A - 8 hr	WARRANT 1B - 8 hr	WARRANT 1A & B
	APP. 1	APP. 3	APP. 2	APP. 4	Σ (APP.1 + APP. 3)	(APP. 2 or 4)	MAJOR/MINOR	MAJOR/MINOR	MAJOR/MINOR
0:00 - 1:00	0	0	0	0	0	0	NO / NO	NO / NO	NO / NO
1:00 - 2:00	0	0	0	0	0	0	NO / NO	NO / NO	NO / NO
2:00 - 3:00	0	0	0	0	0	0	NO / NO	NO / NO	NO / NO
3:00 - 4:00	0	0	0	0	0	0	NO / NO	NO / NO	NO / NO
4:00 - 5:00	0	0	0	0	0	0	NO / NO	NO / NO	NO / NO
5:00 - 6:00	0	0	0	0	0	0	NO / NO	NO / NO	NO / NO
6:00 - 7:00	207	329	6	7	536	7	YES / NO	NO / NO	YES / NO
7:00 - 8:00	289	337	12	12	626	12	YES / NO	NO / NO	YES / NO
8:00 - 9:00	299	265	27	10	564	27	YES / NO	NO / NO	YES / NO
9:00 - 10:00	317	272	27	7	589	27	YES / NO	NO / NO	YES / NO
10:00 - 11:00	326	267	32	6	593	32	YES / NO	NO / NO	YES / NO
11:00 - 12:00	338	303	18	6	641	18	YES / NO	YES / NO	YES / NO
12:00 - 13:00	397	294	16	6	691	16	YES / NO	YES / NO	YES / NO
13:00 - 14:00	393	303	12	5	696	12	YES / NO	YES / NO	YES / NO
14:00 - 15:00	440	334	9	6	774	9	YES / NO	YES / NO	YES / NO
15:00 - 16:00	554	371	10	6	925	10	YES / NO	YES / NO	YES / NO
16:00 - 17:00	579	449	13	7	1028	13	YES / NO	YES / NO	YES / NO
17:00 - 18:00	603	352	5	7	955	7	YES / NO	YES / NO	YES / NO
18:00 - 19:00	387	263	9	7	650	9	YES / NO	YES / NO	YES / NO
19:00 - 20:00	0	0	0	0	0	0	NO / NO	NO / NO	NO / NO
20:00 - 21:00	0	0	0	0	0	0	NO / NO	NO / NO	NO / NO
21:00 - 22:00	0	0	0	0	0	0	NO / NO	NO / NO	NO / NO
22:00 - 23:00	0	0	0	0	0	0	NO / NO	NO / NO	NO / NO
23:00 - 24:00	0	0	0	0	0	0	NO / NO	NO / NO	NO / NO
<b>Daily</b>	<b>5129</b>	<b>4139</b>	<b>196</b>	<b>92</b>					

	Met (Hr)	Required (Hr)	WARRANT MET:
<b>Warrant 1 Eight Hour Volumes</b>	0	8	Not satisfied
Warrant 1A Minimum Vehicular Volume	0	8	Not satisfied
Warrant 1B Interruption of Continuous Flow	0	8	Not satisfied
1A & 1B Combination of Warrants	0	8	Not satisfied
<b>Warrant 2 Four Hour Volumes</b>	0	4	Not satisfied
<b>Warrant 3 Peak Hour Volumes</b>	0	1	Not satisfied
<b>Warrant 7 Crash Experience</b>	0	8	Not satisfied

COMMENTS: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

## TH 316 at Michael Avenue - 2034 Full Build SIGNAL WARRANT ANALYSIS Warrants 2 and 3

X-C-01

LOCATION: TH 316 at Michael Avenue

COUNTY: Dakota

REF. POINT: 0

DATE: 8/27/2023

OPERATOR: BA

40 MPH OR FASTER? YES

POPULATION < 10,000? NO

VOLUME REQ. AT 70%? YES

85 <sup>th</sup> Speed	Approach Description	Lanes	Approach
60	Major App1: TH 316 EB	2	5129
60	Major App3: TH 316 WB	2	4139
30	Minor App2: Michael Avenue NB	1	196
30	Minor App4: Michael Avenue SB	1	92

