Environmental Assessment Worksheet

TH 169/TH 41/CSAH 78/CSAH 14
Intersection Improvements

Scott County, MN

April 2017

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ENVIRONMENTAL ASSESSMENT WORKSHEET

This Environmental Assessment Worksheet (EAW) form and EAW Guidelines are available at the Environmental Quality Board's website at:
http://www.eqb.state.mn.us/EnvRevGuidanceDocuments.htm. The EAW form provides information about a project that may have the potential for significant environmental effects. The EAW Guidelines provide additional detail and resources for completing the EAW form.
Cumulative potential effects can either be addressed under each applicable EAW Item, or can be addresses collectively under EAW Item 19.
Note to reviewers: Comments must be submitted to the RGU during the 30-day comment period following notice of the EAW in the *EQB Monitor*. Comments should address the accuracy and completeness of information, potential impacts that warrant further investigation and the need for an EIS.

1. Project Title: TH 169/TH 41/CSAH 78/CSAH 14 Intersection Improvements

2. Proposer:

Contact person:	Craig Jenson
Title:	Transportation Planner
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Address:	600 County Trail East
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Phone:	952-496-8329
Fax:	952-496-8365
Email:	cjenson@co.scott.mn.us

3. RGU:

Contact person:	Rick Dalton
Title:	Environmental Coordinator
Agency:	MnDOT Metro District
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Phone:	651-234-7677
Fax:	
Email:	Richard.Dalton@state.mn.us

4. Reason for EAW Preparation: (check one)

Required:
- ☐ EIS Scoping
- X 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):
Highway Projects: 4410.4300, Subpart 22, A - "Construction of a road on a new location over one mile in length."

5. Project Location:

County:	Scott
Township(s):	Jackson and Louisville
PLS Location:	Sections 15, 16, 21, 22, 28, & 33; Township 115 North; Range 23 West
Watershed:	Lower Minnesota River
GPS Coordinates:	44°45'57" N, 93°34'42" W

At a minimum attach each of the following to the EAW:
- County map showing the general location of the project (**Figure 1**)
- U.S. Geological Survey 7.5 minute, 1:24,000 scale map indicating project boundaries (**Figure 2**)
- Site plans showing all significant project and natural features. Pre-construction site plan (**Figures 3–4**) and post-construction site plan (**Figure 5** for overview, **Figures 6a–6b** for northern project area, and **Figures 7a–7b** for southern project area).

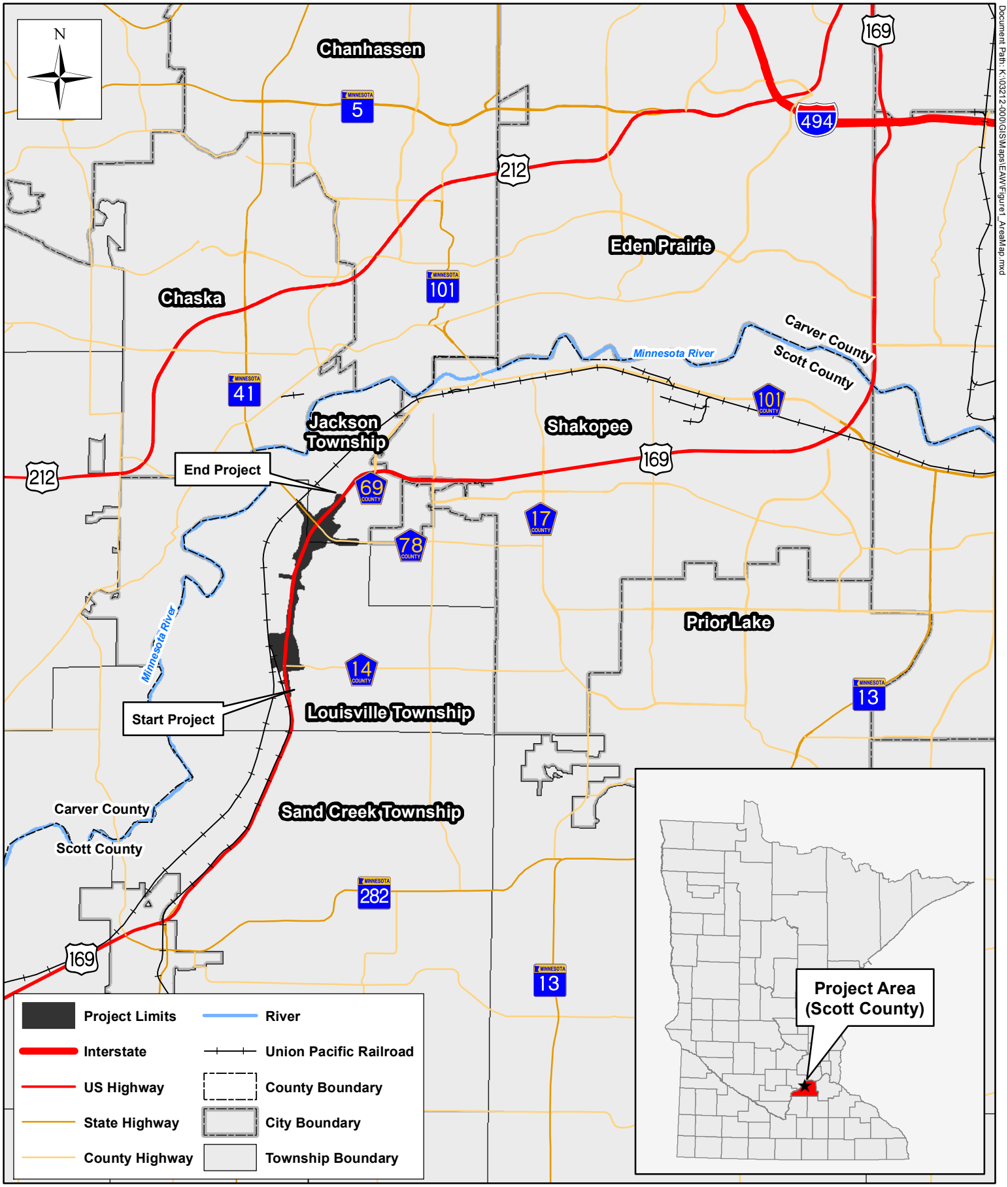

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Figure 1: Area Map

US 169/TH 41/CSAH 78/CSAH 14 Intersection Improvements
SP 070-596-013/7005-121/7009-84/7010-109
Scott County, MN
April 2017

0 2 Miles

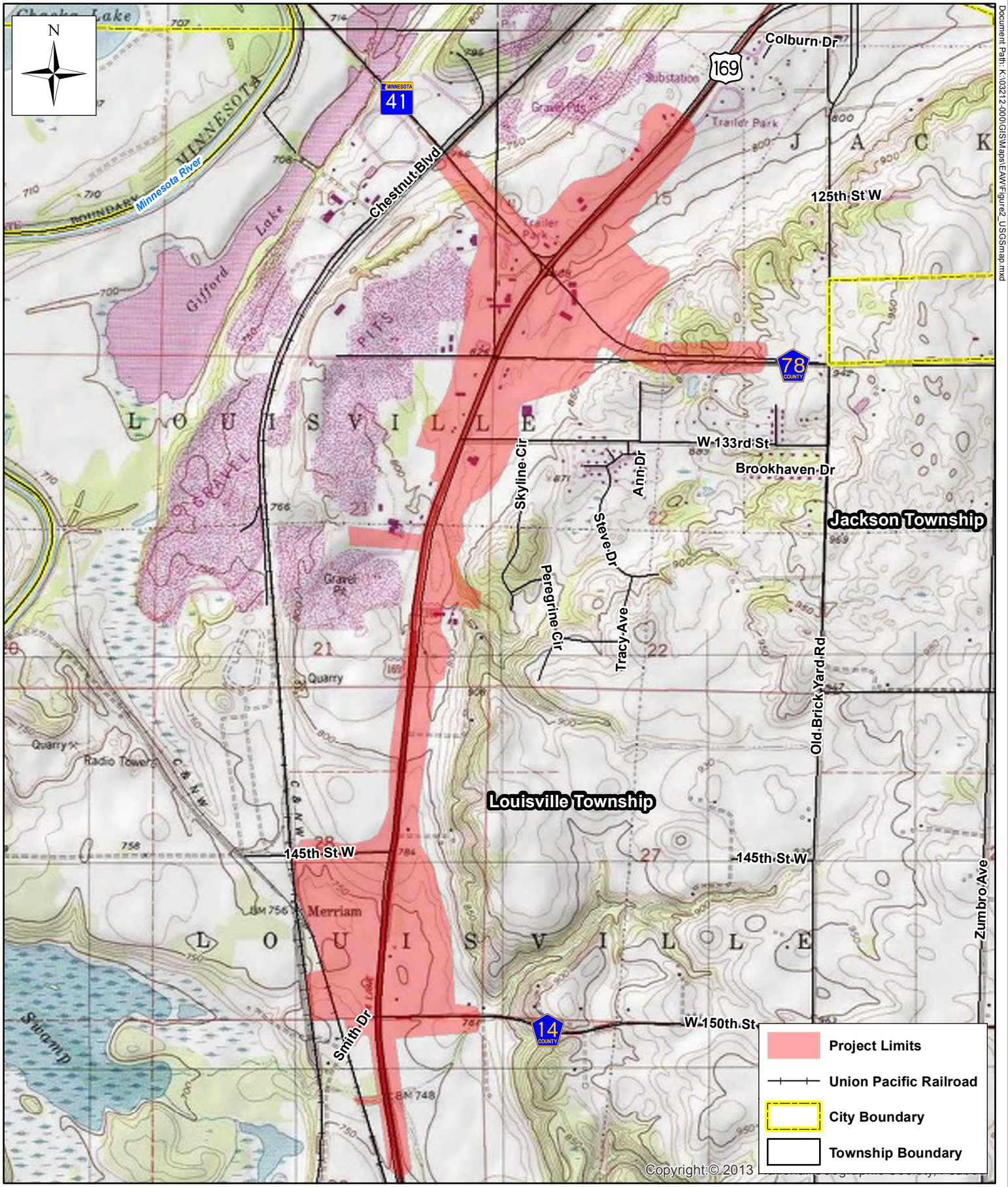

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Figure 2: USGS Map

US 169/TH 41/CSAH 78/CSAH 14 Intersection Improvements
SP 070-596-013/7005-121/7009-84/7010-109
Scott County, MN
April 2017

0 2,000 Feet

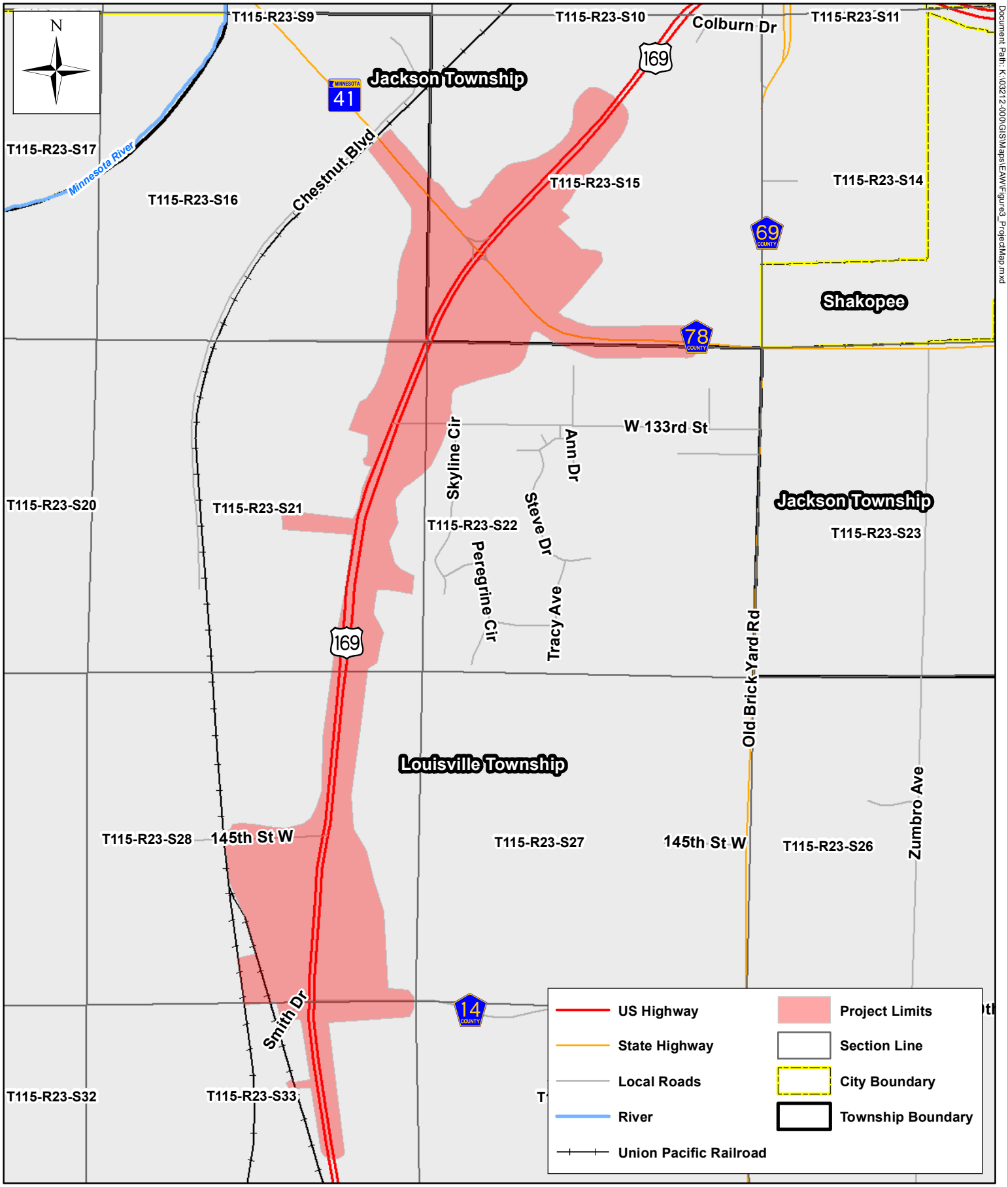

Figure 3: Project Map

US 169/TH 41/CSAH 78/CSAH 14 Intersection Improvements
SP 070-596-013/7005-121/7009-84/7010-109
Scott County, MN
April 2017

0 2,000 Feet

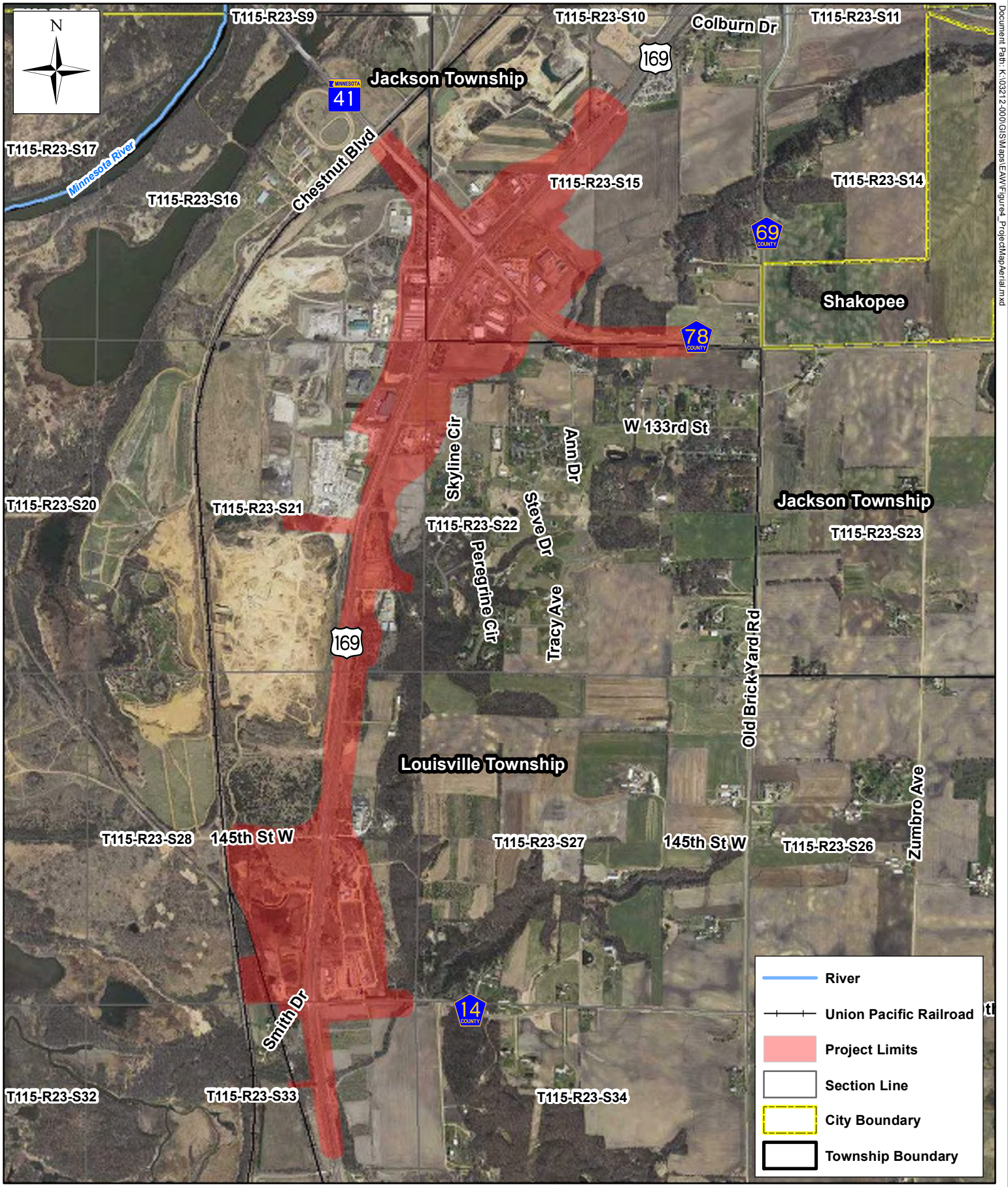

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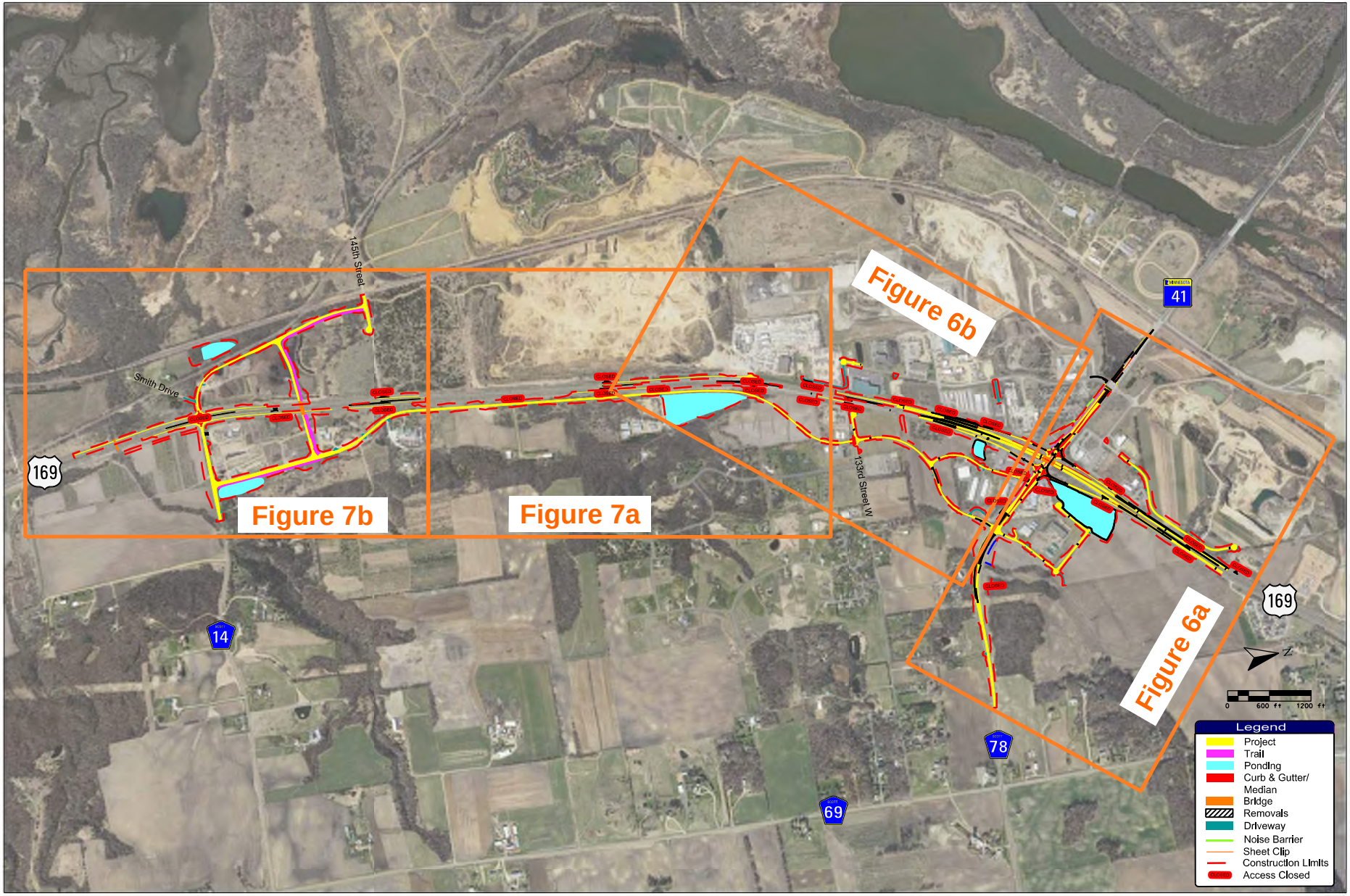
Figure 4: Aerial Project Map

US 169/TH 41/CSAH 78/CSAH 14 Intersection Improvements
SP 070-596-013/7005-121/7009-84/7010-109
Scott County, MN
April 2017

0 2,000 Feet



Scott

Figure 5: Recommended Improvements - Overview

US 169/TH 41/CSAH 78/CSAH 14
Intersection Improvements
Scott County, MN SP 070-596-013/7005-121/7009-81/7010-109
April 2017

Date: Printed: 3/15/2017
WSB Filename: K:\03212-000\Cad\Exhibits\Environmental Doc\Figure 17A Recommended Improvements.dgn

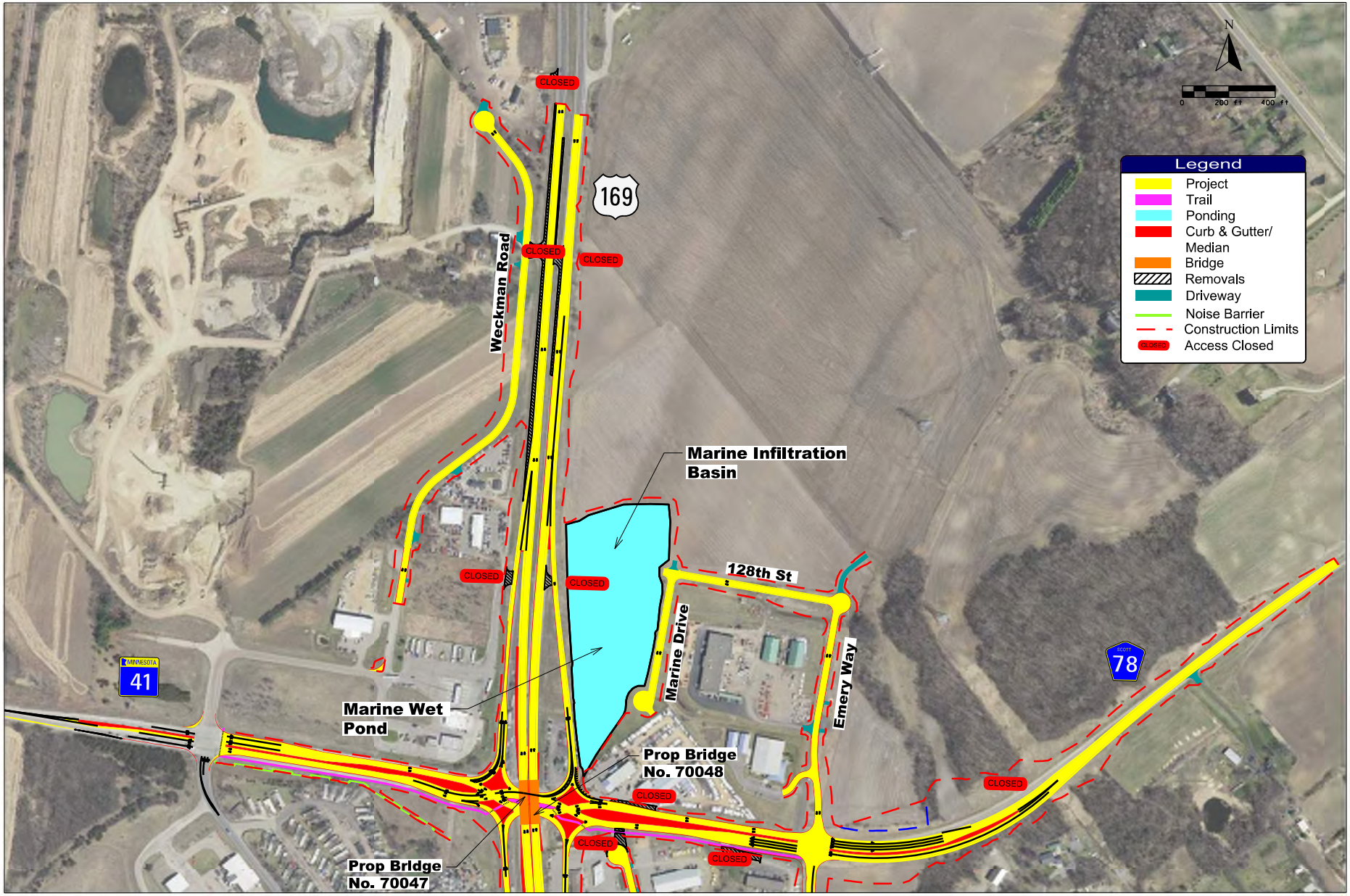


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Figure 6a: Recommended Improvements - North Area

US 169/TH 41/CSAH 78/CSAH 14
Intersection Improvements
Scott County, MN SP 070-596-013/7005-121/7009-81/7010-109
April 2017