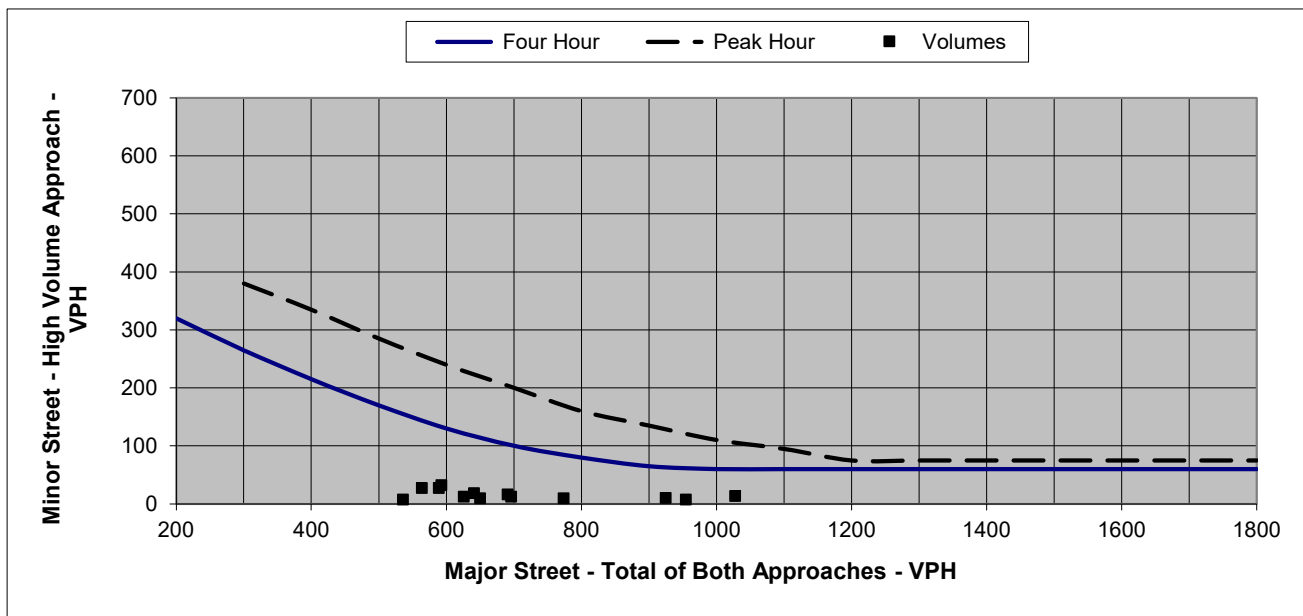


Figure 1. Four Hour and Peak Hour Warrant Analysis

Note: For data points outside the graph range, check the minor street volume against the lower thresholds

Warrant Criteria (Graph)		
Major Approach	Minor App. Four Hour	Minor App. Peak Hour
200	320	
300	265	380
400	215	335
500	170	285
600	130	240
700	100	200
800	80	160
900	65	135
1000	60	110
1100	60	95
1200	60	75
1300	60	75
1400	60	75
1500	60	75
1600	60	75
1700	60	75
1800	60	75