Date: Printed: 3/15/2017
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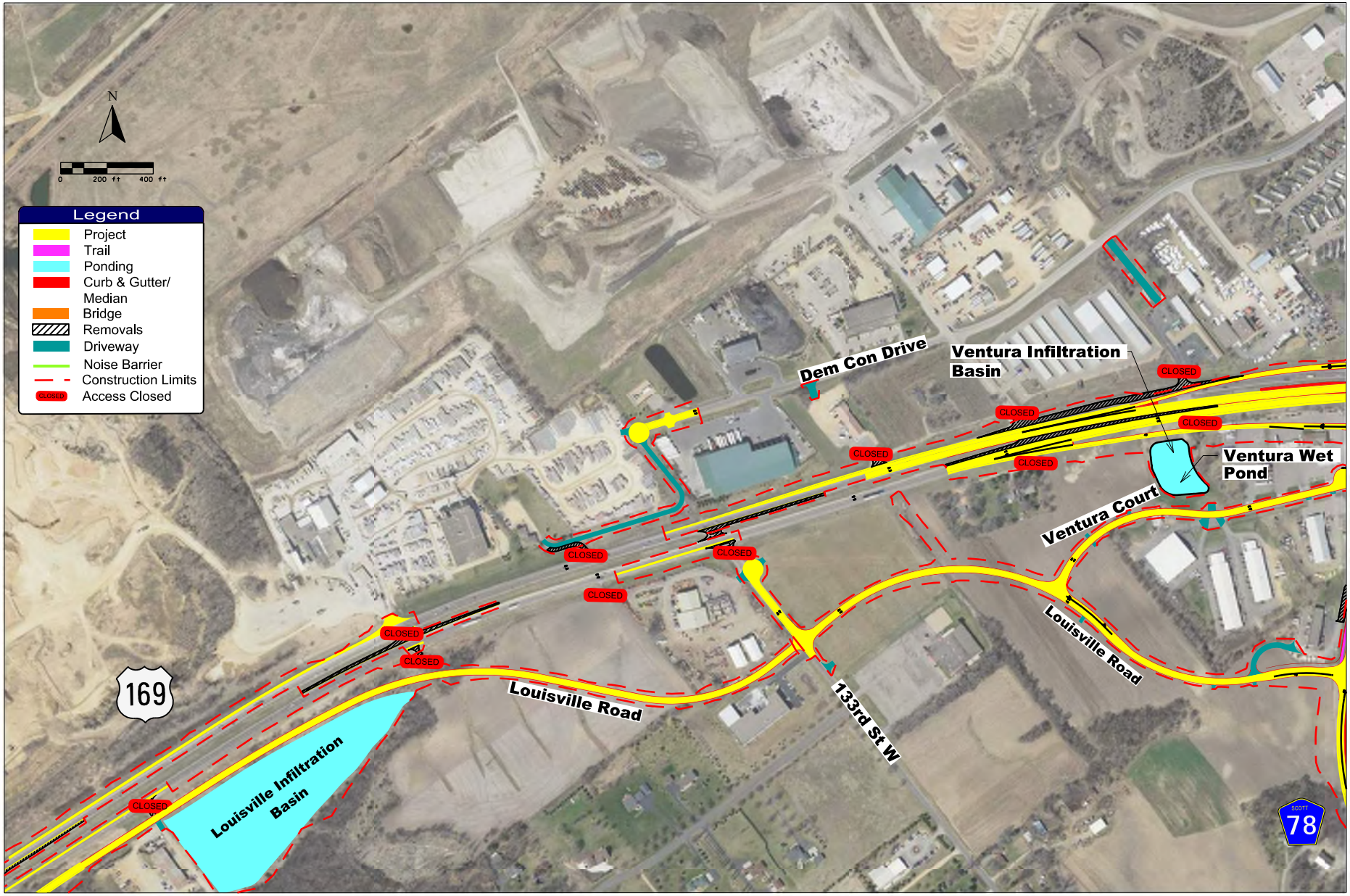

Scott

Figure 6b: Recommended Improvements - North Area

US 169/TH 41/CSAH 78/CSAH 14
Intersection Improvements
Scott County, MN SP 070-596-013/7005-121/7009-81/7010-109
April 2017

Date: Printed: 3/15/2017
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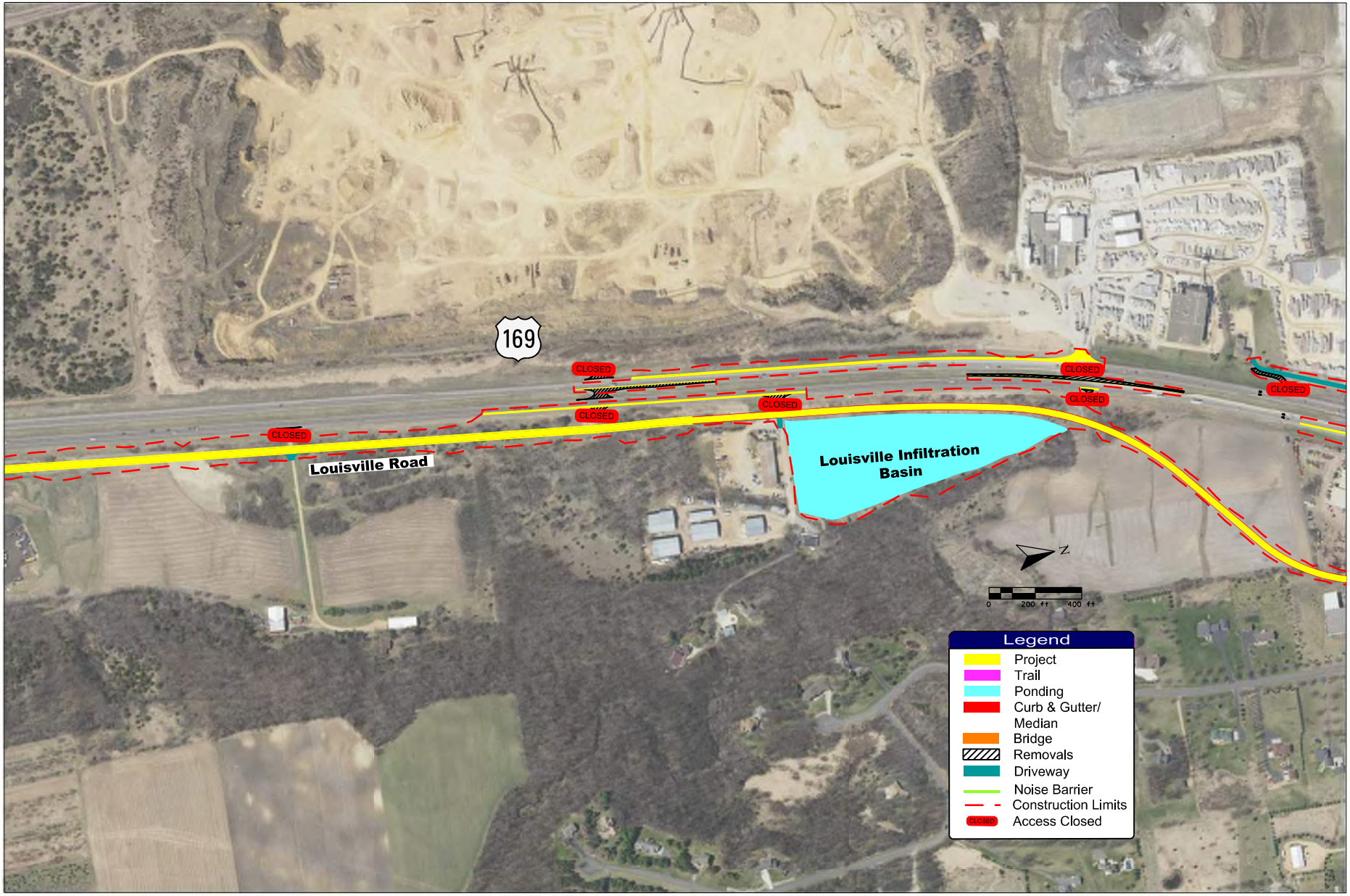

Scott

Figure 7a: Recommended Improvements - South

US 169/TH 41/CSAH 78/CSAH 14
Intersection Improvements
Scott County, MN SP 070-596-013/7005-121/7009-81/7010-109
April 2017

Date: Printed: 3/15/2017
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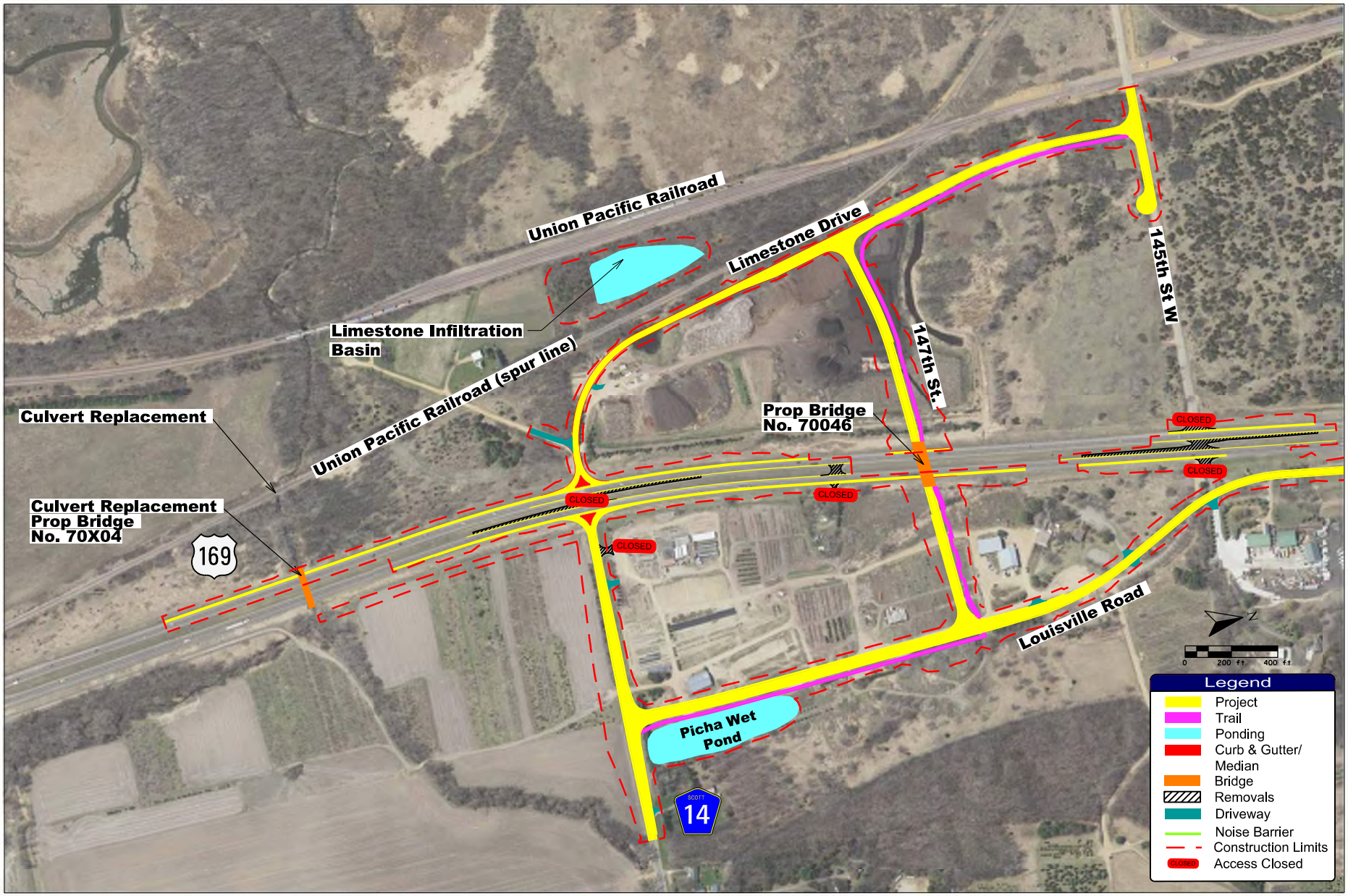

Scott

Figure 7b: Recommended Improvements - South

US 169/TH 41/CSAH 78/CSAH 14
Intersection Improvements
Scott County, MN SP 070-596-013/7005-121/7009-81/7010-109
April 2017

Date: Printed: 3/15/2017
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6. Project Description:

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

Project includes construction of an interchange at the existing signalized TH 169 and TH 41/CSAH 78 intersection and a new overpass near the existing TH 169 and CSAH 14 intersection located in Jackson and Louisville Townships in Scott County. The project also includes construction of frontage roads parallel to TH 169, pedestrian/bicycle accommodations, and stormwater treatment. The project is intended to improve safety and mobility for commuter traffic and standard freight traffic.

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 proposed project would consist of eight primary components:

1. A diverging diamond interchange at Trunk Highway (TH) 169 and TH 41/County State Aid Highway (CSAH) 78 along with roadway geometric improvements on TH 41 and CSAH 78

2. Construction of Weckman Road in the northwest quadrant of the proposed interchange

3. An extension and realignment of Emery Way in the northeast quadrant of the proposed interchange

4. An extension of Dem Con Drive in the southwest quadrant of the proposed interchange

5. A new frontage road—Louisville Road—in the southeast quadrant of the proposed interchange connecting to CSAH 14 and an extended Ventura Court

6. A new frontage road—Limestone Drive—in the southwest project area, including realignment of Smith Drive and railway crossing improvements

7. A new overpass to the north of CSAH 14 over TH 169 (147th Street West)

8. Replacement of culverts under the Union Pacific Railroad spur and TH 169 at Picha Creek

The project would also include closure of all median openings between CSAH 69 through the CSAH 14 intersection and construction of acceleration lanes at CSAH 14 in both directions along TH 169. Along with these elements, there would be associated ponding, new driveway connections to frontage roads, modifications to utilities, and non-motorized traffic enhancements.

Construction methods for the project will consist of excavation and grading for the construction of new roadways, bridges, stormwater facilities, trails, and a noise barrier. The project would not include modification to existing equipment or industrial processes. The project would not include

significant demolition, removal, or remodeling of existing structure; however, the project would include removal and demolition of structures at two commercial businesses and three residential parcels for construction of the interchange and frontage roads. Several culverts will also be removed and replaced as part of the project. Construction activities are anticipated to start in the summer of 2018 and continue through the fall of 2019.

The project is located within Jackson and Louisville Townships in Scott County. The project area is approximately 1.25 miles southwest of Shakopee and 1.5 miles southeast of Chaska. More details on the proposed project are provided in the following paragraphs and shown on **Figures 5–7**.

1. *Diverging Diamond Interchange at TH 169 and TH 41/CSAH 78*
   The diverging diamond interchange would bring TH 169 over the intersection of TH 41 and CSAH 78 on two new bridges (Bridges #70047 and #70048). Traffic on TH 169 would become free flowing—it would not be required to stop if travelling north-south through the intersection. Traffic entering and exiting TH 169 at the intersection with TH 41/CSAH 78 would do so at freeway ramps.

   Traffic on TH 41/CSAH 78 would travel east-west through the interchange. This traffic would be separated from through traffic on TH 169 and would still be controlled by traffic signals. Traffic flow on TH 41 heading for southbound TH 169 would take a right onto a freeway entrance ramp. Vehicles travelling to northbound TH 169 would pass through a traffic signal and then shift to the left and drive on the left side of TH 41 until reaching an entrance ramp that would enable them to take a left turn to enter the freeway. The diverging diamond design which shifts heavy left-turn movements over to the left side of the roadway would reduce conflicts with through traffic on CSAH 78 and would allow greater progression for left turns. Through traffic on eastbound TH 41 would also shift to the left and drive on the left side of TH 41 until reaching a second traffic signal, where it would shift back to the right side of the roadway and continue east on CSAH 78. The movements for westbound vehicles on CSAH 78 would be similar to those described for eastbound TH 41 vehicles.

   In addition to the immediate improvements at the intersection, the diverging diamond would include geometric improvements on TH 41 and CSAH 78 near the interchange. On TH 41 there would be two through lanes in each direction through the intersection with Dem Con Drive. There would also be curb and gutter and a center median in this location. Dedicated left- and right-turn lanes would be provided onto Dem Con Drive. There would also be geometric changes at the intersection of Dem Con Drive, with Dem Con Drive having a dedicated left-turn lane, a through lane and a right-turn lane.

   On CSAH 78 there would be an additional through lane in each direction from TH 169 through the intersection with Emery Way/Louisville Road. East of Emery Way, one of the through lanes on CSAH 78 serves as a truck climbing lane, the roadway would transition to one travel lane in each direction. Concrete curb and gutter and a center median would be constructed along CSAH 78 between TH 169 and Emery Way, and a separate center median would also be constructed east of Emery Way for approximately 1,000 feet. Dedicated left- and right-turn lanes would be provided on CSAH 78 in both directions at its intersection with Emery Way/Louisville Road.

Two ponds have been proposed to address stormwater runoff in the interchange area. One would be located in the northeast quadrant and would add an infiltration basin and pretreatment basin to an existing regional basin. The other would be located in the southeast quadrant, and would comprise an infiltration basin and a pretreatment basin. These ponds would be sized to meet watershed requirements. Storm sewer would also be constructed or modified along the proposed interchange roadways and ramps to carry stormwater to these ponds.

Non-motorized improvements would include construction of a multiuse trail primarily on the south side of TH 41/CSAH 78, with the exception of the area under TH 169, which would be constructed in the middle of the roadway. In addition there would be painted crosswalks and pedestrian countdown timers at the signalized intersections within the interchange and at Dem Con Drive. The intersections would be American with Disabilities Act (ADA) compatible.

In addition, the project includes the construction of a noise barrier along TH 41 on the south side of the corridor from approximately Dem Con Drive to just south of the ramp terminal at TH 169. The noise barrier is anticipated to be approximately 1,090 feet long and 20 feet tall.

2. *Weckman Road*
   Weckman Road would be located in the northwest quadrant of the proposed interchange. The extended frontage road would be a two-lane facility with a rural design. Ditches would be constructed to direct stormwater runoff to an existing treatment basin. The extended frontage road would include a connection between the north leg of Dem Con Drive and a landscaping business, serving three businesses and a residential property. Two of the existing businesses currently utilize a single access point on TH 169 to the north of the Holiday gas station. That entrance would be closed, along with the driveways/entrances from the residential property and the landscaping business off of TH 169. In addition, the existing median opening on TH 169 that serves the residential property would also be closed.

3. *Emery Way Realignment and Extension, 128th Street, and Marine Drive*
   Emery Way is currently located in the northeast quadrant of the interchange. It is a backage road that serves a limited number of existing businesses and undeveloped land. The project would slightly realign, reconstruct and extend Emery Way, along with constructing 128th Street West (in a northwest-southeast direction) and Marine Drive (in a southwest-northeast direction), which would provide access to CSAH 78 for parcels located in the northeast quadrant of the proposed interchange area. The new roadways would serve one business and two agricultural properties. The business is currently served by an access on CSAH 78 that would be closed as part of the project. One of the agricultural properties is currently served by a field access on TH 169 that would also be closed as part of the project.

   Emery Way, 128th Street West, and Marine Drive would be constructed as two-lane facilities. Emery Way would have an urban design, while 128th Street West and Marine Drive would have a rural design. Stormwater runoff would be directed through new storm sewer and ditches to an existing treatment basin northeast of the proposed interchange, which would be enlarged as part of the project.

4. *Louisville Road - Southeast Frontage Road*
From the existing intersection of Emery Way and CSAH 78, Louisville Road would be constructed to serve as a frontage road in the southeast quadrant of the interchange. It would provide a continuation of the realigned Emery Way and would extend south, connecting to CSAH 14. It would also include a connection to the existing businesses located along Ventura Court, which would be disconnected from CSAH 78 as part of the project. Six private accesses on the east side of TH 169 would be closed (two residential driveways, two commercial business driveways, and two field entrances), as would the public street entrance at 133rd Street. Properties along TH 169 and 133rd Street would be served off of the new Louisville Road. The existing intersection of TH 169 and CSAH 14 would be converted to a right-in/out access and the center median on TH 169 would be closed.

The alignment for Louisville Road was previously developed by Louisville Township as part of its long-range plans for the area. The alignment as proposed with this project has been slightly modified from the Township's original concept to reduce property impacts. It was also modified slightly in the southern portion to accommodate the preferred alignment for the proposed overpass.

Louisville Road would be a two-lane roadway with an urban design from CSAH 78 to approximately a half-mile south of 133rd Street, and a rural design further to the south. Stormwater runoff would be transported and treated through new storm sewer, ditches, culverts, two existing basins, and new ponds: one located between TH 169 and the extended Ventura Court south of the existing gas station, a second one located between 133rd Street and 145th Street on the east of Louisville Road, and a third one along the east side of Louisville Road where it intersects the proposed 147th Street West.

5. *Dem Con Drive Extension*
The project would extend the Dem Con Drive roadway slightly beyond the existing cul-de-sac at its southern end to provide a direct roadway connection to the north side of the Anchor Block property. The Dem Con Drive extension would be a two-lane facility with a rural design. Stormwater runoff would be directed to existing drainage facilities via new storm sewer and ditches. It would also include a private driveway connection to the Die Mold Tool property along the north and east side of the Anchor Block property. The existing direct driveway access to the Die Mold Tool property from TH 169 would be closed and traffic to and from the business would enter via Dem Con Drive.

The existing driveway access from TH 169 that serves both Anchor Block and Bryan Rock properties would be converted to a right-in/out access by closing the center median on TH 169. Northbound traffic from these two businesses would be redirected. Northbound traffic from Anchor Block would either utilize the Dem Con Drive or use the right to go southbound on TH 169 and use the overpass and frontage roads near CSAH 14. Traffic from Bryan Rock would use TH 169 and go southbound and utilize the new frontage roads and CSAH 14 overpass. Trucks could also use internal roadways on the property to access the frontage roads and overpass without having to travel on TH 169.

Access to two properties north of Anchor Block (appliance store and hotel) would have their driveways relocated from TH 169 to Dem Con Drive. The street entrance at 130th Street and TH 169 would be closed.

6. *Limestone Drive*
In the southern portion of the project area, the public street entrance at 145th Street and TH 169 would be closed and 145th Street would be shortened with a cul-de-sac. Limestone Drive would be constructed from 145th Street to the south along the east side of the Union Pacific Railroad and would connect to TH 169 at the current junction of Smith Drive and TH 169. At this location, the median would be closed, and right-in/out access would be provided. Smith Drive would be realigned to provide a connection to Limestone Drive. Limestone Drive would also provide a connection to 147th Street West, the proposed overpass over TH 169.

This roadway would be a two-lane facility with a rural design north of the overpass intersection and an urban section south of the overpass intersection. Stormwater runoff would be transported and treated through new storm sewer, ditches, culverts, three existing basins, and a new pond located west of the roadway and south of 147th Street. The proposed pond would be located between the Union Pacific Railroad spur and the mainline tracks, and a culvert would be constructed under the spur line to allow water to be transported into the pond.

In addition to the roadway modifications the project would upgrade the existing at-grade railway intersection with the Union Pacific Railway and 145th Street/Smith Drive. Presently there are no gates or active warning systems in place. The proposed project would include installing gates, signals, bells and other active warning devices.

7. *147th Street West - Overpass*
The proposed 147th Street West would provide an overpass of TH 169 in the vicinity of CSAH 14, replacing the full access that is currently provided at CSAH 14 (150th Street). The overpass (Bridge #70046) and its associated frontage roads would eliminate existing left-turning movements to and from TH 169.

Traffic on TH 169 near CSAH 14 is currently free flowing – it is not required to stop if travelling north-south through the CSAH 14 intersection. Traffic on public streets (145th and 150th) currently is controlled by side-street stops and has full access to TH 169. Northbound traffic wishing to exit TH 169 at the intersection with CSAH 14 would do so by taking a right onto CSAH 14. Southbound traffic exiting TH 169 at CSAH 14 would take a right onto Limestone Drive, followed by a right turn onto 147th Street West (overpass), and a right turn onto Louisville Road, prior to turning left onto eastbound CSAH 14. Motorists wishing to enter northbound TH 169 from CSAH 14 would turn right onto TH 169 at the existing intersection location. Motorists turning south onto TH 169 from CSAH 14 would turn right onto Louisville Road, left onto 147th Street West, left onto Limestone Drive, and right onto southbound TH 169. Existing private driveway accesses onto TH 169 in the vicinity would be closed and redirected to the frontage roads.

147th Street West would have a rural design and would include one travel lane in each direction. On Louisville Road, dedicated left- and right-turn lanes would be provided onto the overpass. A dedicated right-turn lane would be provided on CSAH 14 at the junction with Louisville Road. On Louisville Road, a dedicated left-turn lane would be provided onto CSAH 14. Additionally, a right-turn lane and an acceleration lane would also be added along

TH 169 (in both directions) to allow turning traffic to safely decelerate or accelerate when exiting or entering TH 169. Stormwater runoff would be transported and treated through culverts and the new pond proposed west of Limestone Drive.

Proposed non-motorized improvements in this area would include construction of a multiuse trail beginning along the east side of Louisville Road at its junction with CSAH 14, turning and running along the north side of 147th Street West, and then turning to run along the east side of Limestone Drive to its junction with 145th Street. The intersections would include painted crosswalks and would be American with Disabilities Act (ADA) compatible.

8. *Picha Creek Drainage Improvements*
In the southern portion of the project area, there are culverts that carry Picha Creek under TH 169 (identified as Bridge #8829) and under the Union Pacific Railroad spur line. The existing 84-inch diameter dual corrugated metal pipe (CMP) culverts carrying Picha Creek under the Union Pacific Railroad spur line would be replaced with dual 14-foot by 7-foot box culverts. The existing dual 10-foot by 6-foot box culverts (Bridge #8829) carrying Picha Creek under TH 169 would also be replaced with dual 14-foot by 7-foot box culverts (Bridge #70X04). The new box culverts would address existing stormwater flows that are currently constrained. In addition to addressing the existing capacity deficiencies, the culverts would be designed to accommodate changes in stormwater flow associated with constructing the proposed roadway improvements.

c. **Project magnitude:**

Table 1 shows the project magnitude.

Table 1 – Project Magnitude

Total Project Acreage	**Approximately 85.36 acres**
Linear project length	3.37 miles (TH 169) 0.24 miles (TH 41) 0.34 miles (CSAH 78) 0.29 miles (CSAH 14) 0.44 miles (Weckman Road) 0.19 miles (Dem Con Road extension) 0.20 miles (Emery Way extension) 0.13 miles (128th Street West) 0.13 miles (Marine Drive) 2.34 miles (Louisville Road) 0.10 miles (133rd Street) 0.30 (Ventura Court realignment) 0.57 miles (Limestone Drive) 0.11 miles (145th Street) 0.33 miles (147th Street West) 0.05 miles (Smith Drive) 9.13 miles (Total)
Number and type of residential units	NA
Commercial building area (in square feet)	NA
Industrial building area (in square feet)	NA
Institutional building area (in square feet)	NA
Other uses – specify (in square feet)	NA
Structure height(s)	Two grade-separations/bridges – 16 feet 6 inches Noise Barrier Wall H – 20 ft. high

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.

Project Purpose
The purpose of this project is to provide added safety, improved traffic flow both now and in the future for the intersections of TH 169/TH 41/CSAH 78 and TH 169/CSAH 14 while providing opportunities for non-motorized traffic to cross the highway safely. The project also addresses stormwater deficiencies.

Need for Project
The need to address congestion along TH 169 at the existing intersection of TH 169 and TH 41/CSAH 78 has been documented in numerous reports and studies, with the recommendation for a grade separated solution emerging in the early 2000s. Since then,

additional traffic growth has occurred on TH 169 and CSAH 78. Traffic volumes on TH 41 have remained consistent (the corridor is capacity constrained as a two-lane roadway).

While future traffic is expected to remain fairly static on TH 41, traffic volume increases are expected on TH 169 and CSAH 78 as additional development occurs within Scott and Carver Counties and as freight traffic continues to grow statewide (**Figure 8**).

Scott County has been one of the fastest growing counties in the state since 1990. Future growth for the area, as indicated in Metropolitan Council population and employment projections, expect the county to add approximately another 80,000 people and 26,000 jobs by 2040, increases of 62 percent for each measure. Carver County (located at the northern end of TH 41 and contributing to traffic flow at the TH 169 and TH 41/CSAH 78 intersection) is also expected to experience growth of approximately 71,000 people and 20,000 jobs, increases of 77 percent and 64 percent, respectively. Along with the expected regional growth, statewide growth to the south (Mankato, St. Peter, Le Sueur) and continued high levels of freight movements between the Twin Cities metropolitan area and Greater Minnesota will contribute to increased traffic within the project area.