Actual Hourly Count			Warrants Met:	
HOURLY	Sum Major App.	Max Minor App.	Four Hour	Peak Hour
0:00 - 1:00	0	0	NO	NO
1:00 - 2:00	0	0	NO	NO
2:00 - 3:00	0	0	NO	NO
3:00 - 4:00	0	0	NO	NO
4:00 - 5:00	0	0	NO	NO
5:00 - 6:00	0	0	NO	NO
6:00 - 7:00	536	7	NO	NO
7:00 - 8:00	626	12	NO	NO
8:00 - 9:00	564	27	NO	NO
9:00 - 10:00	589	27	NO	NO
10:00 - 11:00	593	32	NO	NO
11:00 - 12:00	641	18	NO	NO
12:00 - 13:00	691	16	NO	NO
13:00 - 14:00	696	12	NO	NO
14:00 - 15:00	774	9	NO	NO
15:00 - 16:00	925	10	NO	NO
16:00 - 17:00	1028	13	NO	NO
17:00 - 18:00	955	7	NO	NO
18:00 - 19:00	650	9	NO	NO
19:00 - 20:00	0	0	NO	NO
20:00 - 21:00	0	0	NO	NO
21:00 - 22:00	0	0	NO	NO
22:00 - 23:00	0	0	NO	NO
23:00 - 24:00	0	0	NO	NO

# Appendix D

Operational MOE Tables





**Table A2**  
**Walden at Hastings Residential Development**  
**No-Build (2024)**  
**AM & PM Peak Hours**

Intersection	Approach	Demand Volumes				Delay (s/veh)						LOS By Approach		LOS By Intersection		Vehicle Queuing Information (feet)																										
		L	T	R	Total	L	LOS	T	LOS	R	LOS	Delay (S/Veh)	LOS	Delay (S/Veh)	LOS	Left Turn Lane			Through Lane (s)						Right Turn Lane																	
																	Storage (feet) <sup>3</sup>	Avg. Queue (feet) <sup>1</sup>	Max Queue (feet) <sup>1</sup>	% Block Thru <sup>(2)</sup> ---->	% Block Left <sup>(2)</sup> <----	Link Length (feet)	Avg. Queue (feet) <sup>1</sup>	Max Queue (feet) <sup>1</sup>	% Block Right <sup>(2)</sup> ---->	% Block Thru <sup>(2)</sup> <----	Storage (feet) <sup>3</sup>	Avg. Queue (feet) <sup>1</sup>	Max Queue (feet) <sup>1</sup>													
AM Peak Hour	TH 316 at Tuttle Drive	EB	38	237	21	296	3.3	A	6.2	A	3.4	A	5.6	A	5.4	A						815	20	20																		
		WB		322	8	330			6.3	A	3.4	A	6.2	A										1108	20	69																
		NB	36	1		37	3.0	A	2.4	A			3.0	A										394	20	31																
		SB	6	2	93	101	3.5	A	4.7	A	3.2	A	3.2	A										483	20	50																
	TH 316 at Michael Ave	EB		229	16	245			0.2	A	0.0	A	0.2	A	0.5	A																										
		WB	14	300		314	1.1	A	0.3	A			0.3	A										176	20	31																
		NB	17		4	21	6.5	A			3.4	A	5.9	A										354	20	45																
		SB											0.0	A																												
	TH 316 at Secondary Access	EB		233		233			0.1	A			0.1	A	0.1	A																										
		WB		315		315			0.1	A			0.1	A																												
		NB											0.0	A																												
		SB											0.0	A																												
PM Peak Hour	TH 316 at Tuttle Drive	EB	124	458	40	622	5.4	A	8.4	A	5.2	A	7.6	A	7.0	A						815	20	49																		
		WB		410	12	422			7.5	A	4.4	A	7.4	A										1108	30	92																
		NB	42	2	2	46	3.9	A	5.4	A	5.1	A	4.1	A										394	20	57																
		SB	6	3	104	113	4.3	A	4.4	A	3.6	A	3.7	A										483	20	57																
	TH 316 at Michael Ave	EB		450	12	462			0.3	A	0.0	A	0.3	A	0.5	A																										
		WB	17	401		418	2.3	A	0.4	A			0.5	A										176	20	42																
		NB	13		25	38	7.7	A			3.1	A	4.5	A										354	22	48																
		SB											0.0	A																												
	TH 316 at Secondary Access	EB		475		475			0.2	A			0.2	A	0.2	A																										
		WB		418		418			0.2	A			0.2	A																												
		NB											0.0	A																												
		SB											0.0	A																												