Based upon trends and patterns identified in previous plans, expected growth within and near the project area, and continued freight demands on both TH 169 and TH 41, several different needs have been established for improvements at the TH 169 and TH 41/CSAH 78 and TH 169/CSAH 14 intersections. These needs have been broken down into primary needs and other considerations—they are summarized below and explained in greater detail in **Attachment A**, the Purpose and Need Report.

Primary Needs (summary)

Safety – MnDOT annually summarizes crash data on over 8,000 highway intersections across the state. The TH 169 and TH 41/CSAH 78 intersection ranks 78th by crash-cost for the 2011-2013 time period (annual crash cost was approximately $650,000). Based on MnDOT crash data for the period between 2010 and 2014, a total of 260 crashes were recorded along TH 169, TH 41, CSAH 78, and CSAH 14 in the study area.

The number and severity of crashes were reviewed to calculate crash and severity rates for intersections and corridor segments. Crash rates are expressed as the number of crashes per million entering vehicles at an intersection and crashes per million vehicles miles along a segment. Severity rates are a weighted average rate based on the different crash severity types. Crash severity comprises five unique severity types including: fatal, incapacitating injury (Type A), non-incapacitating injury (Type B), possible injury (Type C), or property damage crash.

Crash and severity rates for the project area were compared to statewide average rates for similar intersection and roadway segments. Critical crash and severity rates were calculated for each intersection and segment. These rates are based on the amount of vehicle exposure. If an intersection or segment crash rate is at or above the critical rate, it indicates a sustained crash problem.

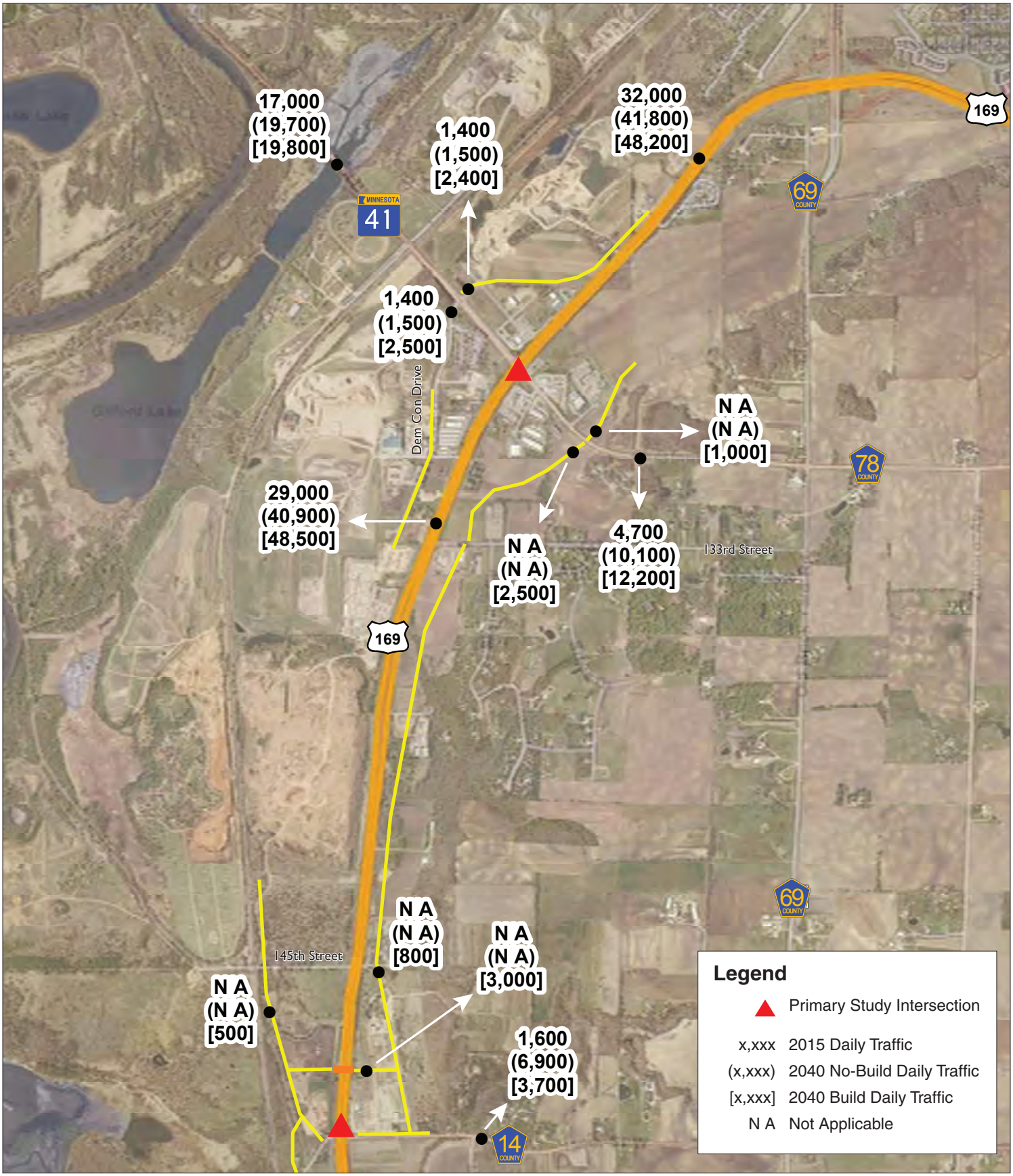

Figure 8: Existing and 2040 Traffic Volumes

US 169/TH 41/CSAH 78/CSAH 14
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Of the 260 crashes within the project area, 189 of them (73 percent) occurred at intersections. The intersection of TH 169 and TH 41/CSAH 78 has crash and severity rates that are more than three times higher than statewide averages for similar intersections. Additionally, the intersection of TH 41 and Dem Con Drive, and TH 41 at the driveways west/north of the railway tracks also have crash and severity rates higher than statewide averages for similar intersections.

At these three locations, a majority of the 151 crashes (71 percent) are rear end crashes. Sideswipe and right angle crashes represent the next most frequent types of crashes at these intersections. In the southern portion of the project area, there were seven crashes at the TH 169/CSAH 14 intersection during the five-year analysis period.

The remaining 71 crashes within the project area (of the total of 260) occurred on the roadway segments between intersections; 63 occurred on TH 169, 8 on TH 41, and none on CSAH 78. Most crashes (39 of the 71) were rear end crashes; this is likely a result of traffic queues from intersections backing up and from vehicles making right- and/or left-turns off of the corridor at locations where there are not dedicated turn lanes. The second most frequent crash type on the segments was the run off the road crash (12 of 39).

See the full Purpose and Need Report (**Attachment A**) for additional details.

Mobility – There are two contributing factors to poor mobility along TH 169 and at the major intersection of TH 169 and TH 41/CSAH 78: (1) the amount of existing and forecasted traffic and (2) the high percent of truck traffic for the current design of the intersection. Traffic volumes at the intersection are starting to exceed their planning-level capacities which is reflected in unacceptable levels of service for key movements. Truck traffic (which fluctuates based on the time of the year) can exceed 15 percent of the daily volumes during the peak freight months which also contributes to the unacceptable levels of service (LOS) for key movements.

Existing and future (2040) intersection level of service (LOS) was modeled for key intersections/driveways on TH 169 between CSAH 69 and CSAH 14; on TH 41 at Dem Con Drive and the intersections immediately north of the railroad; and on CSAH 78 at Ventura Court and Emery Way. The analysis identifies how well intersections are currently accommodating existing traffic volumes. Intersections are ranked in terms of delay for individual vehicles on a scale from a LOS A to LOS F. LOS A represents the best operating conditions from a traveler's perspective and LOS F the worst. LOS F is considered to be severely congested with substantial delays. LOS A – D are generally considered acceptable to travelers and to agencies responsible for the different roadways. LOS E indicates that the roadway or intersection is operating at or very near its capacity – drivers can experience substantial delays.

Under existing conditions, the intersection of TH 169 and TH 41/CSAH 78 operates at LOS D during AM and PM peak hours. In the future condition (2040), this intersection is projected to operate at LOS F in the AM peak hour and LOS E in the PM peak hour. This represents poor operations as traffic volumes increase at this intersection. The intersection of TH 169 and CSAH 14 currently operates overall at LOS A in the AM and PM peak hours; however, the side street approaches operate at LOS E and F in the AM and C and D in the PM due to delays associated with waiting for gaps in through traffic on TH 169. In the future condition, it is projected that this intersection will operate at LOS D in the AM peak hour and LOS E in the PM peak hour with significant delays on the side street approaches. The CSAH 14 westbound approach will

experience delays exceeding 30 minutes at peak periods. See **Attachments A** and **C** for additional information for these intersections and their current and future operations.

Along with general capacity constraints, direct driveway locations and public street accesses off of TH 169 also contribute to mobility problems due to their proximity to the TH 169 and TH 41/CSAH 78 intersection, the TH 169/CSAH 14 intersection, and other nearby roadways. The amount of access results in longer delay for vehicles trying to enter the traffic stream due to a lack of gaps in traffic flow. See **Attachments C** and **D** for more information related to existing and future mobility in the project area, including mainline travel times, queue lengths, and considerations related to freight and spacing of access points along the study area highways.

Other Considerations (summary)

Non-Motorized Accommodations – There are few opportunities for pedestrians and bicyclists to safely cross TH 169 in the project area. Present conditions with high travel speeds and heavy traffic volumes result in uncomfortable conditions for non-motorized modes that inhibit users to cross TH 169. In the southern part of the study area, there are no facilities to safely cross TH 169 and access wildlife refuge lands and the state trail system along the Minnesota River. Non-motorized user accommodations are limited to painted crosswalks at the TH 169 and TH 41/CSAH 78 signalized intersection. At this intersection, each crosswalk traverses between five and seven traffic lanes. With existing geometrics and lack of supporting infrastructure (no sidewalks or trails connecting to the intersection) it is challenging for pedestrians to cross the corridors in the time allocated in a single signal phase. This condition is expected to worsen as additional development occurs and there are more attractions and traffic generators on both sides of TH 169 that would increase the amount of non-motorized traffic trying to cross the highways.

It should also be noted that TH 41/CSAH 78 is identified as a Tier 2 corridor in the Metropolitan Council's Regional Bicycle Transportation Network. This means that the corridor has been identified at a regional level as a transportation route for bicyclists. The current intersection is not consistent with this regional vision for bicycle accommodations.

Consistency with Other Plans – The project area is included in several statewide and local transportation planning studies. These include the TH 41 Regional River Crossing Tier 1 EIS, the TH 169 Interregional Corridor (IRC) Study, the TH 169 Frontage Road Alignment Study, the Congestion and Mitigation Safety Plan Phase II as well as other completed and on-going study efforts that have assessed and documented issues associated with TH 169 between the intersections with TH 41/CSAH 78 and CSAH 14. Each of these planning studies consistently identify the need to pursue improvements to the TH 169 and TH 41/CSAH 78 intersection and connecting highway segments to address increasing safety and mobility issues.

In addition to the studies that have previously been completed, Scott County, Metropolitan Council, and MnDOT are currently studying the need for transit and/or MnPASS improvements on TH 169 from Downtown Minneapolis to I-394 and south on TH 169 to TH 41. No recommendations have been developed at this time; however, it is not anticipated that there will be transit or MnPASS infrastructure (bus lanes, HOV lanes, etc.) that will need to be considered as far south as the study area.

The TH 169 InterRegional Corridor Management Plan (IRC) identified the TH 169 and TH 41/CSAH 78 intersection as a key issue and documented the need to pursue improvements that would remove the traffic signal. The TH 169 Frontage Road Alignment Study set a vision for establishing a supporting frontage/backage road network along TH 169 through Scott County, including the TH 169 intersections at TH 41/CSAH 78 and CSAH 14. This study set the stage for subsequent and ongoing studies aimed at formalizing the location, funding, and implementation of a local road network that would enable the removal of direct local street and private driveway access onto TH 169.

Stormwater Deficiencies – TH 169, local roadways and the Union Pacific Railway spur were constructed prior to current stormwater infiltration and treatment requirements and prior to current drainage design standards. As a result, there are situations when current standards are not being met in terms of infiltration and treatment. Existing conditions result in some localized flooding and silting of ditches and culverts, requiring frequent maintenance on TH 169 in the southern portion of the project area. In this portion of the project, Picha Creek flows east to west, crossing through dual ten-foot by six-foot box culverts under TH 169 (Bridge #8829) then crossing under the Union Pacific Railroad Spur through 84-inch diameter dual corrugated metal pipe (CMP) culverts. During the spring melt and periods of heavy rain, the existing railroad culverts restrict the flow of the Creek because they do not have adequate capacity to accommodate additional the existing volumes of water flow. Additionally, these culverts are prone to debris blockages from trees and other objects that contribute to backups and localized flooding. As a result of these issues, areas within the vicinity of CSAH 14 and TH 169 can flood— including occasional overtopping of TH 169. In the past, this has resulted in closures of TH 169 at/near CSAH 14. When this occurs, motorists, including freight haulers, are required to find alternate routes of travel.

Models of the area indicate that when there is a 50-year rain event, which is 6.2 inches of rain in 24 hours, TH 169 overtops by approximately 1.5 feet. When a 100-year rain event occurs, which is 7.3 inches of rain in 24 hours, TH 169 overtops by approximately 2 feet. If it is a wet year or the spring melt is occurring, a lesser rain event, such as a 10-year event can also trigger overtopping. It takes approximately 24 to 36 hours for the water to subside following the rain event.

50-year and 100-year rain events are not predictable and occur randomly, that is to say, they do not occur every year and sometimes they occur multiple times in a season. The last time that there was significant overtopping of TH 169 in the southern project area was in 2014. Anecdotal information from MnDOT, Scott County and property owners in the area indicate that localized flooding and the occasional overtopping of roadways does occur and has resulted in property damage and road closures.

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

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

7. **Cover Types:**
Estimate the acreage of the site with each of the following cover types before and after development:

Table 2 shows the different cover types within the project area both before and after the project.

Table 2 – Cover Type

Cover Type	Before (acres)	After (acres)
Wetlands	3.5	0.73
Deep water/streams	0.3	0.3
Wooded/forest	42.2	33.0
Brush/Grassland	122.5	86.8
Cropland	72.4	50.3
Lawn/landscaping	102.1	138.17
Impervious surface	223.5	244.6
Stormwater Pond	2.2	15.1
Other (describe)	NA	NA
Ditch	0.9	0.6
Total	**569.6**	**569.6**

Note: numbers may not sum due to rounding.

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

Table 3 shows the permits and approvals needed for the project.

Table 3 – Permits and Approvals

Known Permits, Approvals, Certifications and Financial Assistance	Agency	Action Required/Activity to be Completed
Federal		
Categorical Exclusion	FHWA	Approval
Section 106 (Historic/Archaeological)	Tribal Historic Preservation Office	Consultation
Section 106 (Historic/Archeological)	FHWA	Consultation
Section 404	Army Corps of Engineers	Permit
Surface Transportation Funding	FHWA via the Metropolitan Council	Funds authorized
TIGER Grant	FHWA	Funds authorized
State		
Geometric Layout	MnDOT	Approval
Construction Plans	MnDOT	Approval

Known Permits, Approvals, Certifications and Financial Assistance	Agency	Action Required/Activity to be Completed
Controlled Access	MnDOT	Approval
Highway Interchange Request	MnDOT	Approval
Right of Way Permit	MnDOT	Permit
Transportation and Economic Development (TED) Grant	MnDOT/DEED	Funds authorized
Public Waters General Permit	DNR	Permit
Water Appropriation Permit	DNR	Permit
National Pollutant Discharge Elimination System Construction Stormwater Permit	Minnesota Pollution Control Agency (MPCA)	Permit
Wetland Conservation Act	MnDOT with review by Board of Soil and Water Resources, and DNR if necessary	Approval
Section 401	Minnesota Pollution Control Agency	Approval
Well Sealing Septic Abandonment Form	Minnesota Department of Health Minnesota Pollution Control Agency	Permit Review
Regional/Local		
Highway Interchange Request	Metropolitan Council	Approval
Watershed District	Lower Minnesota	Review/Comment
Watershed Management Organization	Scott County	Review/Comment
Grading Permit	Scott County	Permit
Demolition Permit	Scott County	Permit
Wetland Conservation Act Replacement Plan	Scott County Soil and Water Conservation District	Approval
Construction Plans – Scott County	Scott County	Approval
Construction Plans – Jackson Township	Jackson Township	Approval
Construction Plans – Louisville Township	Louisville Township	Approval
Right of Way Work Permit	Scott County	Permit
Other		
Railroad Agreement/Permit (Crossings, gate installation, and culvert work)	Union Pacific Railway	Approval/Permit

Cumulative potential effects may be considered and addressed in response to individual EAW Item Nos. 9-18, or the RGU can address all cumulative potential effects in response to EAW Item No. 19. If addressing cumulative effect under individual items, make sure to include information requested in EAW Item No. 19

9. Land Use:

a. Describe:

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

Land Uses

Figure 9 shows existing land uses within the corridor. Commercial, industrial and mining uses are prevalent in the project area, although limited residential and agricultural uses also exist. Immediately adjacent to the intersection of TH 169 and TH 41/CSAH 78 are commercial land uses consisting of two gas stations, a used car sales lot, undeveloped commercial land, a boat center, and a motel.

A manufactured home community (residential) is located in the southwest corner of the intersection of TH 169 and TH 41/CSAH 78. North of the intersection is undeveloped and/or agricultural land, a landscaping business, a manufactured home community, an equipment dealer and a printing business. South of the intersection are industrial uses, undeveloped land, a bowling alley, an equipment dealer, and other commercial uses. West of the intersection along TH 41 are industrial land uses including a MnDOT truck station, undeveloped land and mining activities and a railway.

South of the intersection with 133rd Street, towards CSAH 14, there are additional commercial and industrial uses on the east side of the corridor – including a landscaping businesses – as well as limited residential uses. On the west side of the corridor there are additional commercial and mining activities. There is also a US Fish and Wildlife park area and a railway.

Beyond the immediate project area and further to the west is the Minnesota River Valley. Further to the east there are industrial uses and undeveloped/agricultural land.

Parks and Trails

There are no parks or trails within the project area. The Minnesota Valley National Wildlife Refuge (NWR) and the Minnesota Valley State Recreation Area (SRA) are located to the west of the project area. Because most of the existing and proposed land uses within the project area are commercial and industrial in nature, there is no land set aside for parks, trails, or other recreational uses. This is borne out by the correspondence with natural resource agencies such as the Minnesota Department of Natural Resources (DNR) and MnDOT on behalf of the US Fish and Wildlife Service (USFW) which have indicated that there will not be impacts to recreational facilities as a result of the proposed project. While the project will slightly modify access to the main parking lot for the Louisville Swamp Unit of the Minnesota Valley NWR, it will not impact any refuge land. See **Attachment N** for correspondence.

Farmland

As stated above, agricultural uses are mixed within the project area, primarily on properties that may experience future development. The farmland has been identified as prime or of statewide importance based on soil types and slopes.

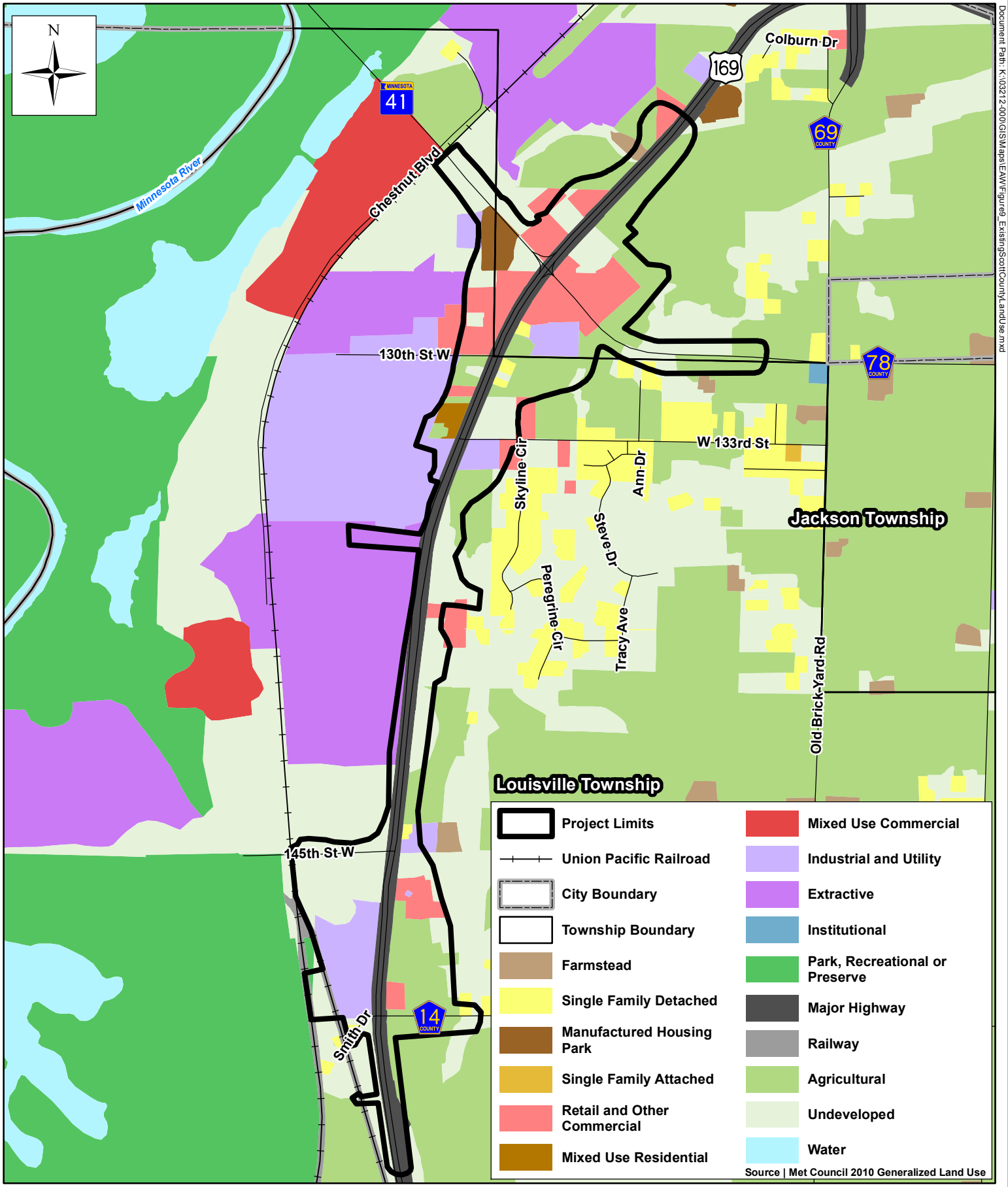

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Figure 9: Scott County Land Use Map

US 169/TH 41/CSAH 78/CSAH 14 Intersection Improvements
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ii. Plans. Describe planned land use as identified in comprehensive plan (if available) and any other applicable plan for land use, water, or resources management by a local, regional, state, or federal agency.

The Scott County 2030 Comprehensive Plan guides most of the project area and surrounding areas for future commercial and industrial land uses—including all of the parcels within the existing TH 169 and TH 41/CSAH 78 intersection area. Outside of the immediate intersection to the north, the area is identified as commercial reserve. This land use allows for the preservation of land for future commercial and industrial uses that will ultimately have urban services. There is also an area south of CSAH 14 identified as commercial reserve.

Between CSAH 78 and CSAH 14 to the west of TH 169 most of the future land use is guided for rural commercial/industrial uses. This category is intended to provide land for uses with limited traffic and water usage, outdoor storage, and other uses that may not be appropriate in urbanized areas. New development would be allowed provided all necessary infrastructure (septic, stormwater treatment, interconnected road system, public safety, etc.) is available. East of the project area is guided as urban expansion. The purpose of this category is to preserve areas around cities for future urban expansion and development. **Figure 10** shows future land use in and around the project area from the Scott County 2030 Comprehensive Plan.

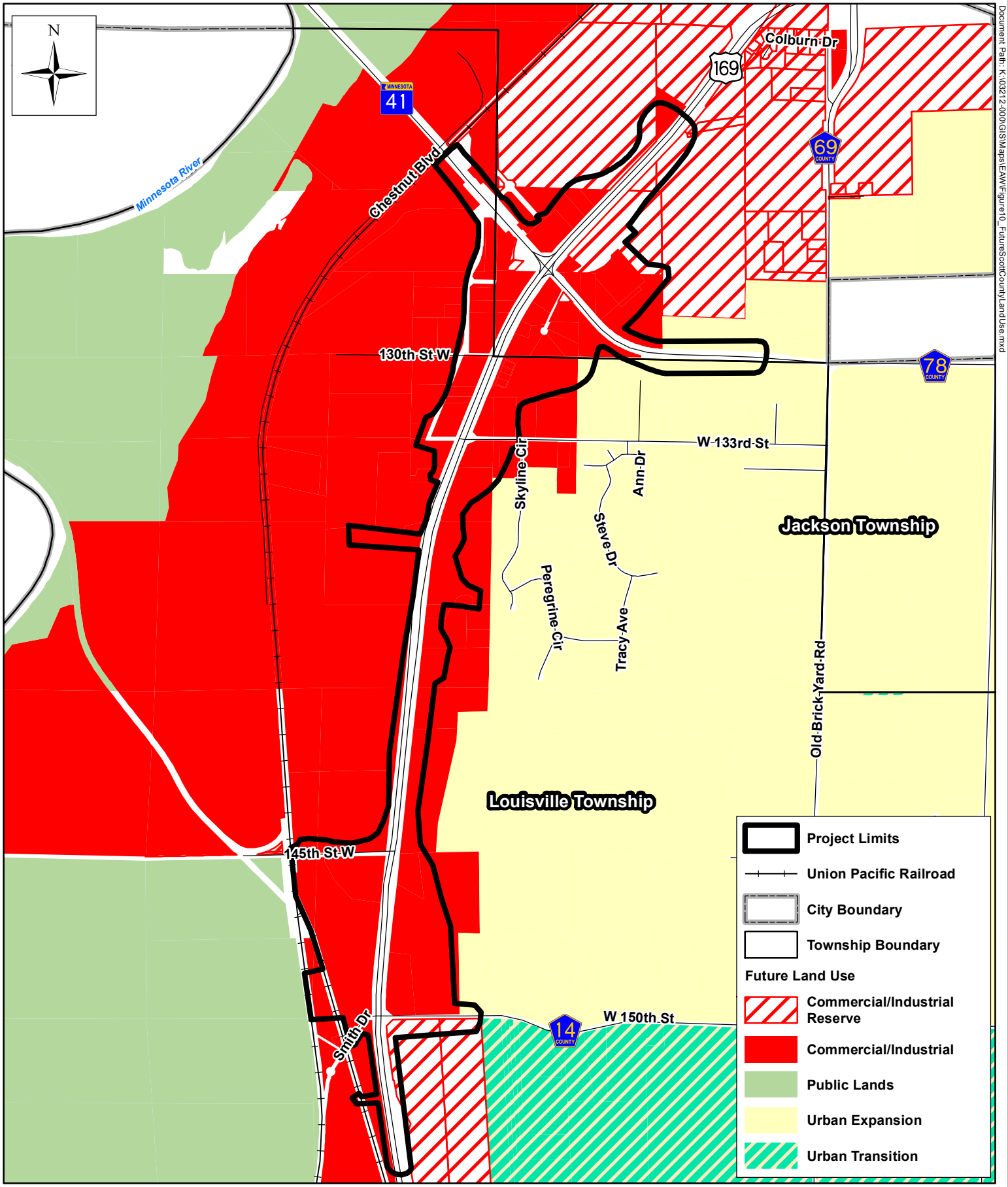

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Figure 10: Future Scott County Land Use

US 169/TH 41/CSAH 78/CSAH 14 Intersection Improvements
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Other plans for locations near the project include the City of Shakopee Comprehensive Plan. This plan anticipates the ultimate incorporation of land within Jackson Township into the city. Future land uses along TH 169 include industrial and commercial. Uses at the intersection with TH 41 and CSAH 78 include industrial, commercial and residential. **Figure 11** shows future land use in and around the project area from the City of Shakopee. In addition to future land use for the area, the city's comprehensive plan also anticipates the extension of sewer and water facilities to the TH 169 and TH 41/CSAH 78 intersection and eastward.