**NOTES**

1. If the reported queue is greater than zero (0), but less than 20 ft, a minimum of 20 ft is reported.
2. Block Percentage is proportion of analysis time (1 hour) the storage lane or through lane is blocked or blocking.
3. Multiple storage lanes of different length are averaged together to show the "Effective Storage Length" per lane.

**Table A3**  
**Walden at Hastings Residential Development**  
**Phase 1 Build (2024)**  
**AM & PM Peak Hours**

Intersection	Approach	Demand Volumes											Delay (s/veh)				LOS By Approach		LOS By Intersection		Vehicle Queuing Information (feet)																											
		Demand Volumes				Delay (s/veh)				LOS By Approach		LOS By Intersection		Left Turn Lane			Through Lane (s)						Right Turn Lane																									
		L	T	R	Total	L	LOS	T	LOS	R	LOS	Delay (S/Veh)	LOS	Delay (S/Veh)	LOS	Storage (feet) <sup>3</sup>	Avg. Queue (feet) <sup>1</sup>	Max Queue (feet) <sup>1</sup>	% Block Thru <sup>(2)</sup> <--->	% Block Left <sup>(2)</sup> <---	Link Length (feet)	Avg. Queue (feet) <sup>1</sup>	Max Queue (feet) <sup>1</sup>	% Block Right <sup>(2)</sup> <---	% Block Thru <sup>(2)</sup> <---	Storage (feet) <sup>3</sup>	Avg. Queue (feet) <sup>1</sup>	Max Queue (feet) <sup>1</sup>																				
AM Peak Hour	TH 316 at Tuttle Drive	EB	38	273	21	332	3.5	A	6.6	A	3.6	A	6.0	A	6.1	A						815	20	22																								
		WB		413	8	421			7.1	A	5.4	A	7.1	A									1108	20	78																							
		NB	36	1		37	3.1	A	2.9	A			3.1	A										394	20	45																						
		SB	6	2	93	101	5.1	A	4.9	A	3.8	A	3.9	A										483	20	64																						
	TH 316 at Michael Ave	EB	36	229	16	281	1.1	A	0.2	A	0.0	A	0.3	A	1.5	A	300	20	30																													
		WB	14	300	4	318	0.8	A	1.2	A	0.1	A	1.2	A																																		
		NB	17		4	21	7.1	A			2.1	A	6.4	A										347	20	49																						
		SB	10		91	101	8.1	A			4.3	A	4.7	A										612	28	65																						
	TH 316 at Secondary Access	EB		243		243			0.1	A			0.1	A	0.1	A																																
		WB		319		319			0.1	A			0.1	A																																		
		NB											0.0	A																																		
		SB											0.0	A																																		
PM Peak Hour	TH 316 at Tuttle Drive	EB	124	548	40	712	6.3	A	9.0	A	6.1	A	8.4	A	7.8	A						815	20	69																								
		WB		477	12	489			8.3	A	4.8	A	8.2	A										1108	35	116																						
		NB	42	2	2	46	4.5	A	4.2	A	5.3	A	4.5	A										394	20	51																						
		SB	6	3	104	113	4.5	A	5.9	A	3.9	A	4.0	A										483	23	75																						
	TH 316 at Michael Ave	EB	90	450	12	552	2.3	A	0.4	A	0.0	A	0.7	A	1.5	A	300	20	51																													
		WB	17	401	10	428	1.5	A	1.3	A	0.1	A	1.3	A																																		
		NB	13		25	38	15.2	C			3.8	A	7.9	A										347	20	45																						
		SB	7		67	74	11.8	B			4.3	A	5.1	A										612	25	76																						
	TH 316 at Secondary Access	EB		482		482			0.2	A			0.2	A	0.2	A																																
		WB		428		428			0.2	A			0.2	A																																		
		NB											0.0	A																																		
		SB											0.0	A																																		

**NOTES**

1. If the reported queue is greater than zero (0), but less than 20 ft, a minimum of 20 ft is reported.
2. Block Percentage is proportion of analysis time (1 hour) the storage lane or through lane is blocked or blocking.
3. Multiple storage lanes of different length are averaged together to show the "Effective Storage Length" per lane.