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

The Scott County Zoning Ordinance governs properties within both Jackson and Louisville Townships. Properties at and immediately surrounding the intersection of TH 169 and TH 41/CSAH 78 are primarily zoned General Commercial (C-1). North of the intersection, properties are primarily zoned Urban Business Reserve (UBR). To the west of TH 169 within the project area, most parcels are zoned Rural Industrial (I-1). To the east of TH 169, south of CSAH 78 and towards CSAH 14, properties are primarily zoned General Commercial and Rural Industrial with a limited number of parcels zoned Urban Expansion Reserve (UER) and Urban Expansion Reserve Cluster (UER-C). Southeast of the junction of TH 169 and CSAH 14, parcels are primarily zoned UBR. The zoning designations are consistent with future land use plans (**Figure 12)**.

There are no special districts within the project area, with the exception of the extreme southern portion of the project area where Picha Creek crosses under TH 169 through a culvert. The area surrounding this stream is identified as part of the DNR Shoreland District and as a FEMA Floodplain Area (Zone A). **Figures 13a-13c** shows the area of the project within the FEMA Floodplain Area. To the west (but outside of) the project area, there are several publicly-owned facilities, including the Minnesota Valley NWR and the Minnesota Valley SRA.

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

<u>Land Uses</u>
In general, the proposed project is compatible with existing zoning regulations and existing and proposed land uses. The proposed interchange and supporting roadway network to access TH 169, TH 41, and CSAH 78, as well as CSAH 14 via the proposed overpass, would be consistent with, and support, future development opportunities that are envisioned in the Scott County 2030 Comprehensive Plan. The proposed frontage roads would enable underutilized properties located along TH 169 to be developed consistent with adjacent properties and with future land use guiding in a manner that does not require direct driveway access to TH 169.

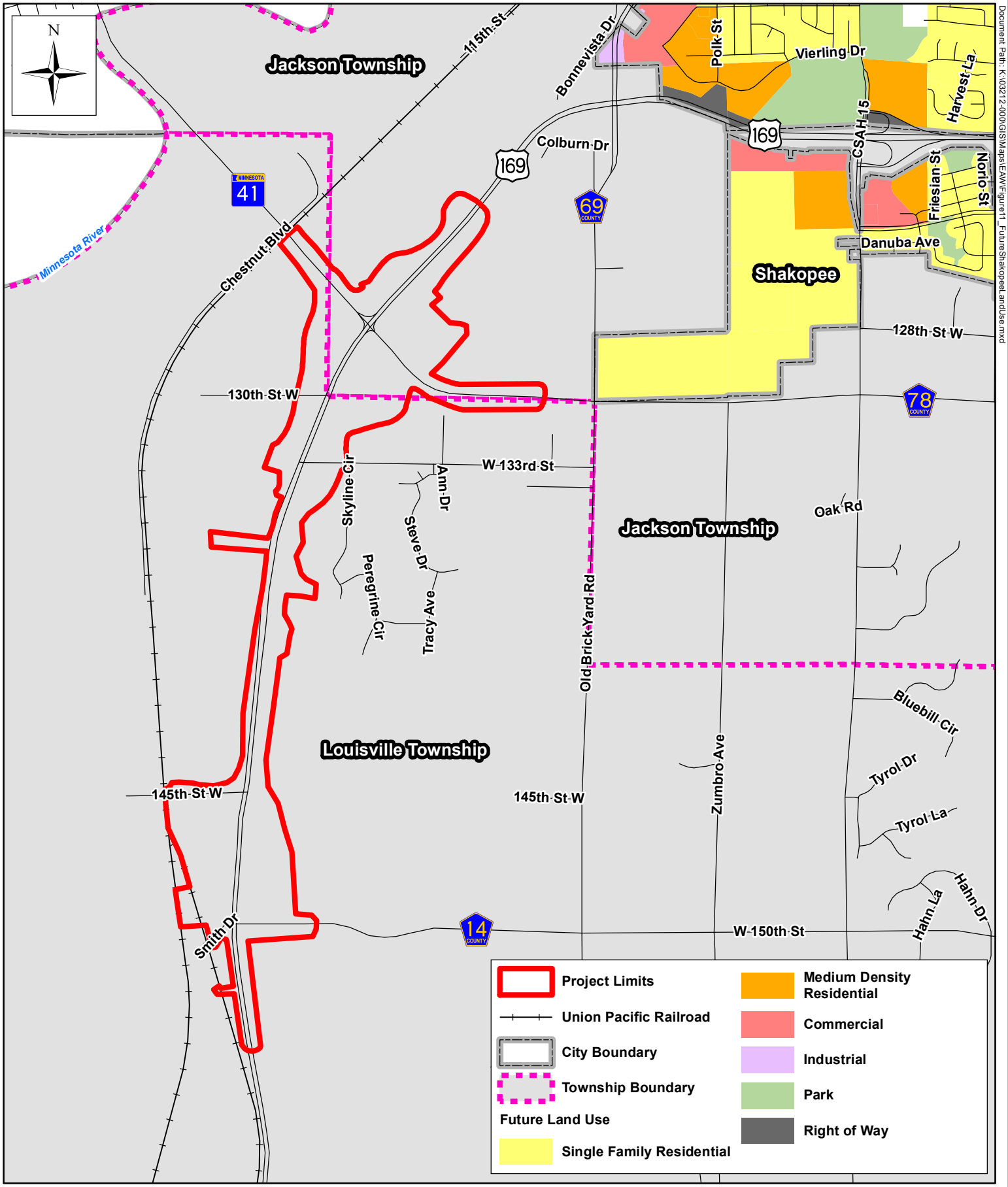

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Figure 11: Future Shakopee Land Use

US 169/TH 41/CSAH 78/CSAH 14 Intersection Improvements

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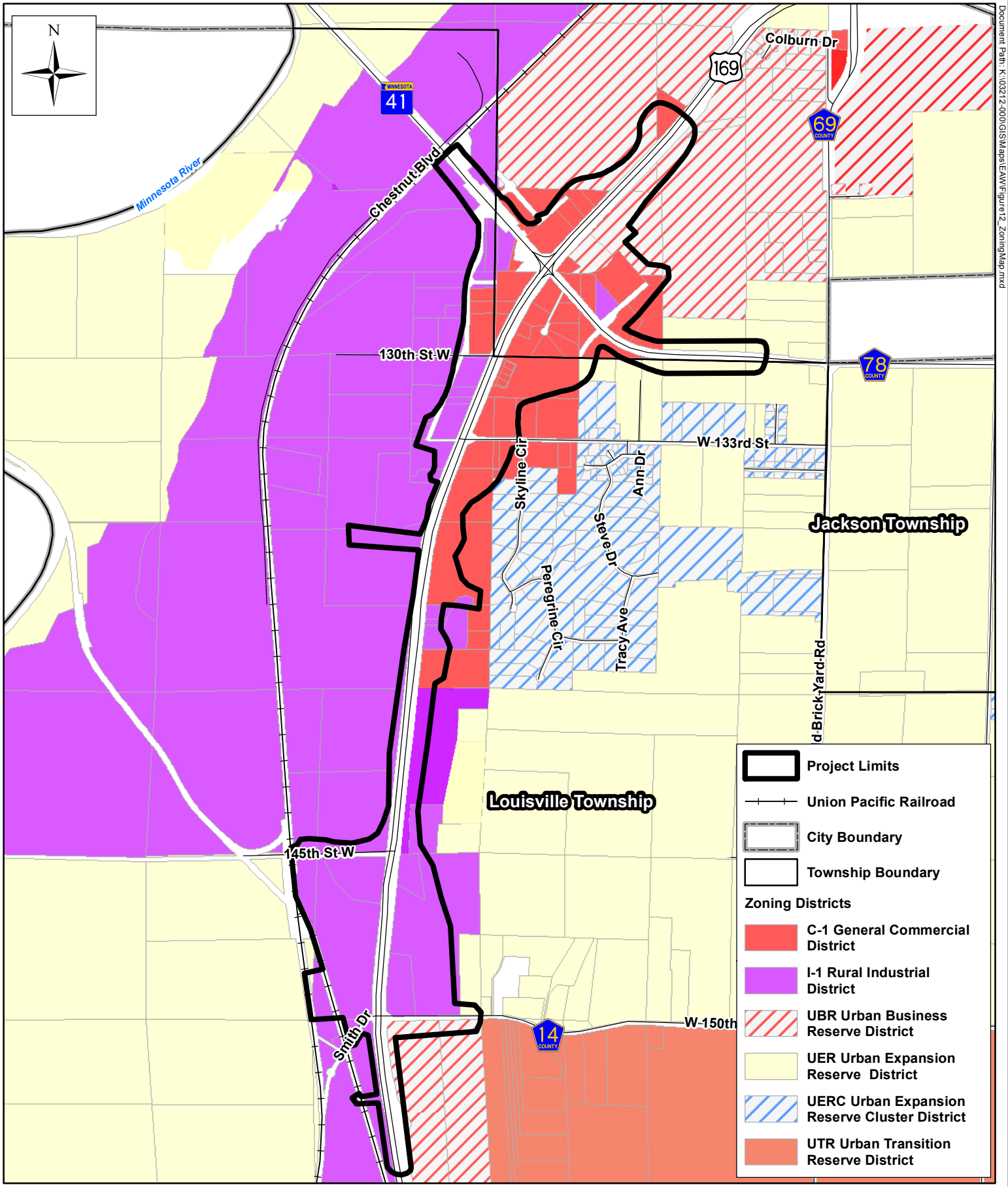

Figure 12: Zoning Map

US 169/TH 41/CSAH 78/CSAH 14 Intersection Improvements
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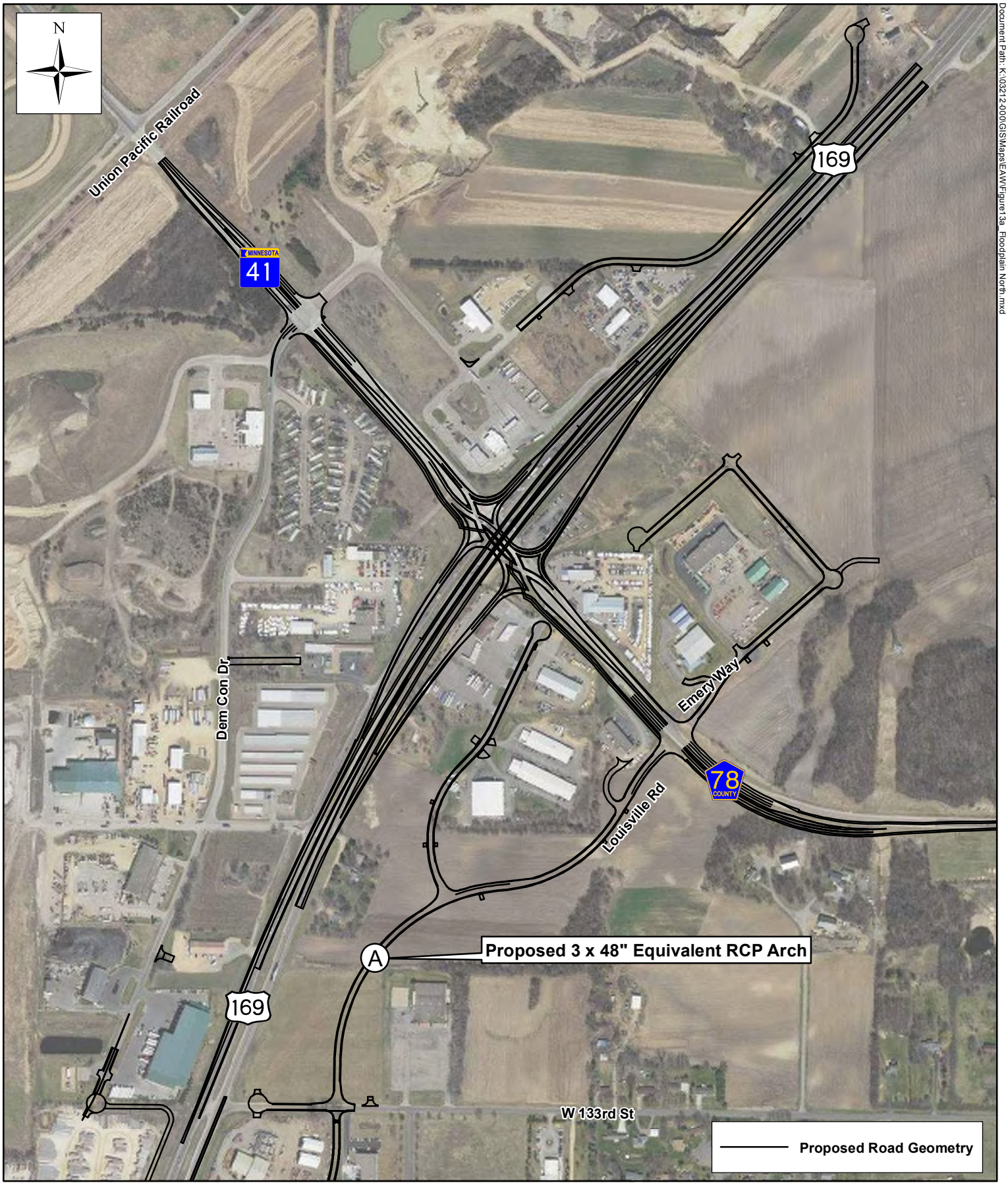

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Figure 13a: Proposed Floodplain Impacts and Crossings

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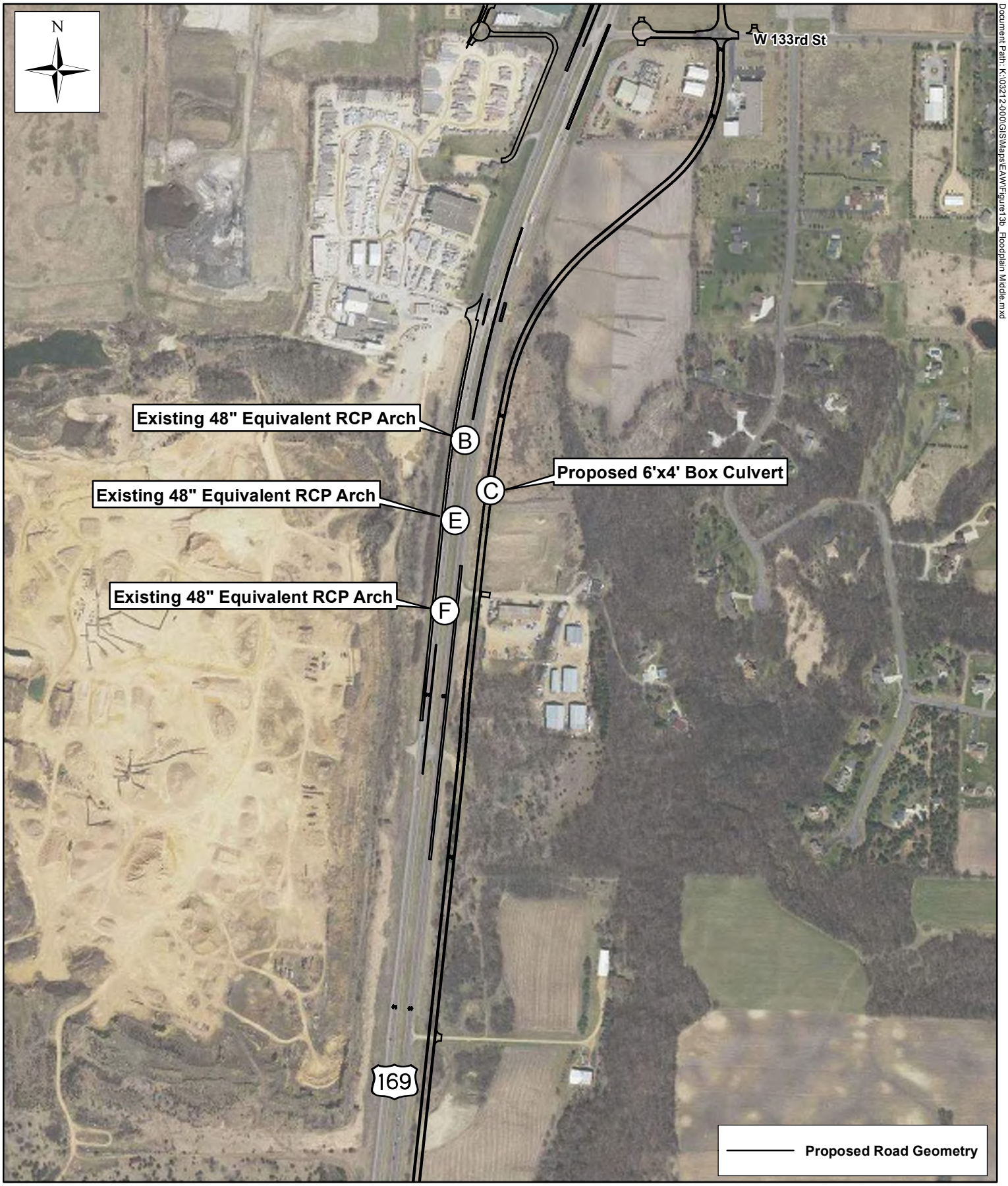

Figure 13b: Proposed Floodplain Impacts and Crossings

US 169/TH 41/CSAH 78/CSAH 14 Intersection Improvements

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Scott County, MN

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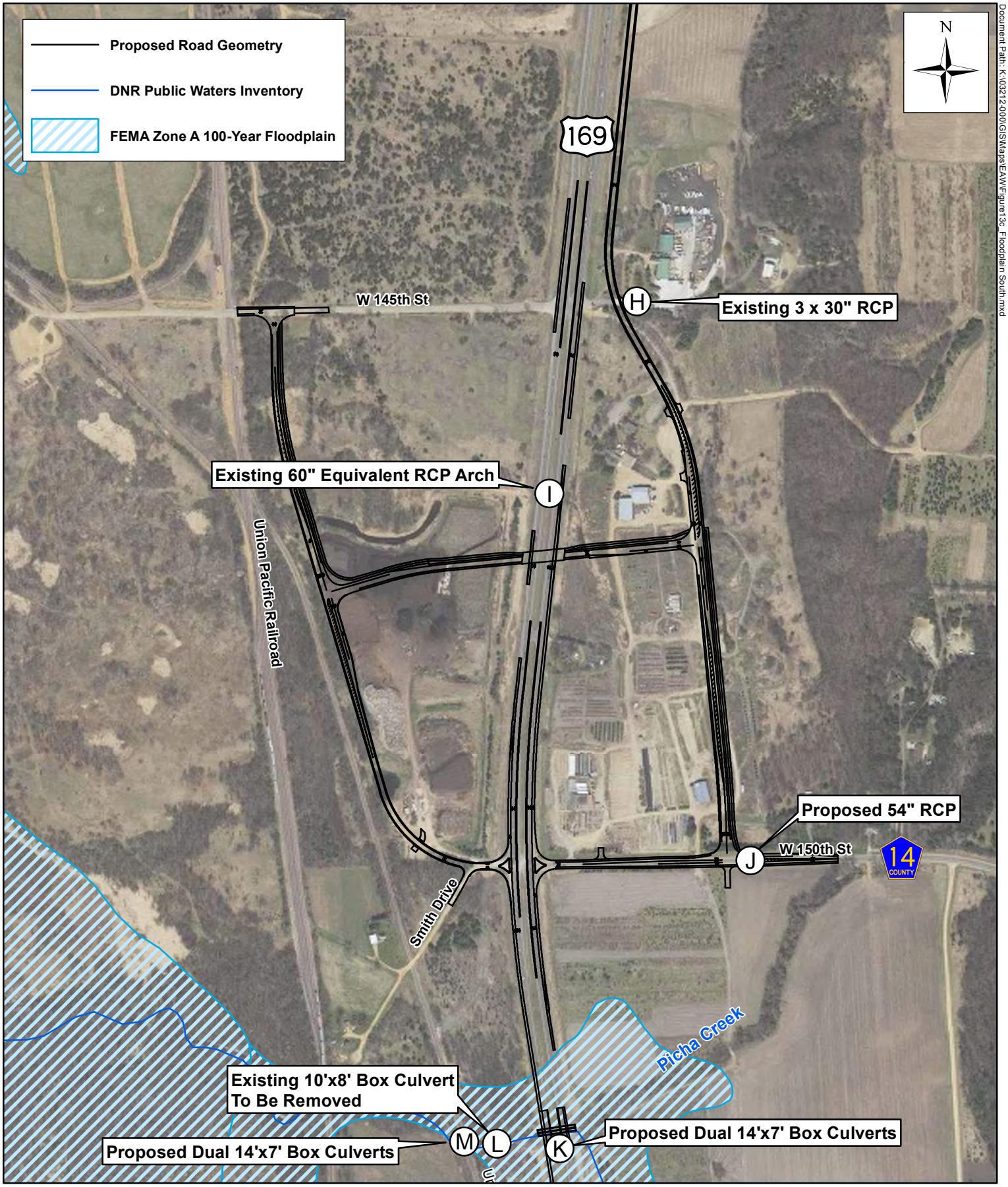

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Figure 13c: Proposed Floodplain Impacts and Crossings

US 169/TH 41/CSAH 78/CSAH 14 Intersection Improvements

SP 070-596-013/7005-121/7009-81/7010-109

Scott County, MN

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Other existing land uses in and near the project area include two manufactured home communities. The northern community—Mobile Manor—is located on the east side of TH 169 north of the intersection with TH 41 and CSAH 78. This community is outside the project limits. This community is not physically impacted by the proposed project—the interchange improvements and frontage road connections included as part of the project will not directly impact the site.

The southern community—Jackson Heights—is located on the south side of TH 41, just west of the intersection with TH 169. This community is not physically impacted by the proposed project—the interchange improvements and frontage road connections included as part of the project will not directly impact the site. However, noise from the project was deemed to be an impact associated with the project. As a result, a noise wall was proposed and has been included as part of the proposed project based on property owner and resident support. The detailed noise analysis and wall location can be found in **Attachment E**.

Shoreland and Floodplain

The project would have limited activities within the shoreland district and floodplain area (FEMA Zone A):

1. The installation of an acceleration lane along southbound TH 169 south of CSAH 14,
2. Replacement of the existing box culverts under TH 169,
3. Removal of the field road culvert under Old TH 169,
4. Replacement of the culverts under the Union Pacific Railroad Spur.

Due to the width of the existing roadway shoulder in the vicinity of Picha Creek, it is not anticipated that any grading, in-water construction, or culvert modifications would be necessary due to the shoulder work.

The floodplain assessment and hydraulic analyses of the culvert replacements are included in **Attachment F**. The analyses indicate that there would be a net reduction in the floodplain elevation upstream of the Union Pacific Spur railroad culverts due to the culvert replacement and removal under the spur line and TH 169. Replacement of the culverts would cause an increase in the discharge downstream. However, Picha Creek discharges to the Louisville Swamp and Minnesota River immediately downstream. Impacts to the Minnesota River floodplain due to the small increase in peak discharge would not be expected due to the large size of the Minnesota River and due to the timing of the peak discharge from Picha Creek occurring prior to the peak discharge in the Minnesota River. There are no properties that would be impacted by the change in the peak discharge. The bridge under the mainline Union Pacific railroad does not need to be replaced as a part of this project.

MnDOT requires completion of a risk assessment for culverts that are 48 inches and larger. The project also includes a number of culverts that meet this criterion where culverts are proposed to accommodate modified drainage patterns associated with roadway construction. Construction of these culverts—which are shown in **Figures 13a, 13b, and 13c**—would not be anticipated to result in floodplain impacts. Risk assessments for these crossings are included in **Attachment G**.

Parks and Trails

Because the project would close the public access to and from TH 169 at 145th Street, access to the main parking lot for the Louisville Swamp Unit of the Minnesota Valley NWR would be

modified. Instead of turning onto 145th Street directly from TH 169, refuge visitors would use a combination of Limestone Drive, 147th Street West, Louisville Road, and CSAH 14 to access the parking area. This change in access would not impact refuge lands and is consistent with long-term use of parkland facilities.

Farmland

As stated above, agricultural uses are mixed within the project area. However, in this area agricultural land has continued to transition to industrial and other business developments. The Scott County 2030 Comprehensive Plan guides much of the existing farmland in the project area for rural commercial and industrial uses or for future urban development. In the interim, adjacent agricultural uses would continue. The proposed project would not prohibit the use of non-converted farmland for current farming practices.

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

The project would be compatible with Scott County's future land use plans for the area and the planned rural commercial/industrial development. It would also be compatible with the City of Shakopee's long-term plans for urban expansion to the west.

Construction activities would be phased such that access to the National Wildlife Refuge parking lot would be maintained throughout construction. Following construction, a combination of Limestone Drive, 147th Street West, Louisville Road, and CSAH 14 would be used to access the parking lot from TH 169.

A public waters work permit would be obtained from the DNR prior to removal and replacement of the culverts at Picha Creek. As part of construction, best management practices would be implemented to minimize impacts to the waterbodies to the extent practicable consistent with the permit. These BMPs would include, but are not limited to:

- Energy dissipation to minimize erosion and scour
- Site management plans for the culvert replacement
- Stabilization methods within 200 feet of discharge points
- Silt fence for perimeter control
- Flotation silt curtain for in-water work and work directly adjacent to waterbodies
- Proper inlet and outlet controls until all upstream locations have been stabilized
- Dewatering plans before dewatering operations
- Providing redundant perimeter control and stabilization

10. Geology, Soils and Topography/Land Forms:

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

The Scott County Geologic Atlas (Atlas C-17) was used for information in this section. The reference maps are plates 2 (bedrock geology), 3 (surficial geology), 5 (depth to bedrock), and 6 (subsurface recharge and surface infiltration). These maps are provided in **Attachment H**.

The surficial geology of the project area is mapped as being primarily glacial terraces undercut by floodplain alluvium from the Minnesota River. The underlying bedrock can be described as finely crystalline dolostone, sandstone and shale of the Prairie du Chien Group Formation, which mostly covers the northern half of the project, and in the southern half the coarse-grained, high silica content of the Jordan Sandstone can also be found. The northern portion of the project area has a depth to bedrock of 51-100 feet, which is also true throughout areas of the southern portion of the site. However, there are areas within both the central and southern portions of the project area where depth to bedrock ranges from 0-50 feet.
The Subsurface Recharge and Surface Infiltration plate shows the study area as having very fast infiltration which would be sensitive to subsurface and groundwater contamination where contaminants can vertically travel ten feet within hours to weeks.

The Minnesota Geological Survey does not identify sinkhole probability for Scott County. There is no indication of sinkholes within the project area on any of the Scott County Geologic Atlas platelets. Because of the glacial outwash and alluvial cover above the bedrock, the probability of sinkhole development is not a concern within the project area. The project area does not contain any known sinkholes, shallow limestone formations, unconfined/shallow aquifers, or karst conditions. There should not be geologic conditions that would impact construction of the project. No mitigation measures are needed for the recommended alternative.

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

The Scott County Soil Survey identifies 32 different soil types within the vicinity of the project (**Figure 14**). Variable thicknesses of loams and sandy loam mantle the underlying glacial till. The area is dominated by soils formed in outwash in the Sparta soil series.

These soils are nearly level to moderately steep, well-drained, silty soils that are formed on uplands. **Table 4** provides an index of the soils identified and notes whether the soils are highly erodible, hydric or floodplain soils, slopes on which they are found, and their permeability.

Soils within the project area do not indicate any limitations in terms of construction of the proposed roadway and intersection improvements. Although some of the soil types are granular or have granular horizons and have fairly rapid permeability, the great depth to bedrock throughout most of the study area will reduce the probability of groundwater contamination.

Soils with high gravel content and permeability may be suitable for storm water infiltration. Because the Comfrey soil series is underlain by glacial till, the central and southern portions of the study area may require specific soil investigations be performed to assess infiltration protection. The surficial water table is located within levels of saturated glacial-outwash and gravel perched on the underlying glacial till. This water is likely very young and is not originating from an aquifer. Given the types of soil identified above, there are no special site conditions regarding erosion or soil stability. Several maps have been included in **Attachment H** to show information regarding depth to soil restrictive layers, drainage classes, flooding frequency, hydric soil rating, parent material, and saturated hydraulic conductivity. The project would require approximately 120,600 cubic yards and 134 acres of soil excavation and grading.

Mitigation measures for spills and leaks include secondary containment for fuels brought on to the project area and spill containment and emergency preparedness material, including absorbent materials and pads, should be on-site during construction and development operations. The use of lawn chemicals, especially fertilizers, including phosphorous should be used minimally.

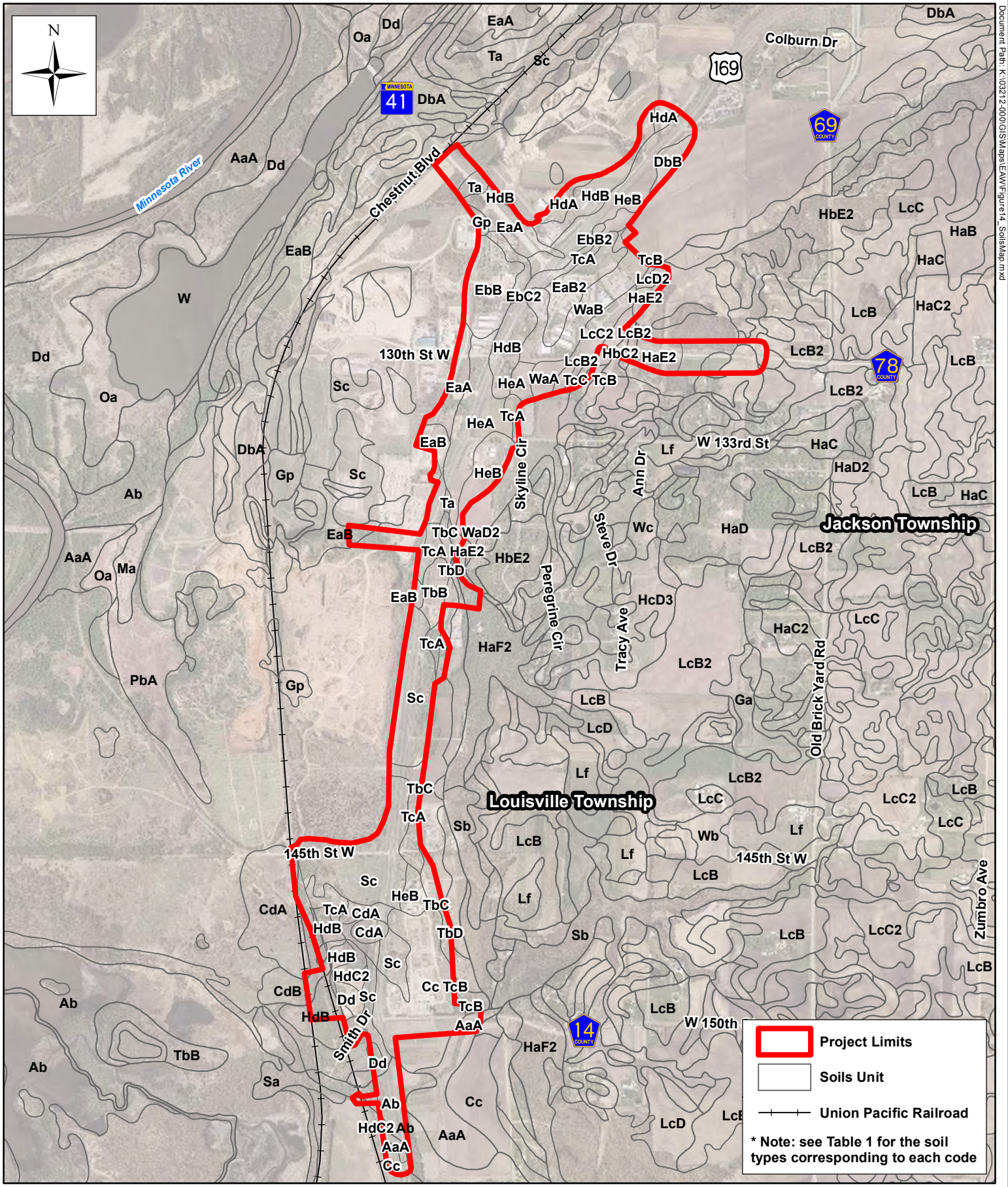

Figure 14: Soils Map

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Table 4 – Soil Types

Code	Name	Erodibility[1]	Hydric[2]	Floodplain[2]	Slope (%)	Permeability[3]
Cc	Comfrey silty clay loam	NHEL	**Yes**	**Yes**	0-1	0.5-0.8
CdA	Coposton silt loam	NHEL	No	No	0-2	0.45
DbB	Dickman sandy loam	NHEL	No	No	2-6	0.8-2.5
Dd	Dorchester silty clay loam	NHEL	No	**Yes**	0-2	2.5-5.0
EaA	Estherville loam and sandy loam	NHEL	No	No	0-2	0.6-1.3
EaB	Estherville sandy loam	NHEL	No	No	2-6	0.6-1.3
EaB2	Estherville loam and sandy loam	NHEL	No	No	2-6	0.6-1.3
EaC2	Estherville loam and sandy loam	PHEL*	No	No	6-12	0.6-1.3
EbB	Salida gravelly sandy loam	NHEL	No	No	0-6	0.6-1.3
EbB2	Salida gravelly sandy loam	NHEL	No	No	6-12	0.6-1.3
EbC	Salida gravelly sandy loam	NHEL	No	No	6-12	0.6-1.3
EbC2	Salida gravelly sandy loam	NHEL	No	No	6-12	0.6-1.3
Gp	Gravel Pit	NHEL	No	No		
HdA	Sparta fine sand	NHEL	No	No	5-10	0.8-2.5
HdB	Sparta fine sand	NHEL	No	No	5-10	0.8-2.5
HdC2	Sparta fine sand	NHEL	No	No	5-10	2.0-6.0
HeA	Sparta loamy fine sand	NHEL	No	No	5-10	0.6-2
HeB	Sparta loamy fine sand	NHEL	No	No	2-6	5-10
HeB2	Sparta loamy fine sand	NHEL	No	No	2-6	5-10
HeC2	Sparta loamy fine sand	NHEL	No	No	6-12	5-10
LcB2	Lester loam	NHEL	No	No	2-6	0.8-2.5
LcC2	Lester loam	PHEL	No	No	6-12	0.8-2.5
LcD2	Lester Loam	HEL*	No	No	12-18	0.8-2.5
Sc	Stony land	NHEL	No	No		
Ta	Terrace escarpments	HEL	No	No		
TbC	Terril loam	NHEL	No	No	6-12	0.8-2.5
TbD	Terril loam	HEL	No	No	12-18	0.8-2.5
TcA	Terril loam	NHEL	No	No	0-2	0.8-2.5
TcB	Terril loam	NHEL	No	No	2-6	0.8-2.5
TcC	Terril loam	NHEL	No	No	6-12	0.8-2.5
WaA	Waukegan silt loam	NHEL	No	No	0-2	2.5-5.0
WaB	Waukegan silt loam	NHEL	No	No	2-6	2.5-5.0

[1] Erodibility: HEL – highly erodible land; NHEL – not highly erodible land; PHEL – potentially highly erodible land; (*) – These PHEL units are considered HEL based on typical slope percent and length for determinations made in the office
[2] Hydric/Floodplain: Yes – listed as a hydric or a floodplain soil; No – not listed
[3] Permeability: inches per hour. Permeability Rating Classes (Inches per Hour)-very slow (<0.06) slow (0.06-0.60), Moderate (0.60-2.0), Rapid (>2.0).

11. Water Resources:

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

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

Figures 15a-15c shows surface and groundwater features. The only public waterbody within the project limits is Picha Creek, which crosses under TH 169 and under the Union Pacific Railroad through culverts south of CSAH 14. Picha Creek is on the MPCA 303d Impaired Waters List for fish bioassessments. There are also six wetlands that have been identified and delineated within the project area, along with five wet ditches, one dry ditch, one watercourse, two constructed stormwater ponds, and one infiltration basin.

Within one mile of the project area, there are a number of other public waterbodies, including Gifford Lake (PWI #118P), Louisville Swamp (PWI #209P), and other unnamed ponds (PWI #210P) located to the east of the Minnesota River. Two of the waterbodies within one mile of the project area are designated as impaired waters. Sand Creek, which is located less than a half mile from the project, is listed as impaired for fish bioassessments and turbidity. Additionally, the segment of the Minnesota River which is located near the project area is on the MPCA 303d Impaired Waters List for mercury, PCB, fecal coliform, and turbidity.

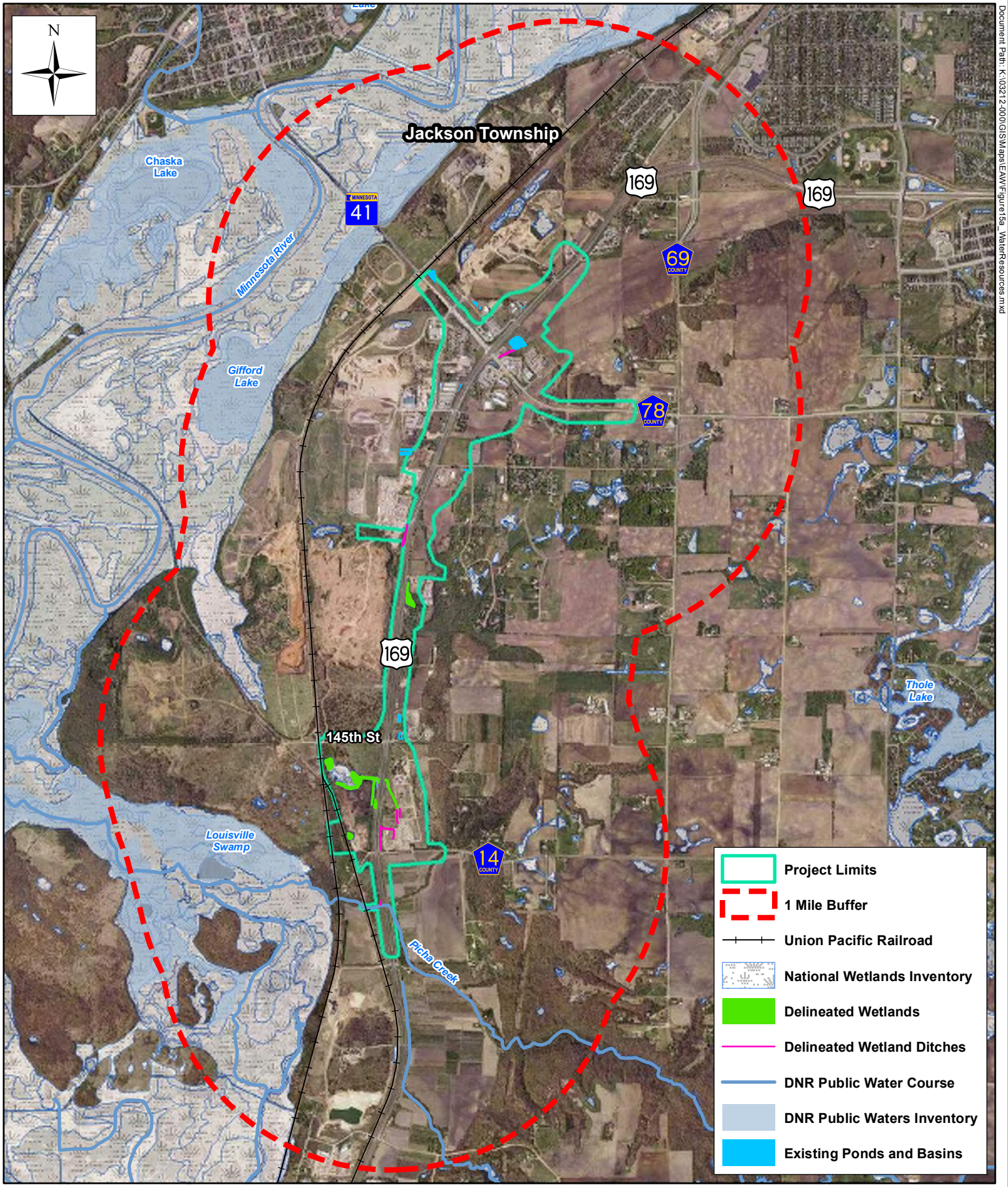

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Figure 15a: Water Resources - Overview

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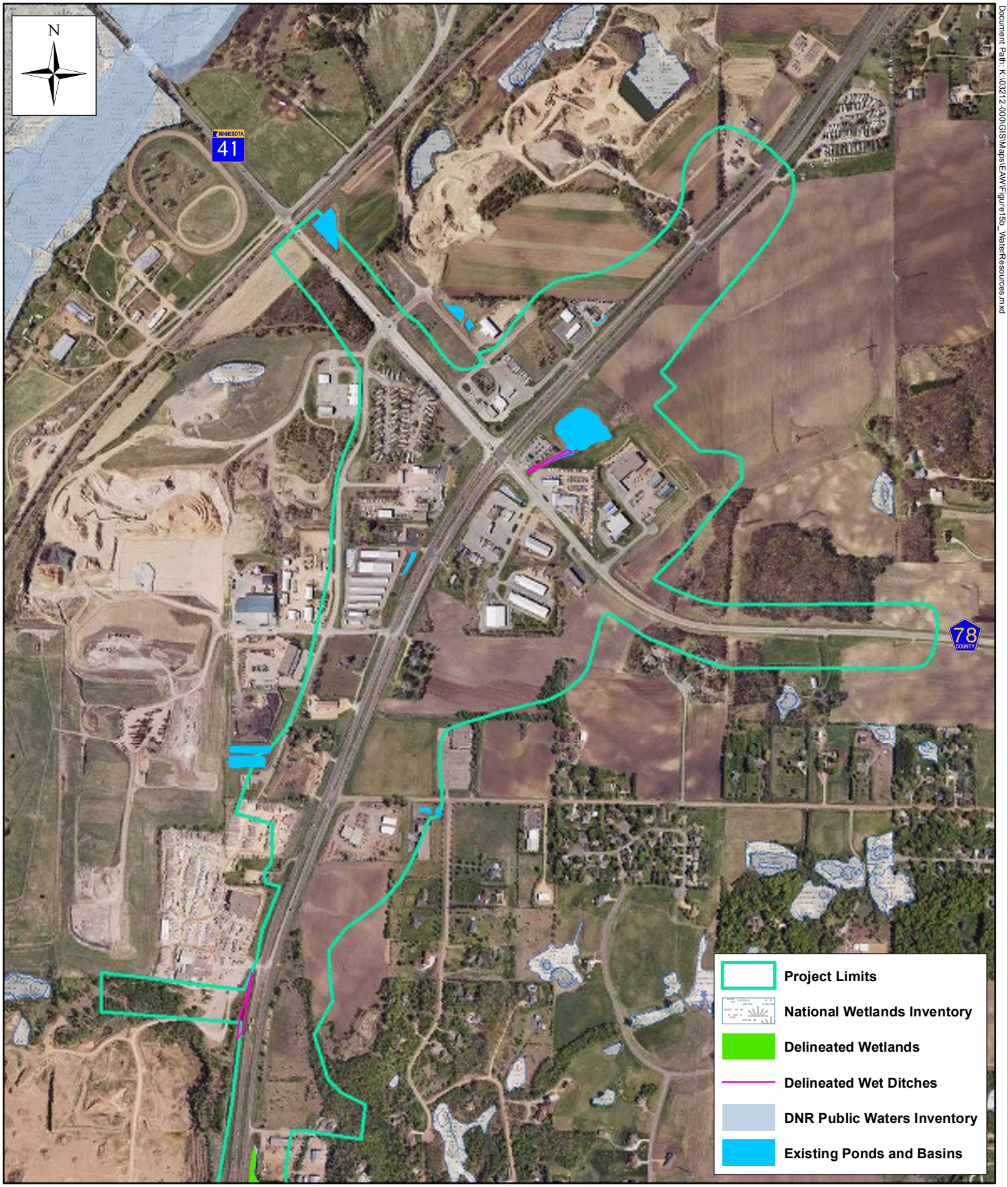

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Figure 15b: Water Resources - North

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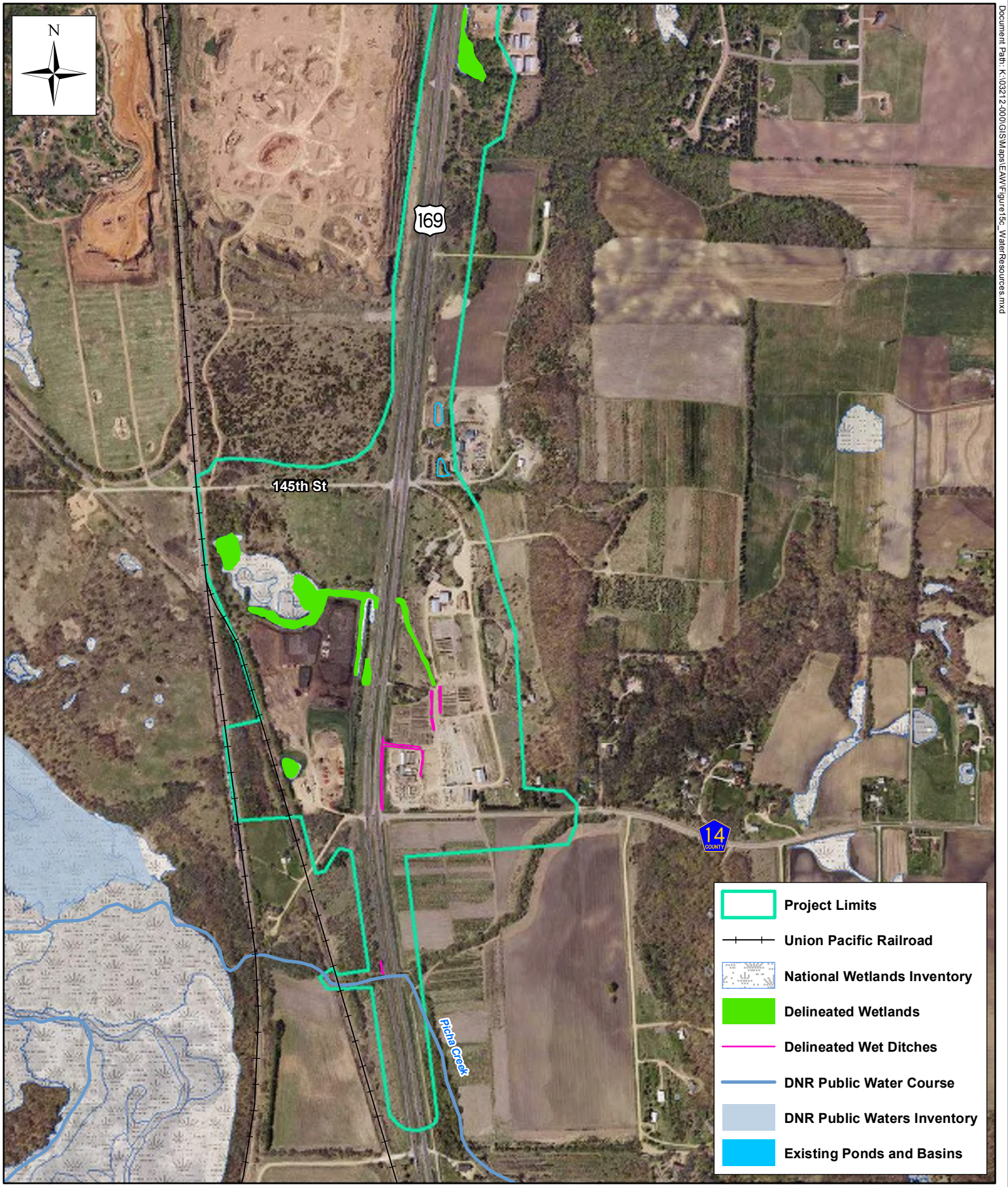

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Figure 15c: Water Resources - South

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0 1,000 Feet

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.

Depth to Groundwater

The depth to groundwater varies across the project area, but generally ranges from 30 feet to 155 feet.

MDH Wellhead Protection Area

A small portion of the northernmost section of the project area is identified as part of the Shakopee Drinking Water Supply Management Area (DWSMA) MN-00482, as designated by the Minnesota Department of Health. **Figure 16** shows the location of the DWSMA.

According to the MDH, a Shakopee Drinking Water Supply Management Area (DWSMA) MN-00482 has been determined and Shakopee Public Utilities has developed a wellhead protection plan for the wellhead protection areas. The project area along TH 169, northeast of the intersection with TH 41/CSAH 78, extends into the designated DWSMA, and this portion of the DWSMA is identified as vulnerable. However, the project does not extend into the associated Wellhead Protection Area.

Minnesota Department of Health guidance will be used to evaluate the feasibility of stormwater infiltration practices within the wellhead protection area.

Onsite and Nearby Wells

Wells within and adjacent to the project area were identified using the Minnesota Geological Survey County Well Index database. These wells are shown on **Figures 17a-17b** and listed in **Table 5**.

Six wells (shown in bold) have been identified that will be impacted as a result of the recommended alternative. The wells will be abandoned as part of the project. Well abandonment would follow state and local guidelines. Wells to be abandoned are noted on **Figures 17a-17c**.

It is not anticipated that the other wells identified near the project area will be impacted. If any additional wells are discovered during construction, they will be sealed. If a well is impacted but the balance of the site (and its associated uses) remains intact, the well will be mitigated by replacement.

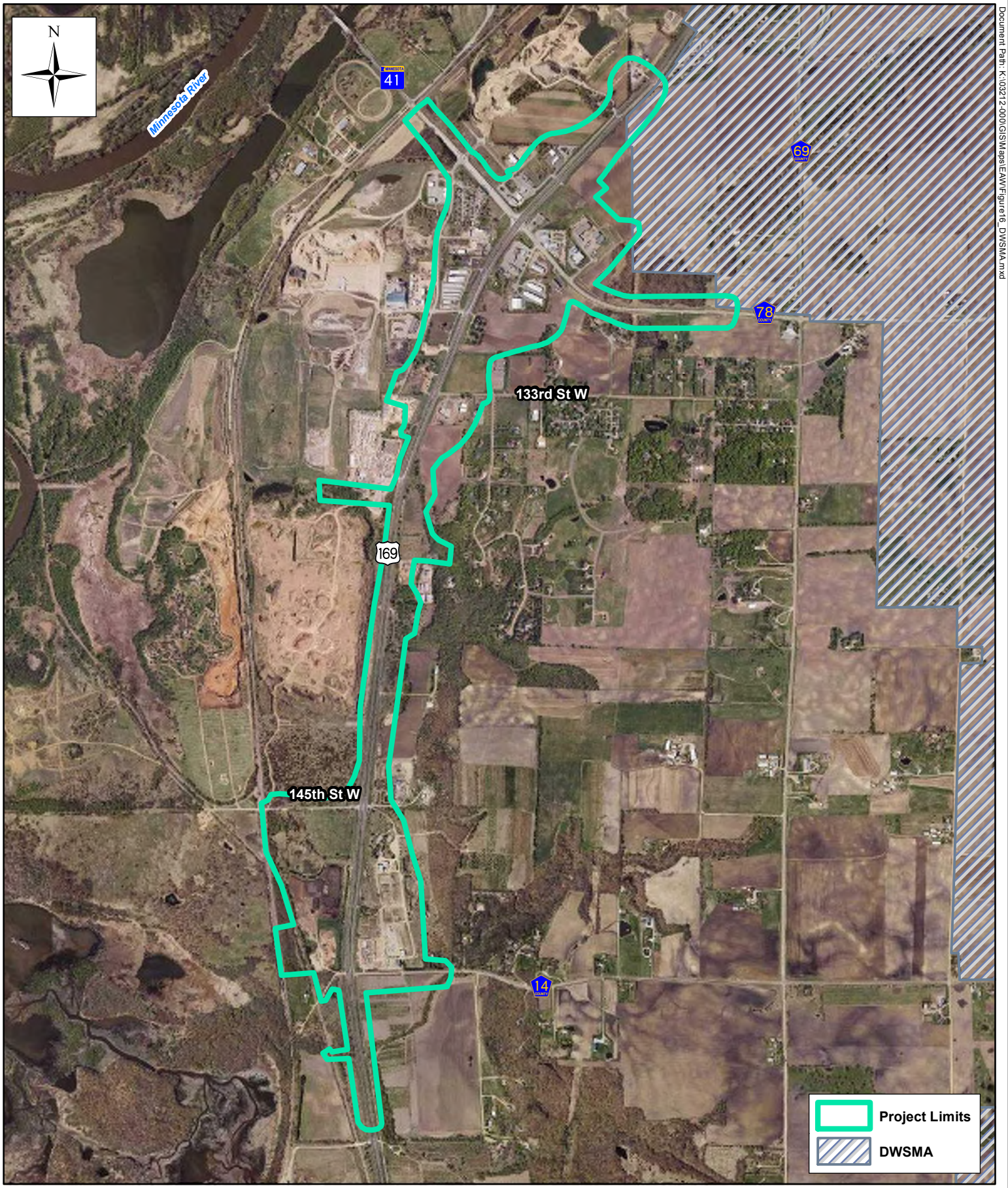

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Figure 16: Drinking Water Supply Management Area