**Table A4**  
**Walden at Hastings Residential Development**  
**No-Build (2029)**  
**AM & PM Peak Hours**

Intersection	Approach	Demand Volumes				Delay (s/veh)						LOS By Approach		LOS By Intersection		Vehicle Queuing Information (feet)																				
		L	T	R	Total	L	LOS	T	LOS	R	LOS	Delay (S/Veh)	LOS	Delay (S/Veh)	LOS	Left Turn Lane				Through Lane (s)				Right Turn Lane												
																	Storage (feet) <sup>3</sup>	Avg. Queue (feet) <sup>1</sup>	Max Queue (feet) <sup>1</sup>	% Block Thru <sup>(2)</sup> <---->	% Block Left <sup>(2)</sup> <----	Link Length (feet)	Avg. Queue (feet) <sup>1</sup>	Max Queue (feet) <sup>1</sup>	% Block Right <sup>(2)</sup> <---->	% Block Thru <sup>(2)</sup> <----	Storage (feet) <sup>3</sup>	Avg. Queue (feet) <sup>1</sup>	Max Queue (feet) <sup>1</sup>							
AM Peak Hour	TH 316 at Tuttle Drive	EB	39	243	22	304	3.4	A	6.3	A	3.6	A	5.8	A	5.6	A						815	20	43												
		WB		330	8	338			6.5	A	3.5	A	6.4	A										1108	20	66										
		NB	37	1		38	3.1	A	5.3	A			3.2	A										394	20	31										
		SB	6	2	96	104	3.9	A	4.8	A	3.3	A	3.4	A										483	20	44										
	TH 316 at Michael Ave	EB		235	16	251			0.1	A	0.0	A	0.1	A	0.4	A																				
		WB	14	308		322	1.1	A	0.3	A			0.3	A										176	20	30										
		NB	18		4	22	6.8	A			3.0	A	5.9	A										354	20	36										
		SB											0.0	A																						
	TH 316 at Secondary Access	EB		239		239			0.1	A			0.1	A	0.1	A																				
		WB		322		322			0.1	A			0.1	A																						
		NB											0.0	A																						
		SB											0.0	A																						
PM Peak Hour	TH 316 at Tuttle Drive	EB	127	470	41	638	5.9	A	8.9	A	6.3	A	8.1	A	7.4	A						815	20	120												
		WB		420	12	432			7.7	A	4.1	A	7.6	A										1108	34	116										
		NB	43	2	2	47	4.1	A	4.7	A	4.8	A	4.2	A										394	20	58										
		SB	6	3	106	115	3.5	A	4.6	A	3.7	A	3.7	A										483	20	58										
	TH 316 at Michael Ave	EB		461	12	473			0.3	A	0.0	A	0.3	A	0.6	A																				
		WB	18	411		429	2.1	A	0.4	A			0.5	A										176	20	51										
		NB	13		26	39	8.5	A			3.1	A	4.9	A										354	24	49										
		SB											0.0	A																						
	TH 316 at Secondary Access	EB		487		487			0.2	A			0.2	A	0.2	A																				
		WB		428		428			0.2	A			0.2	A																						
		NB											0.0	A																						
		SB											0.0	A																						

**NOTES**

1. If the reported queue is greater than zero (0), but less than 20 ft, a minimum of 20 ft is reported.
2. Block Percentage is proportion of analysis time (1 hour) the storage lane or through lane is blocked or blocking.
3. Multiple storage lanes of different length are averaged together to show the "Effective Storage Length" per lane.