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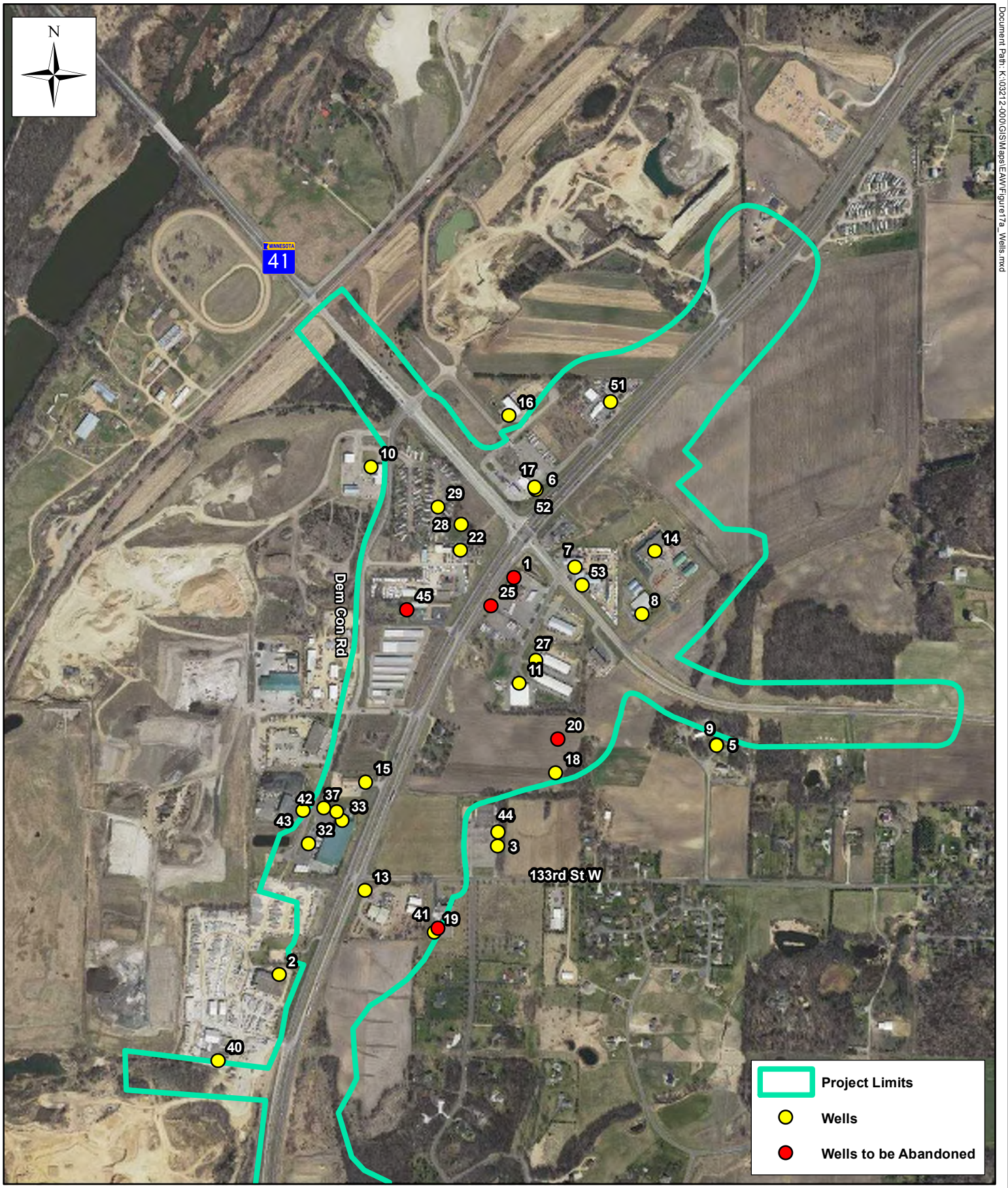

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Figure 17a: Wells

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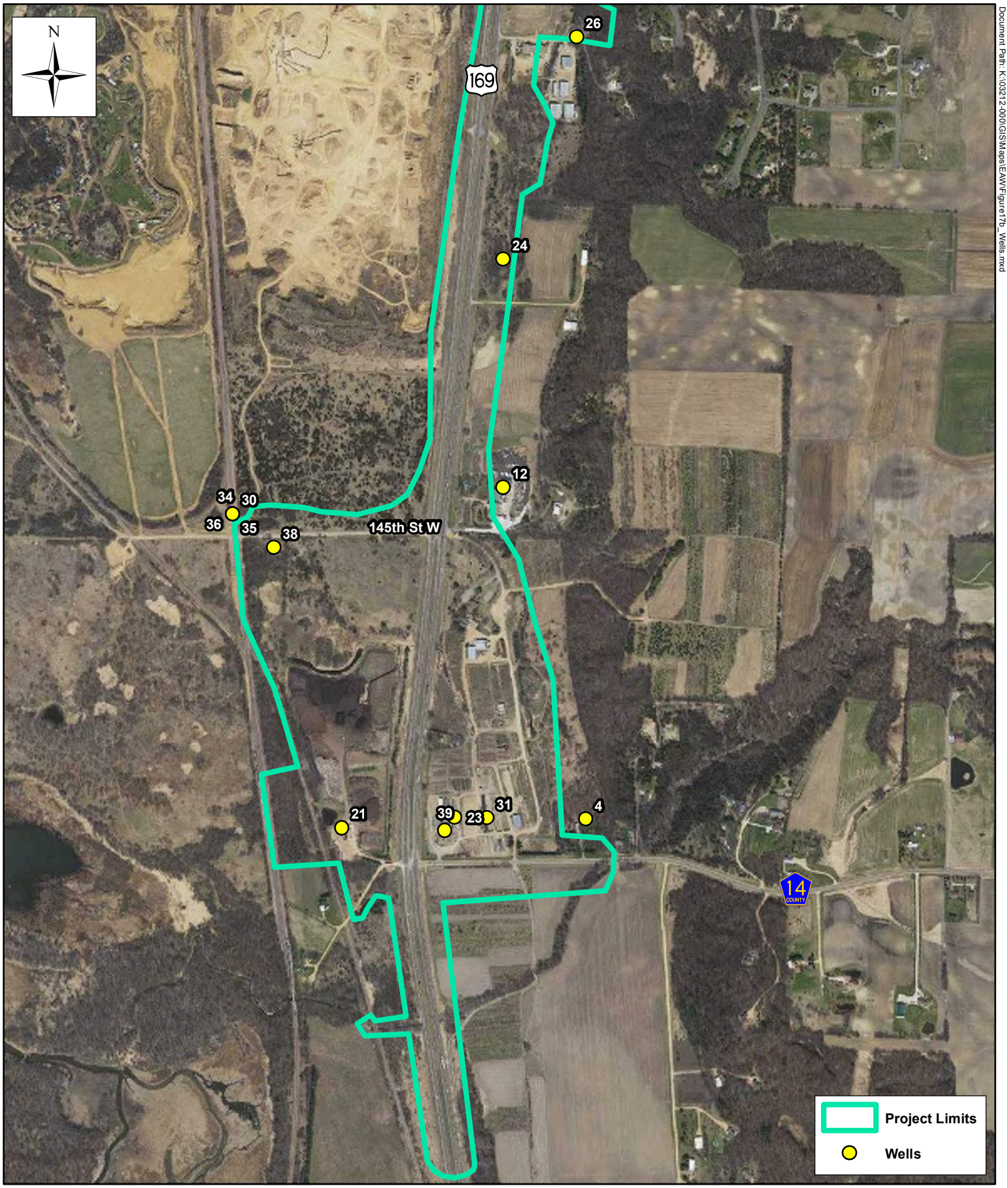

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Figure 17b: Wells

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0 1,000 Feet

Table 5 – Project Area Wells

Map ID	Unique ID	Address	Use[1]	Impacted
1	**563892**	**12835 Venture Ct, Shakopee**	**AB/S**	**Yes**
2	610403	Unknown	PN	No
3	603564	13610 Peregrine Circle, Shakopee	DO	No
4	211864	3036 150th St, Shakopee	DO	No
5	570155	2612 133rd St W, Shakopee	DO	No
6	407614	Unknown	CO	No
7	515776	Unknown	DO	No
8	605935	12860 Emery Way, Shakopee	DO	No
9	404371	2612 133rd St W, Shakopee	DO	No
10	261425	Unknown	PN	No
11	609840	12912 Venture Ct, Shakopee	DO	No
12	709026	14331 Johnson Memorial Dr, Shakopee	DO	No
13	209939	3021 133rd St W, Shakopee	CO	No
14	637822	Unknown	IN	No
15	405973	13122 Johnson Memorial Dr, Shakopee	DO	No
16	772251	12565 41 Highway, Shakopee	IN	No
17	432854	12550 Chestnut Blvd, Shakopee	DO	No
18	625966	13621 Peregrine Circle, Shakopee	DO	No
19	745250	3019 133rd St, Shakopee	AB	No
20	**645906**	**13615 Peregrine Circle, Shakopee**	**DO**	**Yes**
21	569344	14800 Johnson Memorial Dr, Shakopee	DO	No
22	248284	Unknown	PP	No
23	211863	3232 150th St W, Shakopee	CO	No
24	207444	14145 Johnson Memorial Dr, Shakopee	IR	No
25	**653689**	**12835 Ventura Ct, Shakopee**	**PN**	**Yes**
26	551318	13731 Johnson Memorial Dr, Shakopee	DO	No
27	560332	12900 Ventura Ct, Shakopee	IN	No
28	653060	12810 Chestnut Blvd, Shakopee	DO	No
29	207073	Unknown	PC	No
30	215710	3606 145th St W, Shakopee	AB	No
31	211865	3232 150th St W, Shakopee	CO	No
32	272748	13162 Johnson Memorial Highway, Shakopee	AB	No
33	272749	13162 Johnson Memorial Highway, Shakopee	AB	No
34	244436	3606 145th St W, Shakopee	AB	No
35	244437	3606 145th St W, Shakopee	AB	No
36	244438	3606 145th St W, Shakopee	AB	No
37	796915	13161 Dem Con Dr, Shakopee	CO	No
38	513892	3325 145th St W, Shakopee	PS	No
39	401129	14505 Johnson Memorial Highway, Shakopee	DO	No
40	221364	13450 Johnson Memorial Highway, Shakopee	AB	No
41	**803239**	**3019 133rd St W, Shakopee**	**PS**	**Yes**
42	796914	13161 Dem Con Dr, Shakopee	PN	No
43	809771	13142 Dem Con Dr, Shakopee	DO	No
44	249572	Unknown	PN	No
45	**249579**	**Unknown**	**PN**	**Yes**
46	**178547**	**Unknown**	**DO**	**Yes**
47	195520	12827 Chestnut Blvd, Shakopee	CO	No
48	595729	3331 Akers Lane, Shakopee	RM	No

Map ID	Unique ID	Address	Use[1]	Impacted
49	1000011745	12826 Johnson Memorial Dr, Shakopee		No
50	233116	Unknown	IR	No
51	Unknown – supplemental Scott County data			No
52	Unknown – supplemental Scott County data			No
53	Unknown – supplemental Scott County data			No

Bold values indicate wells will be impacted as a result of the project. Wells with unknown addresses appear on CWI maps but are not in the MDH database. Wells with blank uses do not have a use listed in the MDH database. Approximate locations are shown on **Figures 17a-17b** and well logs, where available, are provided in **Attachment I**.

[1]AB = Abandoned; CO = Commercial; DO = Domestic; IN = Industrial; IR = Irrigation; PC = Community Supply; PN = Public Water Supply – Non-Community – Transient; PP = Public Water Supply – Non-Community – Non-Transient; PS = Public Water Supply – Non-Community; RM = Remedial

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.

Not applicable.

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.

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.

Not applicable.

ii. Stormwater - Describe the quantity and quality of stormwater runoff at the site prior to and post construction. Include the routes and receiving water bodies for runoff from the site (major downstream water bodies as well as the immediate receiving waters). Discuss any environmental effects from stormwater discharges. Describe stormwater pollution prevention plans including temporary and permanent runoff controls and potential BMP site locations to manage or treat stormwater runoff. Identify specific erosion control, sedimentation control or stabilization measures to address soil limitations during and after project construction.

Existing Conditions
The area is rural with industrial and commercial areas located along TH 169. The remainder of the project area consists of primarily farmed land, woodland, and wetland areas.

The existing drainage patterns within the project area are generally from east to west. Runoff from the bluffs travels west and is conveyed by several large diameter culverts under TH 169 towards the Minnesota River. The offsite run-off from the east is a primary factor in culvert sizing and determining the roadway profile for the proposed project. Proposed drainage patterns would generally remain the same as existing.

Proposed Conditions
The proposed project construction would create a total of 21.1 acres of new impervious surface. Larger areas of impervious surface typically result in an increased volume of stormwater runoff from a site, a leading source of water pollution. To address this effect, mitigation measures would be implemented in order to meet required local, state, and federal standards for water quality and infiltration. Specifically, these standards include Scott County Zoning Ordinance, MnDOT, and the Minnesota Pollution Control Agency (MPCA) National Pollutant Discharge Elimination System (NPDES) program.

The following provides a general summary of compliance with the requirements. The 30 percent Drainage Reports incorporated in **Attachment J** provide detailed analyses and modeling of the proposed preliminary stormwater best management practices (BMPs) and storm sewer system.

To determine the stormwater management requirements for the project, various guidelines and standards were referenced, including MnDOT Drainage Manual, Scott County Zoning Ordinance, Lower Minnesota Watershed District standards, and MPCA NPDES program. The following sections describe how each applicable requirement would be met. The text below is based on the preliminary design. Some details may change as final design proceeds; however, the requirements demonstrate that new stormwater facilities, along with modifications to an existing stormwater basin and existing storm sewer facilities would be sufficient to meet the stormwater management requirements for the project.

Rate Control, Volume Control and Water Quality standards
Rate control, water quality treatment, and volume control would be provided through several BMPs. The Natural Resources Conservation Service Web Soil Survey was used to determine soil conditions. The results from the project corridor indicate that soils are mainly sandy soils, generally hydrologic soil Group A. The soil information indicates that the corridor and areas adjacent to the corridor would be suitable for infiltration.

The 30 percent Drainage Memos provide additional detail on the existing drainage patterns. The following are the controlling stormwater management requirements for the proposed project:

Rate Control

- Peak discharge rates leaving the project site for the 2-, 10-, and 100-year events must not exceed pre settlement rates (Scott County).

- Presettlement rate control does not apply to areas that do not change land cover (Scott WMO Rule Guidance).

Volume Retention/Infiltration Required

- The volume (considered as an instantaneous volume) from one inch of runoff over the area of the net new impervious surface must be retained on site (Scott County and NPDES).

- The BMPs providing the volume reduction must receive drainage from at least the amount of net new impervious surface.

- Pretreatment is required prior to discharge to infiltration BMPs.

Water Quality

- Meeting the volume reduction satisfies the water quality requirements for this project (Scott County and NPDES).

The following BMPs are proposed to meet the stormwater requirements. The BMPs are described starting from the north end of the project and moving south. BMPs are shown on **Figures 18a–18c**.

1. BMP 1 – There is a net reduction in impervious to the existing basin along TH 41, BMP 1. Due to the impervious surface reduction, no modifications would be needed to this basin for proposed conditions.

2. Marine Wet Pond and Infiltration Basin – This system is a proposed expansion to the existing Scott County regional infiltration basin. The Marine BMPs are sized to provide rate control, pretreatment and infiltration volume for the new impervious surfaces associated with the interchange improvements, and mitigation for the loss of flood storage due to the TH 169 ramp and northeastern (Emery Way) frontage road.

3. Ventura Wet Pond and Infiltration Basin – This is a proposed basin that would provide pretreatment and infiltration volume for the new impervious associated with Louisville Road.

4. Ditch Checks – Ditch checks are proposed for rate control, water quality treatment and infiltration volume for the new impervious surfaces from the proposed Weckman Road and the extended Dem Con Drive.

5. Louisville Infiltration Basin – This infiltration basin would mitigate the loss in flood storage in the existing depression due to the proposed Louisville Road. Additionally, it provides rate control, water quality treatment and infiltration for the new impervious surfaces from Louisville Road (from approximate road station 146+00 to 195+00).

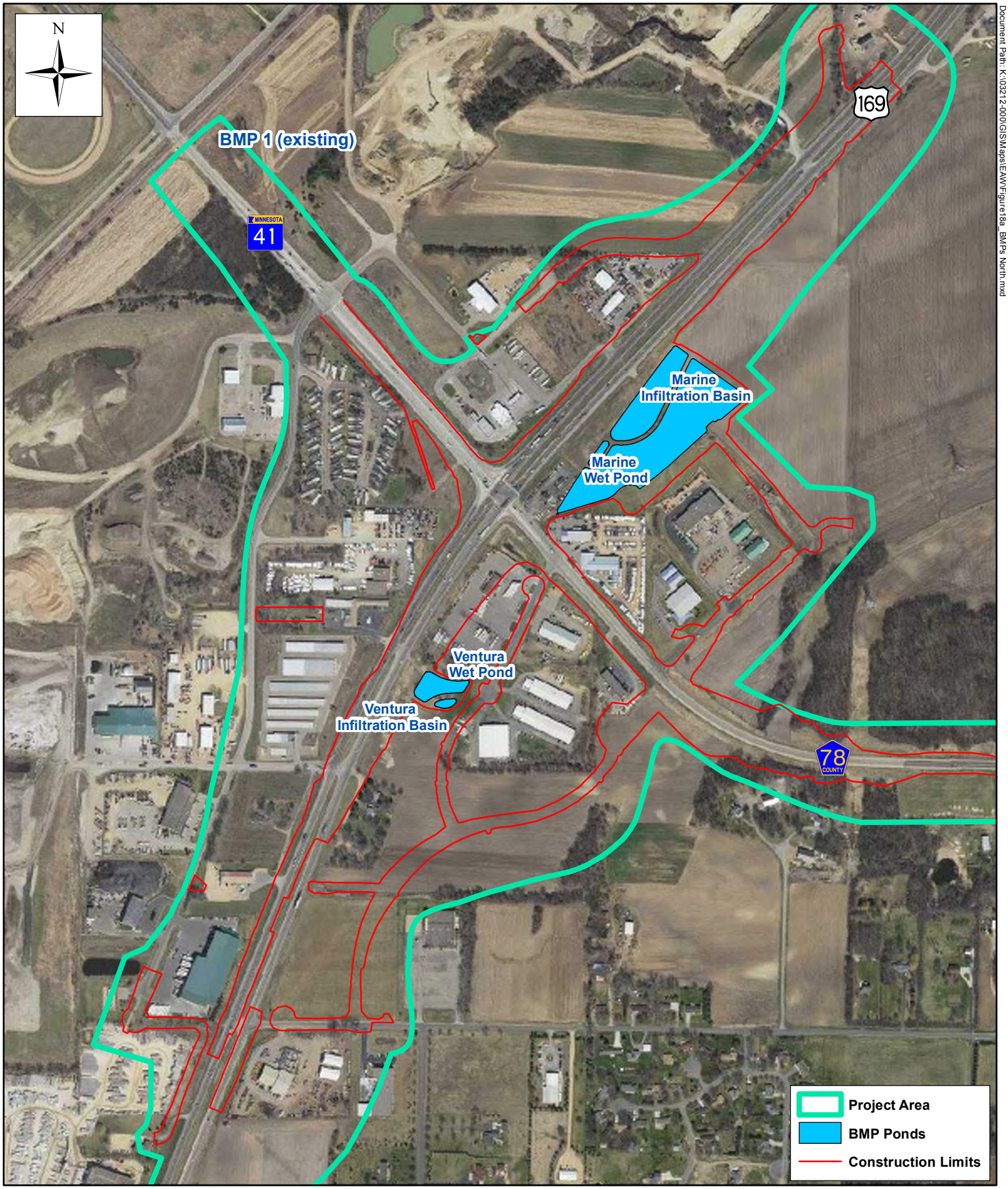

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Figure 18a: Proposed Stormwater BMPs - North

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Figure 18b: Proposed Stormwater BMPs - Central

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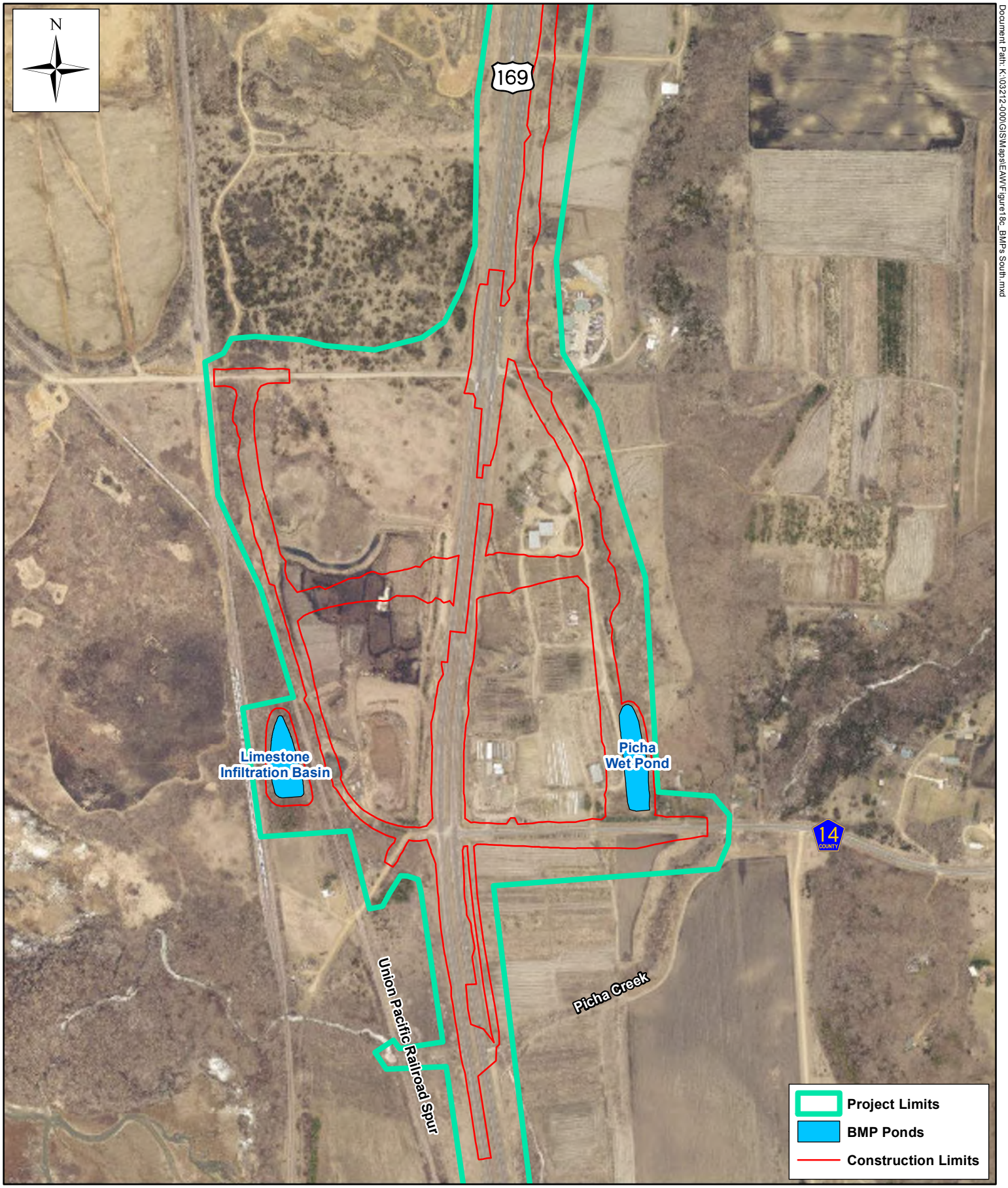

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Figure 18c: Proposed Stormwater BMPs - South

US 169/TH 41/CSAH 78/CSAH 14 Intersection Improvements
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0 725 Feet

6. Picha Wet Pond – This BMP would be constructed as a wet pond to provide sedimentation capacity for the upstream offsite run-on. Picha Wet Pond is upstream of Picha Creek. This pond will provide water quality treatment volume for a portion of Louisville Road (from approximate road station 146+00 to 100+00) and for offsite runoff from the east. This BMP will help to reduce total suspended solids and total phosphorus loads prior to discharge to Picha Creek. This type of BMP is a suggested approach for addressing the impairments associated with Picha Creek (as described in Section 11.a.i).

7. Limestone Infiltration Basin – This BMP is an infiltration basin that would provide water quality treatment and rate control for the proposed Limestone Drive south of 147th Street West.

8. Ditch Checks – Ditch checks would provide rate control, water quality treatment and infiltration volume for the new impervious surfaces from Limestone Drive north of 147th Street West and from Louisville Road from station 146+00 to CSAH 14.

Roadway Overtopping

The design overtopping was based on MnDOT Hydraulic Guidance from the State Aid Bridge Unit. The guidance determines the overtopping frequency based on the average daily traffic (ADT). Storm sewer sizing and catch basin spacing would be consistent with MnDOT Technical Memorandum 16-05-B-02, dated September 13, 2016 for work on TH 169 and TH 41. CSAH 78, CSAH 14, Limestone Drive, and Louisville Road storm sewer sizing and catch basin spacing would follow State Aid criteria. The remaining frontage roads would be required to meet either the Scott County Zoning Ordinance or State Aid criteria depending on their classification.

Erosion Control

Erosion and sedimentation of all exposed soils within the project area would be minimized by implementing BMPs during construction. Implementation of BMPs greatly reduces the amount of construction-related sedimentation and helps to control erosion and runoff. Ditches, dikes, siltation fences, bale checks, sedimentation basins, and temporary seed could be utilized as temporary erosion control measures. BMPs contained in MnDOT's Standard Specifications, details, and special provisions would also be used. DNR recommends using 'bio-netting' or 'naturalnetting' types of erosion control products (category 3N or 4N), and excluding use of plastic mesh netting. Temporary and permanent erosion control plans would be identified in the final site grading and construction plans as required by the NPDES permitting for construction sites, in accordance with the MPCA. A stormwater pollution prevention plan (SWPPP) that includes erosion control and sediment management practices would be submitted with the NPDES permit as part of design and implementation of proposed improvements. Erosion control measures, including requiring erosion control plans and designating a site inspector and enforcer, would be in place and maintained throughout the entire construction process. Removal of erosion control measures would occur only after all disturbed areas have been stabilized.