**Table A5**  
**Walden at Hastings Residential Development**  
**Full Build (2029)**  
**AM & PM Peak Hours**

Intersection	Approach	Demand Volumes											Delay (s/veh)				LOS By Approach		LOS By Intersection		Vehicle Queuing Information (feet)																									
		Demand Volumes				Delay (s/veh)				LOS By Approach		LOS By Intersection		Left Turn Lane			Through Lane (s)					Right Turn Lane																								
		L	T	R	Total	L	LOS	T	LOS	R	LOS	Delay (S/Veh)	LOS	Delay (S/Veh)	LOS	Storage (feet) <sup>3</sup>	Avg. Queue (feet) <sup>1</sup>	Max Queue (feet) <sup>1</sup>	% Block Thru <sup>(2)</sup> ---->	% Block Left <sup>(2)</sup> <----	Link Length (feet)	Avg. Queue (feet) <sup>1</sup>	Max Queue (feet) <sup>1</sup>	% Block Right <sup>(2)</sup> ---->	% Block Thru <sup>(2)</sup> <----	Storage (feet) <sup>3</sup>	Avg. Queue (feet) <sup>1</sup>	Max Queue (feet) <sup>1</sup>																		
AM Peak Hour	TH 316 at Tuttle Drive	EB	39	288	22	349	3.9	A	6.7	A	3.5	A	6.2	A	6.3	A						815	20	20																						
		WB		447	8	455			7.2	A	4.3	A	7.2	A								1108	20	86																						
		NB	37	1		38	3.4	A	3.7	A			3.4	A								394	20	43																						
		SB	6	2	96	104	3.1	A	4.0	A	3.8	A	3.8	A								483	20	54																						
	TH 316 at Michael Ave	EB	36	244	16	296	1.7	A	0.3	A	0.0	A	0.4	A	1.6	A	300	20	41																											
		WB	14	334	4	352	0.8	A	1.3	A	0.1	A	1.3	A																																
		NB	18		4	22	8.3	A			3.3	A	7.2	A								347	20	28																						
		SB	10		91	101	8.1	A			4.5	A	4.9	A								612	30	74																						
	TH 316 at Secondary Access	EB	9	249		258	1.4	A	0.2	A			0.2	A	0.4	A																														
		WB		326	1	327			0.3	A	0.0	A	0.3	A																																
		NB											0.0	A																																
		SB	3		26	29	9.6	A			2.9	A	3.3	A								536	20	37																						
PM Peak Hour	TH 316 at Tuttle Drive	EB	127	590	41	758	7.3	A	10.2	B	6.8	A	9.6	A	8.7	A						815	20	157																						
		WB		504	12	516			8.7	A	5.6	A	8.6	A								1108	42	114																						
		NB	43	2	2	47	5.3	A	6.4	A	4.4	A	5.3	A								394	20	45																						
		SB	6	3	106	115	4.5	A	5.8	A	4.0	A	4.1	A								483	23	61																						
	TH 316 at Michael Ave	EB	90	491	12	593	2.5	A	0.5	A	0.0	A	0.8	A	1.5	A	300	21	58																											
		WB	18	428	10	456	1.9	A	1.4	A	0.1	A	1.4	A																																
		NB	13		26	39	15.1	C			4.9	A	8.0	A								347	20	55																						
		SB	7		67	74	12.9	B			4.6	A	5.2	A								612	25	56																						
	TH 316 at Secondary Access	EB	30	494		524	1.9	A	0.6	A			0.7	A	0.6	A																														
		WB		438	3	441			0.4	A	0.0	A	0.4	A																																
		NB											0.0	A																																
		SB	2		17	19	16.1	C			3.1	A	4.5	A								536	20	30																						

**NOTES**

1. If the reported queue is greater than zero (0), but less than 20 ft, a minimum of 20 ft is reported.
2. Block Percentage is proportion of analysis time (1 hour) the storage lane or through lane is blocked or blocking.
3. Multiple storage lanes of different length are averaged together to show the "Effective Storage Length" per lane.



**Table A6**  
**Walden at Hastings Residential Development**  
**No-Build (2034)**  
**AM & PM Peak Hours**

Intersection	Approach	Demand Volumes				Delay (s/veh)						LOS By Approach		LOS By Intersection		Vehicle Queuing Information (feet)																					
		L	T	R	Total	L	LOS	T	LOS	R	LOS	Delay (S/Veh)	LOS	Delay (S/Veh)	LOS	Left Turn Lane			Through Lane (s)					Right Turn Lane													
																	Storage (feet) <sup>3</sup>	Avg. Queue (feet) <sup>1</sup>	Max Queue (feet) <sup>1</sup>	% Block Thru <sup>(2)</sup> <---->	% Block Left <sup>(2)</sup> <----	Link Length (feet)	Avg. Queue (feet) <sup>1</sup>	Max Queue (feet) <sup>1</sup>	% Block Right <sup>(2)</sup> <---->	% Block Thru <sup>(2)</sup> <----	Storage (feet) <sup>3</sup>	Avg. Queue (feet) <sup>1</sup>	Max Queue (feet) <sup>1</sup>								
AM Peak Hour	TH 316 at Tuttle Drive	EB	40	249	22	311	3.3	A	6.3	A	3.6	A	5.7	A	5.6	A						815	20	54													
		WB		338	8	346			6.6	A	3.7	A	6.5	A										1108	20	54											
		NB	38	1		39	3.1	A	3.2	A			3.1	A										394	20	41											
		SB	6	2	98	106	4.1	A	4.2	A	3.4	A	3.4	A										483	20	61											
	TH 316 at Michael Ave	EB		241	17	258			0.2	A	0.0	A	0.2	A	0.5	A																					
		WB	15	315		330	1.4	A	0.3	A			0.3	A										176	20	37											
		NB	18		4	22	6.8	A			2.6	A	6.1	A										354	20	44											
		SB											0.0	A																							
	TH 316 at Secondary Access	EB		245		245			0.1	A			0.1	A	0.2	A																					
		WB		330		330			0.2	A			0.2	A																							
		NB											0.0	A																							
		SB											0.0	A																							
PM Peak Hour	TH 316 at Tuttle Drive	EB	130	481	42	653	6.0	A	9.1	A	6.5	A	8.3	A	7.7	A						815	20	118													
		WB		430	13	443			8.3	A	5.0	A	8.2	A										1108	38	116											
		NB	44	2	2	48	4.2	A	5.7	A	4.3	A	4.3	A										394	20	61											
		SB	6	3	109	118	4.3	A	4.4	A	3.8	A	3.9	A										483	21	54											
	TH 316 at Michael Ave	EB		473	13	486			0.3	A	0.0	A	0.3	A	0.7	A																					
		WB	18	421		439	2.2	A	0.5	A			0.6	A										176	20	56											
		NB	14		26	40	10.9	B			2.9	A	5.3	A										354	25	45											
		SB											0.0	A																							
	TH 316 at Secondary Access	EB		499		499			0.2	A			0.2	A	0.2	A																					
		WB		439		439			0.2	A			0.2	A																							
		NB											0.0	A																							
		SB											0.0	A																							

**NOTES**

1. If the reported queue is greater than zero (0), but less than 20 ft, a minimum of 20 ft is reported.
2. Block Percentage is proportion of analysis time (1 hour) the storage lane or through lane is blocked or blocking.
3. Multiple storage lanes of different length are averaged together to show the "Effective Storage Length" per lane.