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

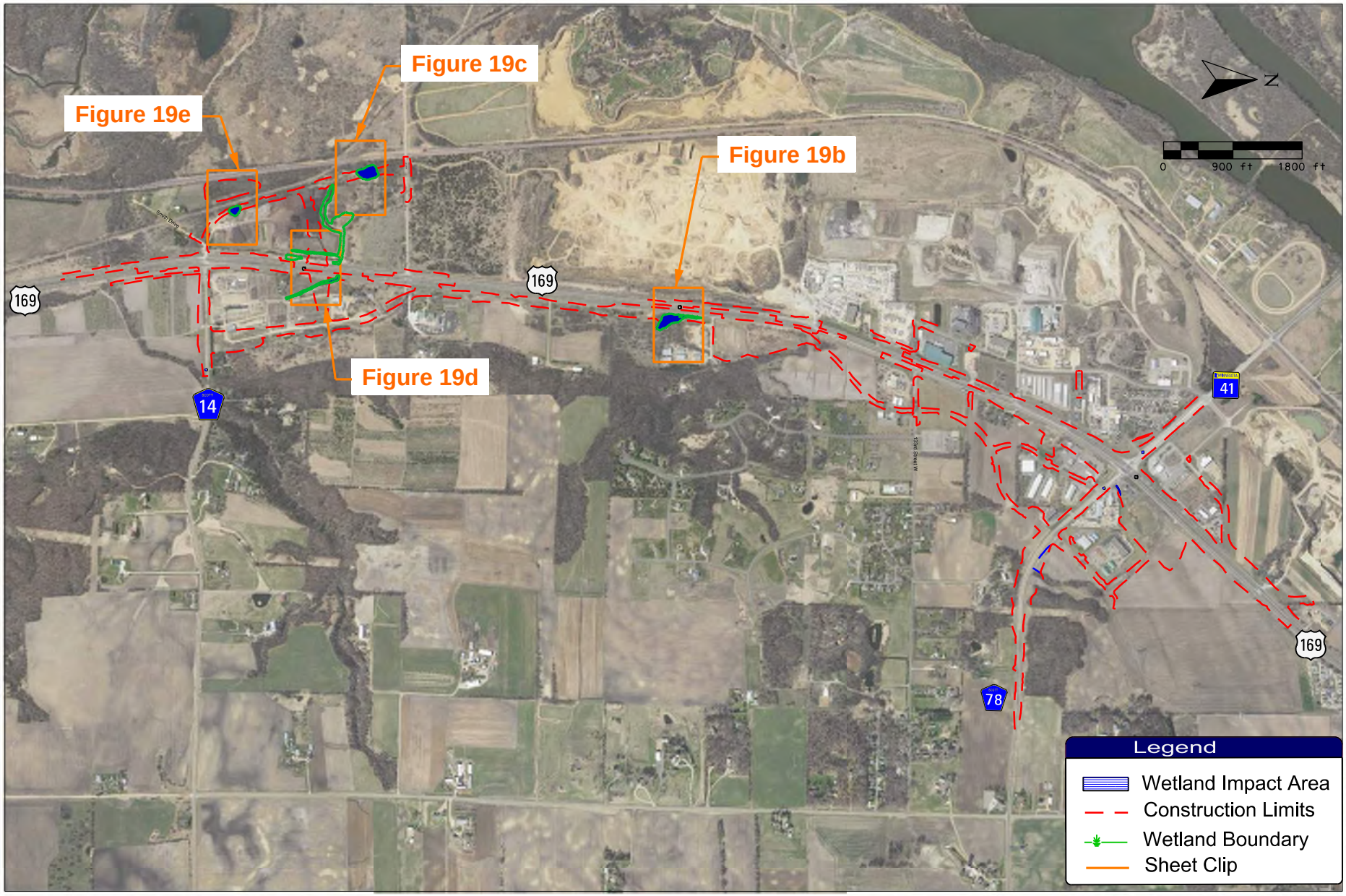
Replacement of the culverts on Picha Creek under the Union Pacific Railway and TH 169 would require temporary dewatering. The appropriate DNR groundwater appropriation permits would be obtained. The project would not require any connections to existing municipal water supplies.

iv. Surface Waters

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

As shown in **Figures 19a–19e**, it is anticipated that approximately 2.77 acres of Wetlands A, B, C, E, and F would be filled as a result of constructing the recommended alternative. Wetland impacts would be mitigated through the purchase of credits from a wetland bank approved by the U.S. Army Corps of Engineers and the Board of Water and Soil Resources. The bank area would be within the major watershed. See **Attachment K** for the Wetland Delineation and **Attachment L** for the Wetland Assessment and Two Part Finding. Wetland impact minimization efforts included the following: review of slopes and addition of a section of retaining wall to carry mainline TH 169 over TH 41/CSAH 78.

Wetland impacts would not be expected to have any effects on the host watershed. The proposed project would involve improvements to the stormwater system and any impacts to the watershed from the wetland fill would be mitigated during that process.



Scott

Figure 19a: Anticipated Wetland Impacts - Overview

US 169/TH 41/CSAH 78/CSAH 14
Intersection Improvements
Scott County, MN SP 070-596-013/7005-121/7009-81/7010-109
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Scott

Figure 19b: Anticipated Wetland Impacts - Wetland A

US 169/TH 41/CSAH 78/CSAH 14
Intersection Improvements
Scott County, MN SP 070-596-013/7005-121/7009-81/7010-109
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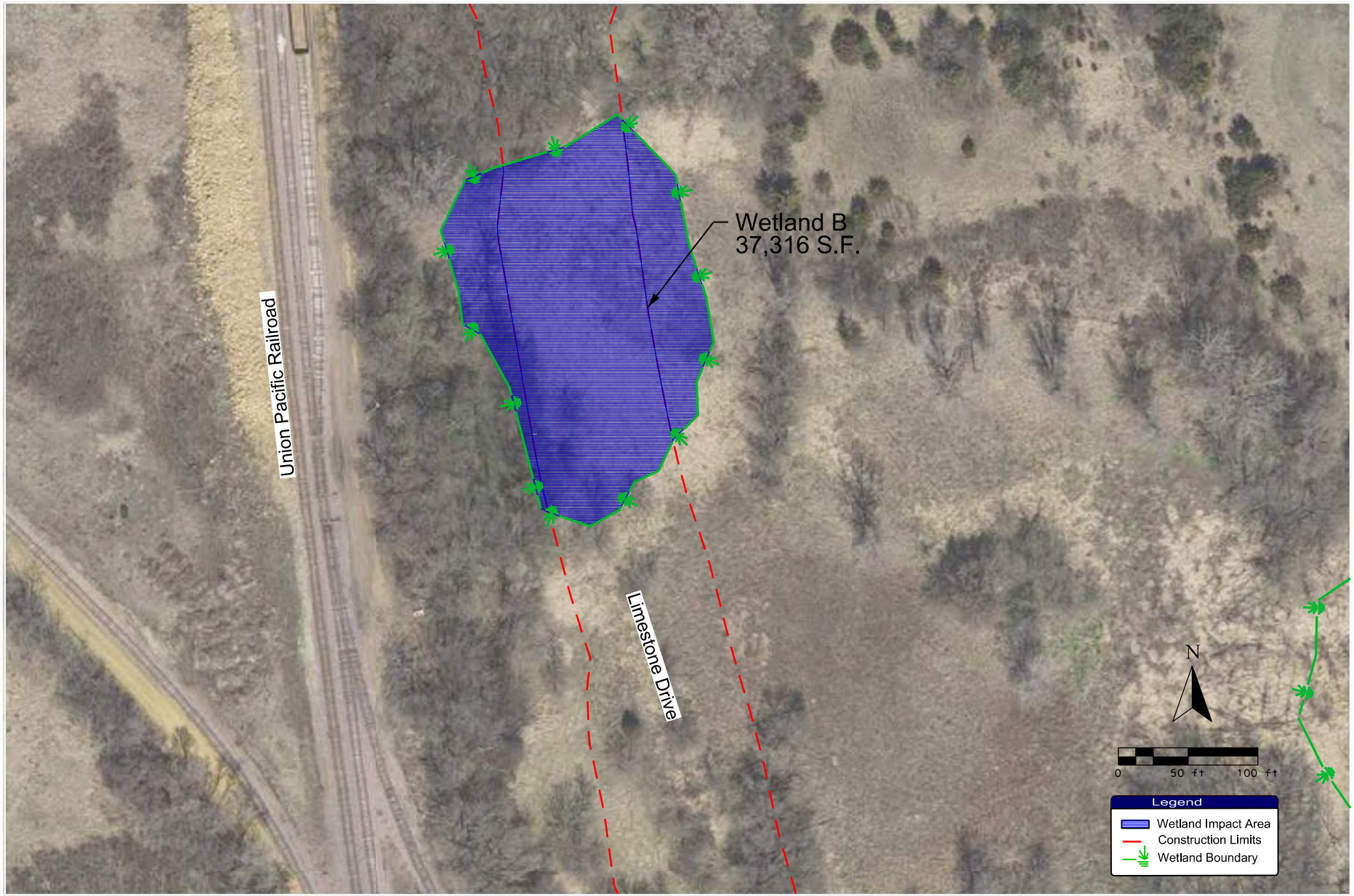

Figure 19c: Anticipated Wetland Impacts - Wetland B

US 169/TH 41/CSAH 78/CSAH 14
Intersection Improvements
Scott County, MN SP 070-596-013/7005-121/7009-81/7010-109
April 2017

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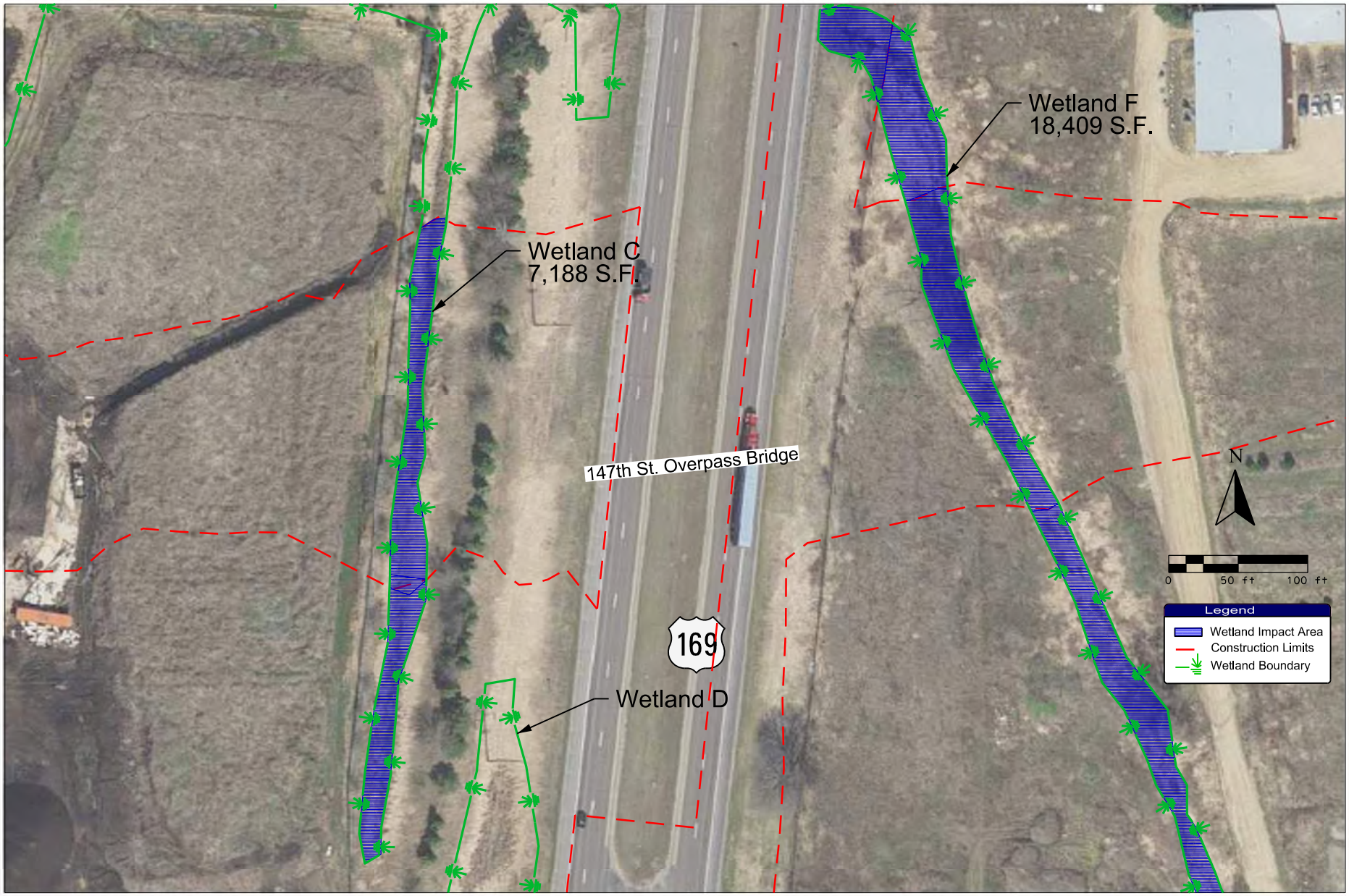

Figure 19d: Anticipated Wetland Impacts - Wetlands C and F

US 169/TH 41/CSAH 78/CSAH 14
Intersection Improvements
Scott County, MN SP 070-596-013/7005-121/7009-81/7010-109
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Date: Printed: 3/15/2017
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Scott

Figure 19e: Anticipated Wetland Impacts - Wetland E

US 169/TH 41/CSAH 78/CSAH 14
Intersection Improvements
Scott County, MN SP 070-596-013/7005-121/7009-81/7010-109
April 2017

Date: Printed: 3/15/2017
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b) Other surface waters- Describe any anticipated physical effects or alterations to surface water features (lakes, streams, ponds, intermittent channels, county/judicial ditches) such as draining, filling, permanent inundation, dredging, diking, stream diversion, impoundment, aquatic plant removal and riparian alteration. Discuss direct and indirect environmental effects from physical modification of water features. Identify measures to avoid, minimize, or mitigate environmental effects to surface water features, including in-water Best Management Practices that are proposed to avoid or minimize turbidity/sedimentation while physically altering the water features. Discuss how the project will change the number or type of watercraft on any water body, including current and projected watercraft usage.

There are three activities that would alter surface water features. Impacts to wetlands were described in section a above and expansion of an existing stormwater pond near the intersection of TH 169 and CSAH 78 was previously noted. These activities would also require the clearance of existing aquatic vegetation in these areas. The third activity that will result in impacts to surface waters is the replacement of the existing culverts in which Picha Creek flows under the Union Pacific Railway spur line. The existing culverts are not large enough to accommodate existing water flows.

Picha Creek is a DNR public waterbody. The project would impact this waterbody through culvert replacement under the Union Pacific Railroad spur. These impacts are considered minor modifications because they would occur within the waterbody's cross section. **Figure 15c** shows the location of the public water that would be affected by the project activities. These activities would not be anticipated to substantially change the course, current or cross section of any stream or waterbody.

A public waters work permit would be obtained from the DNR prior to construction. As part of construction, best management practices (BMPs) would be implemented to minimize impacts to the waterbodies to the extent practicable consistent with the permit. These BMPs would include, but are not limited to:

- Energy dissipation to minimize erosion and scour
- Site management plans for the culvert replacement
- Stabilization methods within 200 feet of discharge points
- Silt fence for perimeter control
- Flotation silt curtain for in-water work and work directly adjacent to waterbodies
- Proper inlet and outlet controls until all upstream locations have been stabilized
- Dewatering plans before dewatering operations
- Providing redundant perimeter control and stabilization

As described above under **Section 11.b.ii** (Stormwater), as part of the stormwater management for this project, new and modified drainage features would be constructed to address infiltration and treatment of stormwater runoff associated with the project, including the need to replace the capacity of existing stormwater management features that would be impacted or modified due to the project. BMPs would be adopted to minimize sedimentation and turbidity impacts associated with

these activities, including BMPs contained in MnDOT's Standard Specifications, details, and special provisions. Temporary and permanent erosion control plans would be identified in the final site grading and construction plans as required by the NPDES permitting for construction sites, in accordance with the MPCA. A SWPPP that includes erosion control and sediment management practices would be submitted with the NPDES permit as part of design and implementation of proposed improvements.

The project would not result in any changes in watercraft usage.

12. Contamination/Hazardous Materials/Wastes:

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

Contaminated Properties

A preliminary review of the parcels within and near the project area was conducted to identify parcels containing contaminated materials. Contaminated materials sites were identified through several steps. A Limited Phase I Environmental Site Assessment (ESA) was completed by Scott County for the northern portion of the project area in November 2015 to identify possible sources of contamination that could impact the proposed project. The ESA included review of environmental databases, historical records, interviews with individuals familiar with the project area, and a reconnaissance of the project area (see **Attachment M**). Properties located within one mile of the project area were incorporated in the review. Following consultation with MnDOT, the Phase I ESA in this area revealed 5 high risk sites, 35 moderate risk sites, and 8 low risk sites. High risk sites included Voluntary Investigation and Cleanup (VIC) sites, active and inactive dump sites, and active Leaking Underground Storage Tank (LUST) sites. Moderate risk sites included closed LUST sites, Underground Storage Tank and Aboveground Storage Tank sites, and salvage yards. Low risk sites included other hazardous waste generator sites and some commercial and farmstead sites.

After the project was expanded to the south, a Supplemental Limited Phase I ESA was completed by the County for the southern portion of the project area in September 2016. Following consultation with MnDOT, the assessment in this area revealed five high risk sites, six moderate risk sites, and six low risk sites. The general types of sites revealed in the Supplemental Phase I ESA were similar to those identified in the original Phase I ESA for the project.

Following completion of the Phase I ESAs and early notification correspondence, additional consultation with MnDOT occurred, and 19 sites were identified for potential further review and analysis. These sites were identified based on their proximity to project features, including ground-disturbing activities such as grading and construction of stormwater BMPs. The locations of these sites are shown in **Figures 20a** and **20b**.

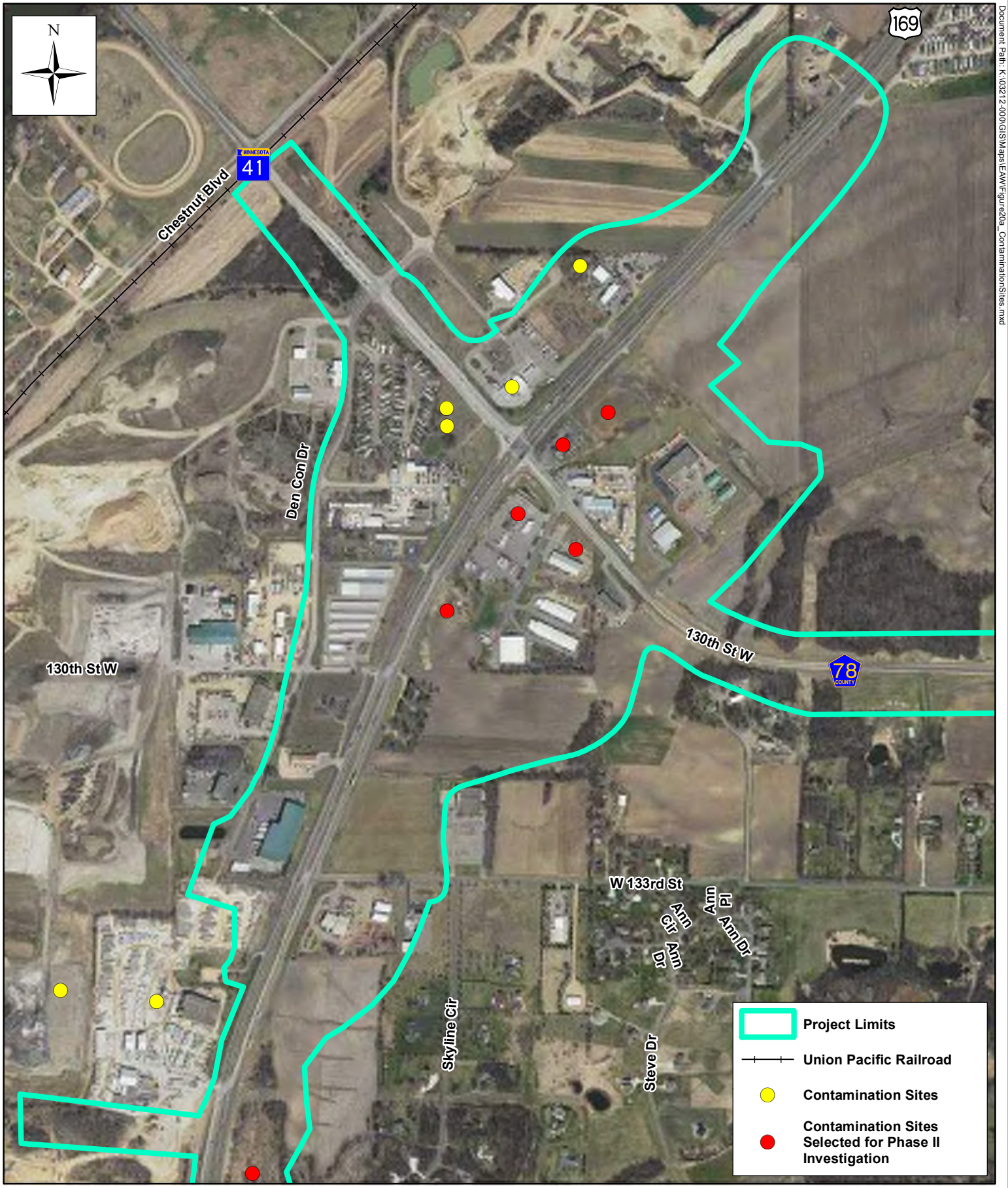

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Figure 20a: Contamination Sites - North

US 169/TH 41/CSAH 78/CSAH 14 Intersection Improvements
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Scott County, MN
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0 800 Feet

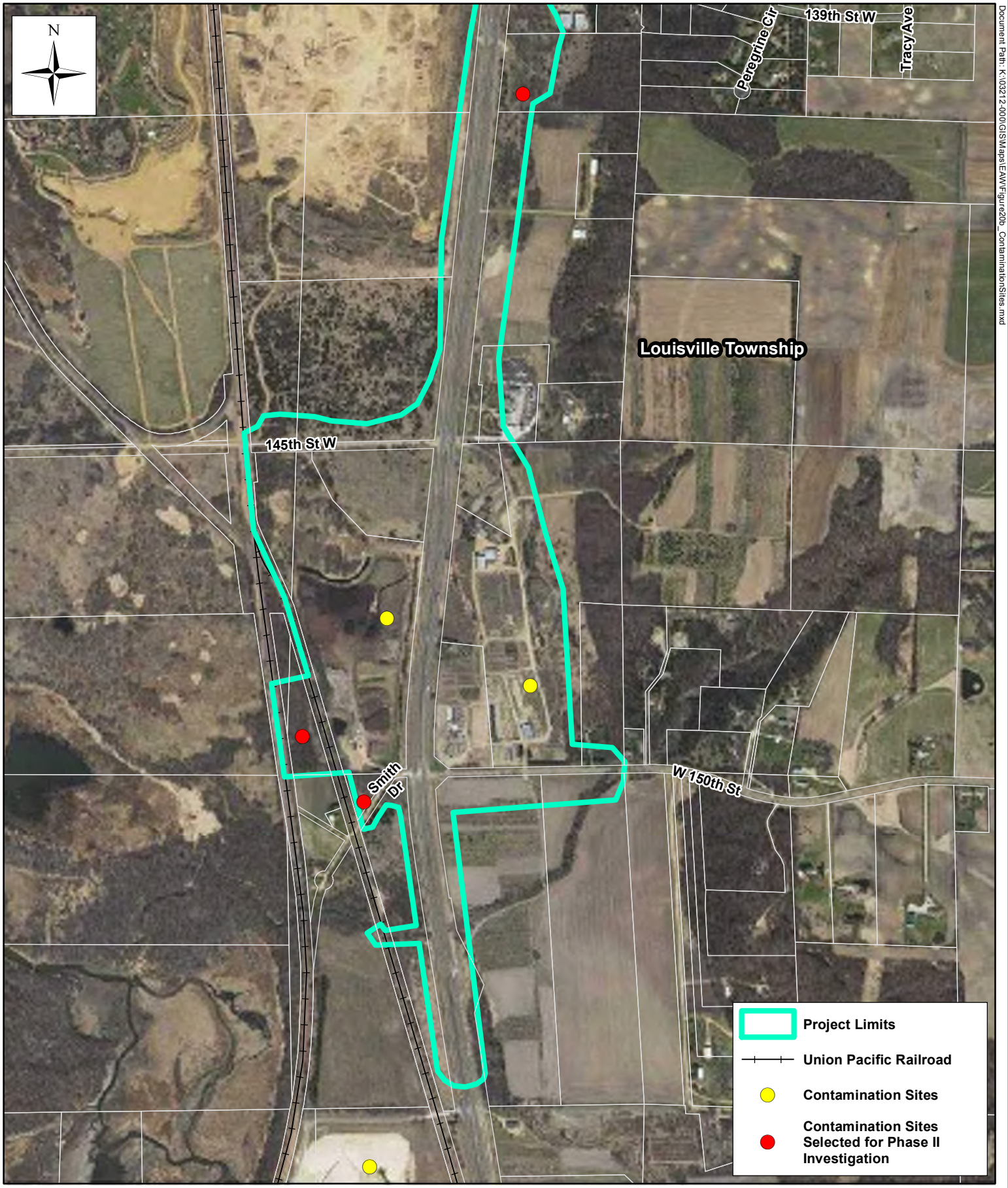

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Figure 20b: Contamination Sites- South

US 169/TH 41/CSAH 78/CSAH 14 Intersection Improvements
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0 1,000 Feet

There is the potential to encounter contaminated soil and/or groundwater that would require special handing and management during construction due to the nature of the project (excavation, subsurface construction activities, etc.) Scott County is coordinating with MnDOT on the development of a Phase II ESA. Results will be used to prepare special provisions to provide for soil and groundwater management.

Regulated Waste
There is the potential for hazardous wastes to be generated as a result of the project. The proposed project would require the acquisition of two commercial properties and two residential properties. Buildings on these sites would be removed in order to construct the project. In addition, Scott County also owns two residential parcels which would be impacted by the project. These parcels would also have their buildings removed. Prior to removal, the sites would be inspected for regulated waste such as lead, asbestos, mercury, etc. Before the structures are demolished these materials would be removed and disposed of in accordance with local and state rules and regulations. **Figures 21a** and **21b** show the locations where structures will be removed from the project area. The project also includes removal of several culverts and other utility infrastructure, which may also require inspection for regulated waste.

Toxic/Hazardous Materials during Construction
Toxic or hazardous materials, such as fuel for construction equipment, and construction materials (sealant, paint, contaminated rags, acids, bases, herbicides, and pesticides) would likely be used during site preparation and road construction. Best management practices would be used to minimize the chance of such spills. If a spill were to take place during construction, appropriate action to remedy the situation would be taken immediately in accordance with MPCA guidelines and regulations. Any contaminated spills or leaks that occur during construction would be the responsibility of the contractor, who will be required to notify the Duty Officer and work with the MPCA to contain and remediate contaminated soil/materials in accordance with applicable standards.

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 of the project would generate solid waste and construction debris normal to construction. Management of this material would be in accordance with state guidelines and regulations. All solid wastes generated by construction of the proposed project would be disposed of properly in a permitted, licensed solid waste facility. Project demolition of concrete, asphalt, and other potentially recyclable construction materials would be directed to the appropriate storage, crushing or renovation facility for recycling.

Following construction the project would not generate solid wastes.