**Table A7**  
**Walden at Hastings Residential Development**  
**Full Build (2034)**  
**AM & PM Peak Hours**

Intersection	Approach	Demand Volumes				Delay (s/veh)						LOS By Approach		LOS By Intersection		Vehicle Queuing Information (feet)																				
		L	T	R	Total	L	LOS	T	LOS	R	LOS	Delay (S/Veh)	LOS	Delay (S/Veh)	LOS	Left Turn Lane				Through Lane (s)				Right Turn Lane												
															Storage (feet) <sup>3</sup>	Avg. Queue (feet) <sup>1</sup>	Max Queue (feet) <sup>1</sup>	% Block Thru <sup>(2)</sup> <---->	% Block Left <sup>(2)</sup> <---	Link Length (feet)	Avg. Queue (feet) <sup>1</sup>	Max Queue (feet) <sup>1</sup>	% Block Right <sup>(2)</sup> ---->	% Block Thru <sup>(2)</sup> <---->	Storage (feet) <sup>3</sup>	Avg. Queue (feet) <sup>1</sup>	Max Queue (feet) <sup>1</sup>									
AM Peak Hour	TH 316 at Tuttle Drive	EB	40	294	22	356	3.7	A	6.6	A	3.7	A	6.1	A	6.2	A						815	20	20												
		WB		455	8	463			7.1	A	4.1	A	7.1	A									1108	20	76											
		NB	38	1		39	3.2	A	4.7	A			3.2	A									394	20	39											
		SB	6	2	98	106	3.1	A	5.8	A	3.5	A	3.5	A									483	20	50											
	TH 316 at Michael Ave	EB	36	250	17	303	1.8	A	0.2	A	0.0	A	0.4	A	1.6	A	300	20	39																	
		WB	15	341	4	360	0.8	A	1.3	A	0.1	A	1.3	A			300	20	24																	
		NB	18		4	22	8.0	A			2.0	A	6.8	A									347	20	28											
		SB	10		91	101	8.4	A			4.5	A	4.9	A									612	31	71											
	TH 316 at New Access	EB	9	255		264	1.7	A	0.2	A			0.2	A	0.4	A																				
		WB		334	1	335			0.3	A	0.0	A	0.3	A									248	20	31											
		NB											0.0	A																						
		SB	3		26	29	7.4	A			2.8	A	3.3	A									536	20	29											
PM Peak Hour	TH 316 at Tuttle Drive	EB	130	601	42	773	7.2	A	10.0	B	7.4	A	9.4	A	8.5	A						815	20	153												
		WB		514	13	527			8.5	A	5.2	A	8.4	A									1108	37	113											
		NB	44	2	2	48	5.1	A	4.8	A	4.3	A	5.1	A									394	20	61											
		SB	6	3	109	118	4.8	A	5.3	A	4.0	A	4.1	A									483	24	65											
	TH 316 at Michael Ave	EB	90	503	13	606	2.6	A	0.5	A	0.0	A	0.8	A	1.5	A	300	20	54																	
		WB	18	438	10	466	1.8	A	1.4	A	0.1	A	1.4	A			300	20	27																	
		NB	14		26	40	12.7	B			4.6	A	7.3	A									347	20	41											
		SB	7		67	74	15.5	C			4.4	A	5.5	A									612	25	51											
	TH 316 at New Access	EB	30	506		536	1.9	A	0.7	A			0.8	A	0.7	A																				
		WB		449	3	452			0.4	A	0.0	A	0.4	A									248	20	62											
		NB											0.0	A																						
		SB	2		17	19	9.7	A			3.4	A	4.4	A									536	20	29											

**NOTES**

1. If the reported queue is greater than zero (0), but less than 20 ft, a minimum of 20 ft is reported.
2. Block Percentage is proportion of analysis time (1 hour) the storage lane or through lane is blocked or blocking.
3. Multiple storage lanes of different length are averaged together to show the "Effective Storage Length" per lane.

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