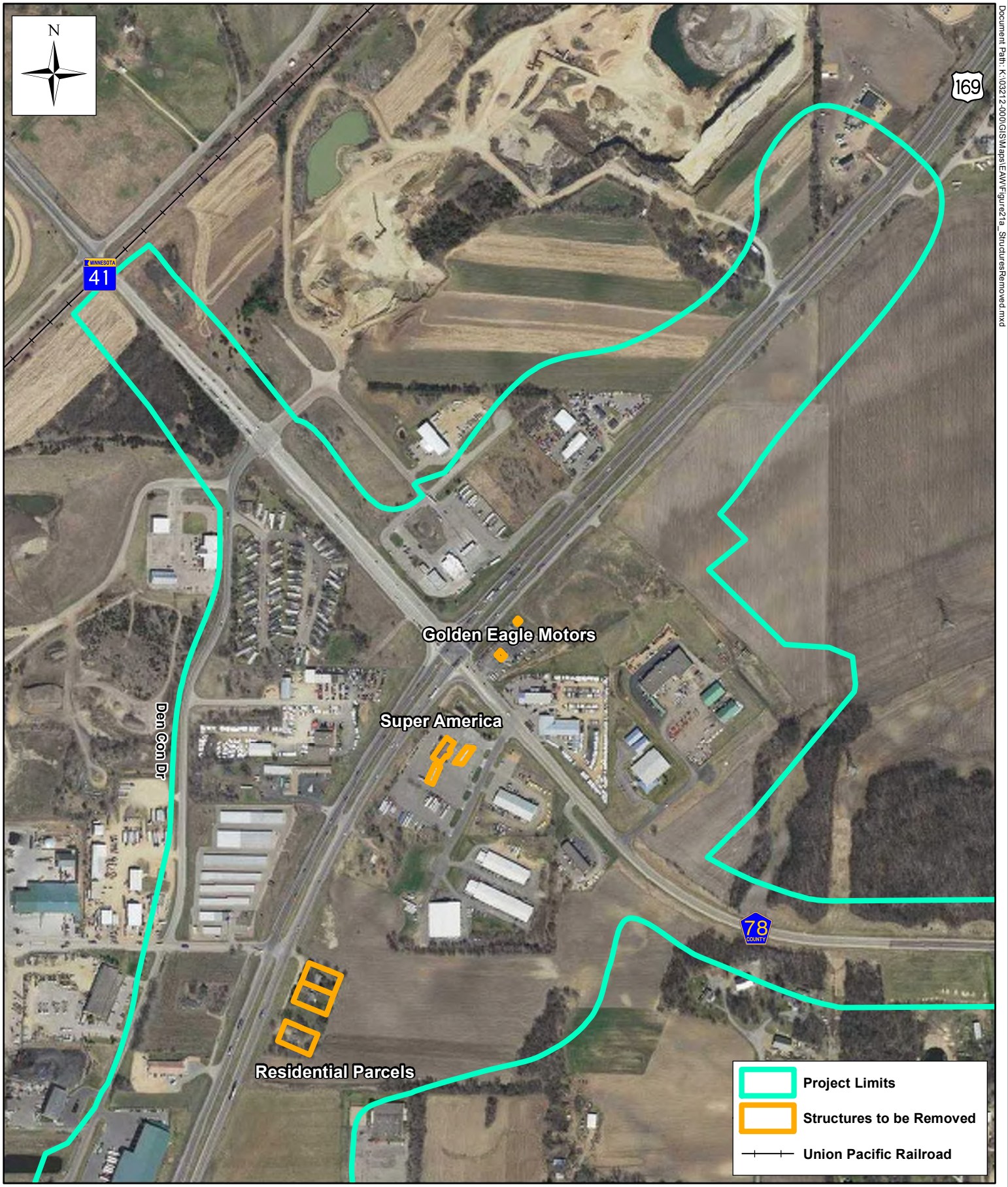

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Figure 21a: Structures to be Removed

US 169/TH 41/CSAH 78/CSAH 14 Intersection Improvements
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Scott County, MN
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0 600 Feet

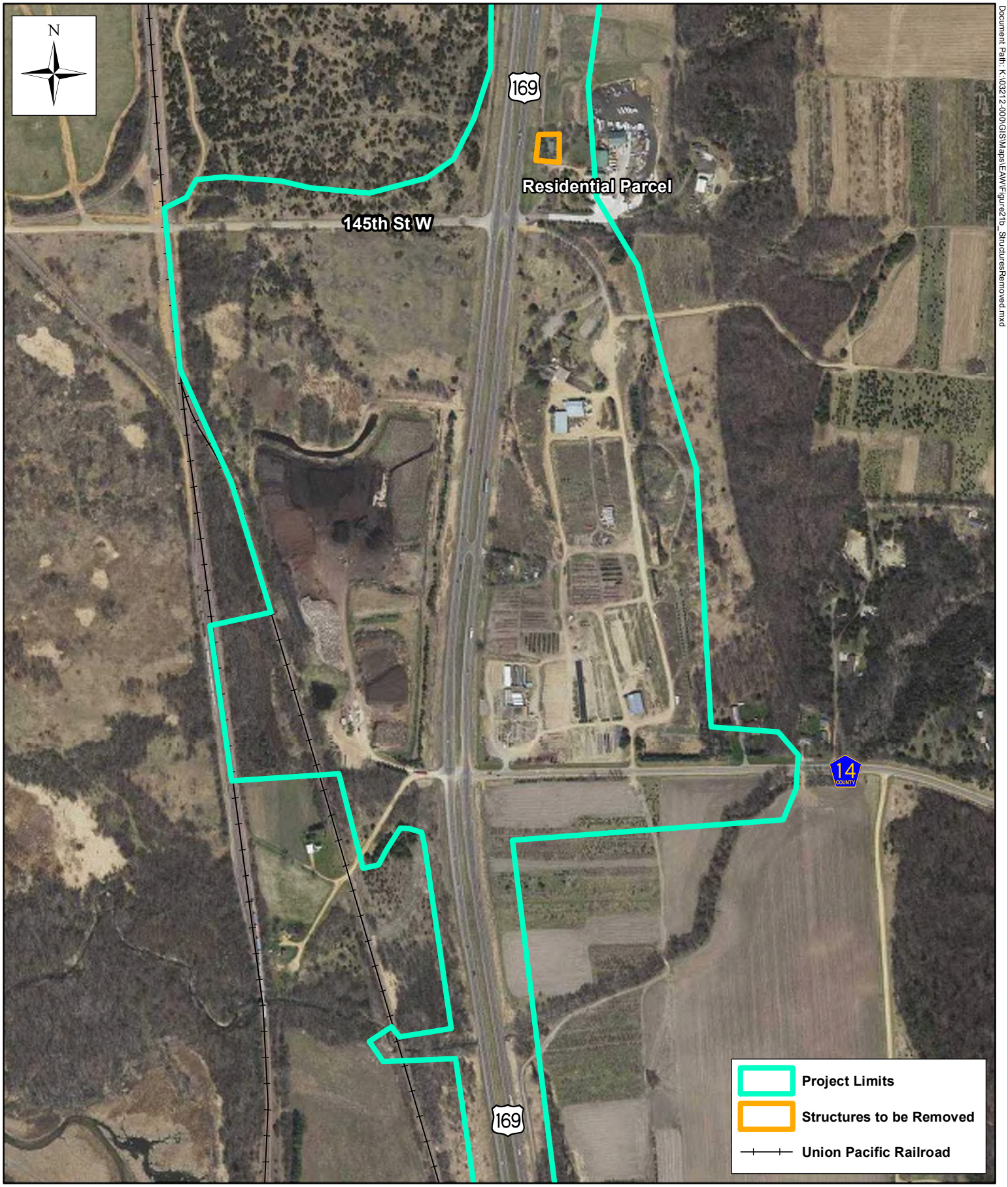

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Figure 21b: Structures to be Removed

US 169/TH 41/CSAH 78/CSAH 14 Intersection Improvements
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0 600 Feet

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

Construction

Toxic or hazardous materials, such as fuel for construction equipment, and construction materials (sealant, paint, contaminated rags, acids, bases, herbicides, and pesticides) would likely be used during site preparation and road construction. The potential for substantial fuel or other chemical spills during and after road construction activities is considered low. Best management practices would be used to minimize the chance of such spills. If a spill were to take place during construction, appropriate action to remedy the situation would be taken immediately in accordance with MPCA guidelines and regulations.

Any contaminated spills or leaks that occur during construction would be the responsibility of the contractor, who will notify the Duty Officer and work with the MPCA to contain and remediate contaminated soil/materials in accordance with state and federal standards.

Operation

Once the project has been constructed there would be no above or below ground petroleum storage tanks within the site.

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.

There is the potential for hazardous wastes to be generated as a result of the project. The proposed project would require the acquisition of three commercial parcels (containing two businesses) and three residential parcels (containing two residences). Buildings on these sites would be removed in order to construct the project. In addition, Scott County owns two residential parcels where buildings would be removed for the project. **Figures 21a** and **21b** show the locations where structures would be removed from the project area.

Prior to removal, the sites would be inspected for regulated waste such as lead, asbestos, mercury, etc. When the structures are demolished these materials would be removed and disposed of in accordance with local and state rules and regulations. If a spill of hazardous or toxic substances would occur or was discovered during construction of the proposed project, it would be the responsibility of the contractor to notify the Minnesota Department of Public Safety, Division of Emergency Services, to arrange for corrective measures to be taken pursuant to 6 MCAR 4.9005E. Any contamination spills or leaks that occur or are discovered during construction would be responded to in accordance with MPCA guidance and remedial action procedures.

All regulated materials and waste, including hazardous waste, from such buildings would be removed and properly disposed of prior to demolition. A certified asbestos abatement contractor would be used to remove any asbestos containing materials identified. Any green-treated wood would be documented and disposed of in a MPCA approved Mixed Municipal Solid Waste (sanitary) landfill or Industrial Waste Landfill.

Any contaminated soil removed on site will be disposed of in a MPCA approved landfill. Following completion of the project, the roadway would not generate hazardous wastes.

13. Fish, Wildlife, Plant Communities, and Sensitive Ecological Resources:

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

The project area comprises developed highway, commercial, industrial, and residential land, with some areas of agriculture and undeveloped land. Several areas of low-lying vegetation are also present; however, nearly all of the land within the project area has been disturbed.

Fish resources and habitat within the project area are limited to Picha Creek in the southern portion of the project area. Based on the project's proximity to the Minnesota Valley National Wildlife Refuge, there are some areas of plant and wildlife habitat, particularly in the southern portion of the project area, including small areas of woodland, ponds and ditches, and areas of low-lying vegetation. A number of observations in the Minnesota Natural Heritage Information System (NHIS) overlap with the project area.

The northern long-eared bat and the rusty-patched bumble bee are the only listed or proposed federal threatened or endangered species with the potential to reside within the project area. The northern long-eared bat (a federally-listed threatened species) can be found throughout Minnesota, though no known maternity roost trees and/or hibernacula entrances have been documented in the project area. The project area is also outside of the High Potential Zone for the rusty-patched bumble bee (a federally-proposed endangered species), as identified by the U.S. Fish and Wildlife Service.

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

A review of the Minnesota Natural Heritage Information System (NHIS) indicates that there are a number rare features within or adjacent to the project area. The vast majority of rare features identified in the NHIS search reside within the Minnesota River and surrounding floodplain and blufflands (see DNR Questionnaire Response Letters in **Attachment N**). The entire river valley is also considered a regionally significant ecological corridor.

DNR native plant communities within the vicinity of (but outside of) the project area include bulrush marsh, silver maple floodplain forest, pin oak-bur oak woodland, sand-gravel oak savanna, spikerush-bur reed marsh, dry sand-gravel prairie, and red oak-sugar maple-basswood

forest. Many of these native plant communities are also identified as sites of moderate, high, or outstanding biodiversity significance. The project would be constructed primarily on land that has been disturbed; therefore, it is not anticipated to cause any direct impacts to these resources.

The northern long-eared bat is a federally-listed threatened species and a state-listed species of special concern that can be found throughout Minnesota. New rules are in place that affect environments that the northern long-eared bat has been known to use as habitats. During the winter this species hibernates in caves and mines, and during the active seasons (approximately April-October) it roosts underneath bark, in cavities, or in crevices of both live and dead trees. According to the Minnesota DNR and USFW databases, there are no known maternity roost trees and/or hibernacula entrances documented for the northern long-eared bat within an approximate one-mile radius of the proposed project.

As described above, the rusty-patched bumble bee has recently been proposed for listing as endangered by the U.S. Fish and Wildlife Service. The project area includes townships with a known or expected occurrence of rusty-patched bumble bee.

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

While direct impacts to rare features are not anticipated to occur as a result of the project, it is possible that soil disturbance and vegetation clearance associated with construction of various project features, including frontage roads, could create conditions that enable the spread of invasive species.

Additionally, the use of certain types of erosion control netting can entrap and kill small animals; however, as described in Section 13.d, below, use of erosion control netting for the project would be limited to ‘bio-netting’ or ‘naturalnetting’ types (category 3N or 4N), and will exclude use of plastic mesh netting.

While there are no known roosting sites or hibernacula for the northern long-eared bat within the project area, the project will involve approximately 8.3 acres of tree clearing, which could affect unknown bat roost sites.

Regarding the rusty-patched bumble bee, because the project is located outside of the High Potential Zone for the species, MnDOT, on behalf of the FHWA, has made a No Effect determination for the project (see correspondence in **Attachment N**).

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

While there are no known rare features within the project area that would be affected by construction activities, portions of the project area are adjacent to native plant communities and sites of biodiversity significance owned and managed by the USFW and DNR. To be cognizant of these resources, several measures will be taken to minimize effects in these areas.

In areas that are not proposed for mowed turf grass, such as roadway in-slopes and residential or commercial areas, the project would include native vegetation mixes when revegetating soils disturbed by construction activities. The project would use native vegetation recommendations developed by the Board of Water and Soil Resources (BWSR) or MnDOT. Revegetation may include native woody vegetation (trees and shrubs) in addition to grasses and/or forbs.

The use of erosion control blanket would be limited to 'bio-netting' or 'naturalnetting' types (category 3N or 4N), and will exclude use of plastic mesh netting.

Coordination with MnDOT and the USFW has determined that the project may affect northern long-eared bats, but will not cause prohibited incidental take. To minimize the potential to affect bats, the project would not remove trees between June 1 and August 15.

14. Historic Properties:

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

A review of the project area indicated that there were no historic and/or archaeological resources within the project area that would be affected by the proposed project. There were also no properties identified for potential designation on the National Register of Historic Places.

A letter was also sent to tribal representatives from Sioux and Sisseton-Wahpeton Oyate communities soliciting their input with regard to potential archaeological resources in the area. The letter from MnDOT staff indicated that there are no previously recorded archaeological resources within the project area or adjacent to it. Tribal representatives were requested to provide any comments regarding the finding within 30 days. No responses were received.

Please refer to **Attachment O** for correspondence relating to historic and archaeological resources, including tribal coordination.

15. Visual:

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

The immediate project area does not contain scenic views or vistas. Many of the project improvements would take place in areas that are either developed with commercial and industrial uses, mining activities or vacant land without resource amenities such as trees, wetlands, rolling hills, etc. However, in the southern portion of the project area, there are some areas of wetlands, rolling hills, and trees.

The proposed project would add two grade-separations/bridges near the location of existing at-grade intersections, so vertical views for highway users in these areas would be altered. For those on TH 169 near TH 41/CSAH 78 and on the 147th Street West overpass near CSAH 14, the viewshed of

the Minnesota River Valley may be somewhat enhanced because they will be able to see portions of the area that were not previously visible from the at-grade intersections (grade would be raised by approximately 21.5 feet). For highway users on TH 41 and CSAH 78, roadway infrastructure (including bridges, ramps, etc.) would play a larger role in views of the area. However, due the largely industrial and commercial nature of current conditions, this is not expected to substantially alter the quality of views in the area.

Construction of frontage roads would not result in major alterations to existing views in or near the project area. For users on TH 169 and CSAH 78, new/extended frontage roads would be visible in the northwest, southwest, and southeast quadrants of the existing intersection; however, based on existing conditions, the presence of the frontage roads would not result in any substantial visual effects. In the southern portion of the project, the 147th Street West overpass would be visible from TH 169, as would Louisville Road south of 133rd Street. Roadway infrastructure would be a more dominant feature in the views in this area.

Construction of a noise barrier south of TH 41 would affect some views to and from the Jackson Heights Manufactured Home community. The noise barrier would be approximately 1,100 feet long and 20 feet tall, which would limit views to the north of the Jackson Heights community. However, the purpose of the noise barrier would be to improve environmental conditions in this location related to noise levels. As part of the noise evaluation process, affected residents and the property owner were asked to vote whether they wanted a noise barrier. All those who responded voted in favor of the noise barrier.

16. Air:

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

The proposed project is a highway project and therefore, will not generate stationary source emissions in the project area.

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 intent of the project is to provide added safety and improved traffic flow both now and in the future for the intersections of TH 169/TH 41/CSAH 78 and TH 169/CSAH 14, while providing opportunities for non-motorized traffic to cross TH 169 safely.

TH 169 is a four-lane divided north/south principal arterial with a speed limit of 55 mph. The 2012 annual average traffic (AADT) was 29,500 vehicles per day (vpd) north of TH 41 and 28,000 vpd south of TH 41.

TH 169 is an Interregional Corridor (IRC) that connects Mankato to the Twin Cities Metropolitan area. The IRC system connects the largest regional trade centers in Minnesota and TH 169 is a vital connection between southern Minnesota and the metro area and carries a high volume of truck traffic. TH 41 also carries a high volume of truck traffic in the area due to the surrounding commercial and industrial properties.

MnDOT's official Heavy Vehicle AADT (HCAADT) shows a ten percent HCAADT on TH 169 north of TH 41 and eight percent on TH 169 south of TH 41. TH 41 has an eight percent HCAADT west of TH 169. 48-hour traffic counts were collected as part of the traffic analysis indicated that approximately 13 percent to 16 percent of the daily traffic demands are heavy vehicles. Heavy vehicles generate more pollutants than motor vehicles when they sit idling. By improving mobility and reducing vehicle delays (and time spent idling) through the construction of a grade-separated interchange and overpass along the TH 169 corridor, the proposed improvements will reduce heavy truck idling time and associated diesel emissions.

Introduction to Transportation Air Quality

Motorized vehicles affect air quality by emitting airborne pollutants. Changes in traffic volumes, travel patterns, and roadway locations affect air quality by changing the number of vehicles in an area and the congestion levels. The air quality impacts from the project are analyzed by addressing criteria pollutants, a group of common air pollutants regulated by the Environmental Protection Agency (EPA) on the basis of criteria (information on health and/or environmental effects of pollution). The criteria pollutants identified by the EPA are ozone, particulate matter, carbon monoxide, nitrogen dioxide, lead, and sulfur dioxide. Potential impacts resulting from these pollutants are assessed by comparing projected concentrations to National Ambient Air Quality Standards (NAAQS). In addition to the criteria air pollutants, the EPA also regulates air toxics. The Federal Highway Administration (FHWA) provides guidance for the assessment of Mobile Source Air Toxic (MSAT) effects for transportation projects in the National Environmental Policy Act (NEPA) process. A qualitative evaluation of MSATs has been performed for this project as documented below. The scope and methods of the analysis performed were developed in collaboration with MnDOT and the MPCA.

NAAQS Criteria Pollutants

Ozone

Ground-level ozone is a primary constituent of smog and is a pollution problem in many areas of the United States. Exposures to ozone can cause people to be more susceptible to respiratory infection, resulting in lung inflammation, and aggravating respiratory diseases, such as asthma. Ozone is not emitted directly from vehicles but is formed when volatile organic compounds (VOCs) and nitrogen oxides (NO_x) react in the presence of sunlight. Transportation sources emit NO_x and VOCs and can, therefore, affect ozone concentrations. However, due to the phenomenon of atmospheric formation of ozone from chemical precursors, concentrations are not expected to be elevated near a particular roadway.

The MPCA, in cooperation with various other agencies, industries, and groups, has encouraged voluntary control measures for ozone concentrations and has begun developing a regional ozone modeling effort. Ozone concentrations in the lower atmosphere are influenced by a complex relationship of precursor concentrations, meteorological conditions, and regional influences on

background concentrations. The MPCA states in the document, *The Air We Breathe – The State of Minnesota's Air Quality 2017*, that:

> *On October 1, 2015, the EPA strengthened the ozone standard to 70 parts per billion (ppb), down from the 2008 standard of 75 ppb. All areas of Minnesota currently meet the new standard – but some parts of the state are close. Measured ozone levels in some areas of the state are now within 85% or more of the level of the ozone standard, placing these areas at greater risk for violating the standard in the future. While emissions that help form ozone are decreasing, warmer summers and more frequent wildfires may cause both fine-particle levels and ozone levels to rise.*

Ozone levels in the Twin Cities metropolitan area currently meet state and federal standards. Additionally, the State of Minnesota is classified by the EPA as an "ozone attainment area," which means that Minnesota has been identified as a geographic area that meets or exceeds the national standards for the reduction of ozone levels. Because of these factors, a quantitative ozone analysis was not conducted for this project.

Particulate Matter

Particulate Matter (PM) is the term for particles and liquid droplets suspended in air. Particles come in a wide variety of sizes and have been historically been measured by the diameter of the particle in micrometers. $PM_{2.5}$, or finer particulate matter, refers to particles that are 2.5 micrometers or less in diameter. PM_{10} refers to particulate matter that is 10 micrometers or less in diameter.

Motor vehicles (i.e., cars, trucks, and buses) emit direct PM from their tailpipes, as well as from normal brake and tire wear. Vehicle dust from paved and unpaved roads may be re-entrained, or re-suspended, in the atmosphere. In addition, $PM_{2.5}$ can be formed in the atmosphere from gases such as sulfur dioxide, nitrogen oxides, and volatile organic compounds. $PM_{2.5}$ can penetrate the human respiratory system's natural defenses and damage the respiratory tract when inhaled. Numerous scientific studies have linked particle pollution exposure to a variety of problems, including:

- Increased respiratory symptoms, such as irritation of the airways, coughing, or difficulty breathing;
- Decreased lung function;
- Aggravated asthma;
- Development of chronic bronchitis;
- Irregular heartbeat;
- Nonfatal heart attacks; and
- Premature death in people with heart or lung disease.
  (Source: https://www.epa.gov/pm-pollution/health-and-environmental-effects-particulate-matter-pm)

On December 14, 2012, the EPA issued a final rule revising the annual health NAAQS for fine particles ($PM_{2.5}$). The EPA website states:

> *With regard to primary (health-based) standards for fine particles (generally referring to particles less than or equal to 2.5 micrometers (mm) in diameter, $PM_{2.5}$), the EPA is strengthening the annual $PM_{2.5}$ standard by lowering the level to 12.0 micrograms per*

cubic meter (μg/m^3). The existing annual standard, 15.0 μg/m^3, was set in 1997. The EPA is revising the annual $PM_{2.5}$ standard to 12.0 μg/m^3 so as to provide increased protection against health effects associated with long- and short-term exposures (including premature mortality, increased hospital admissions and emergency department visits, and development of chronic respiratory disease), and to retain the 24-hour $PM_{2.5}$ standard at a level of 35 μg/m^3 (the EPA issued the 24-hour standard in 2006). The EPA is revising the Air Quality Index (AQI) for $PM_{2.5}$ to be consistent with the revised primary $PM_{2.5}$ standards. (Source: http://www.epa.gov/pm/actions.html).

The EPA also retained the existing standards for coarse particle pollution (PM_{10}). The NAAQS 24-hour standard for PM_{10} is 150 μg/m^3, which is not to be exceeded more than once per year, on average, over three years.

The Clean Air Act conformity requirements include the assessment of localized air quality impacts of federally-funded or federally-approved transportation projects that are located within $PM_{2.5}$ nonattainment and maintenance areas and deemed to be projects of air quality concern. The project is located in an area that has been designated as an unclassifiable/attainment area for PM. This means that the project area has been identified as a geographic area that meets the national health- based standards for PM levels, and therefore is exempt from performing PM analyses.

Nitrogen Dioxide (Nitrogen Oxides)
Nitrogen oxides, or NO_x, are the generic term for a group of highly reactive gases, all of which contain nitrogen and oxygen in varying amounts. Nitrogen oxides form when fuel is burned at high temperatures, as in a combustion process. The primary sources of NO_x are motor vehicles, electric utilities, and other industrial, commercial, and residential sources that burn fuels. Besides contributing to forming ozone and fine particles, NOx also have potential adverse health effects such as cardiovascular illnesses, respiratory illnesses and irritation (*The Air we Breathe: The State of Minnesota's Air Quality,* 2017).

Nitrogen dioxide (NO_2), which is a form of nitrogen oxide (NO_x), is regularly monitored. Minnesota currently meets federal nitrogen dioxide standards, according to the *Annual Air Monitoring Network Plan for Minnesota, 2017* (August 2016). This document states: "A monitoring site meets the annual NAAQS for NO_2 if the annual average is less than or equal to 53 ppb. Figure 21 [**Chart 1**] shows the 2015 average at Minnesota sites and compares them to the standard. Minnesota averages ranged from 5 ppb at Flint Hills Refinery 423 to 14 ppb at the Near Road I-35/I-94 site (962); therefore, Minnesota currently meets the annual NAAQS for NO_2."

In the *Annual Air Monitoring Network Plan for Minnesota, 2017*, it states the following with regard to the 1-hr NO_2 Standard:

> *On January 22, 2010 the EPA finalized revisions to the NO_2 NAAQS. As part of the standard review process, the EPA retained the existing annual NO_2 NAAQS, but also created a new 1-hour standard. This new 1-hour NAAQS will protect against adverse health effects associated with short term exposures to elevated NO_2. To meet this standard, the three-year average of the annual 98th percentile daily maximum 1-hour NO_2 concentration must not exceed 100 ppb. Figure 22 [**Chart 2**] shows the 2013-2015 average of the annual 98th percentile daily maximum 1-hour NO_2 concentrations at*

Minnesota sites and compares them to the 1-hour standard. Minnesota averages ranged from 27 ppb at Flint Hills Refinery 423 to 46 ppb at Blaine (6010); therefore, all Minnesota sites currently meet the 1-hour NAAQS for NO_2.

The EPA's regulatory announcement, EPA420-F-99-051 (December 1999), describes the Tier 2 standards for tailpipe emissions, and states:

The new tailpipe standards are set at an average standard of 0.07 grams per mile for nitrogen oxides for all classes of passenger vehicles beginning in 2004. This includes all light-duty trucks, as well as the largest SUVs. Vehicles weighing less than 6000 pounds will be phased-in to this standard between 2004 and 2007.

As newer, cleaner cars enter the national fleet, the new tailpipe standards will significantly reduce emissions of nitrogen oxides from vehicles by about 74 percent by 2030. The standards also will reduce emissions by more than 2 million tons per year by 2020 and nearly 3 million tons annually by 2030.

Within the project area, it is unlikely that NO_2 standards will be approached or exceeded based on the relatively low ambient concentrations of NO_2 in Minnesota and on the long-term trend toward reduction of NO_x emissions. Because of these factors, a specific analysis of NO_2 was not conducted for this project.

Chart 1 – Annual Average NO_2

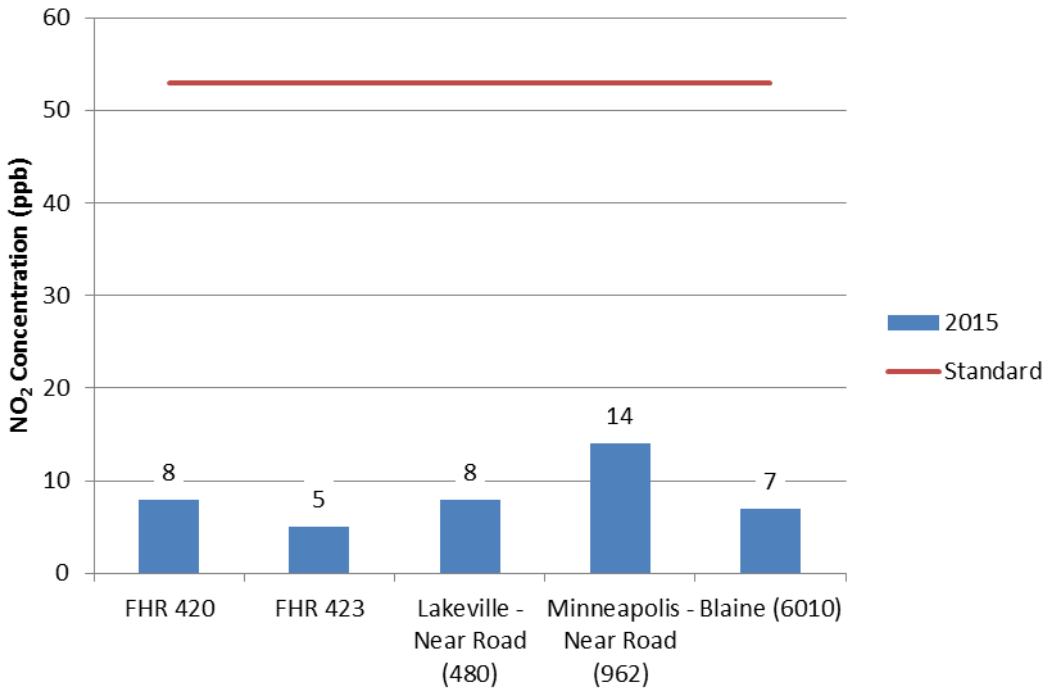
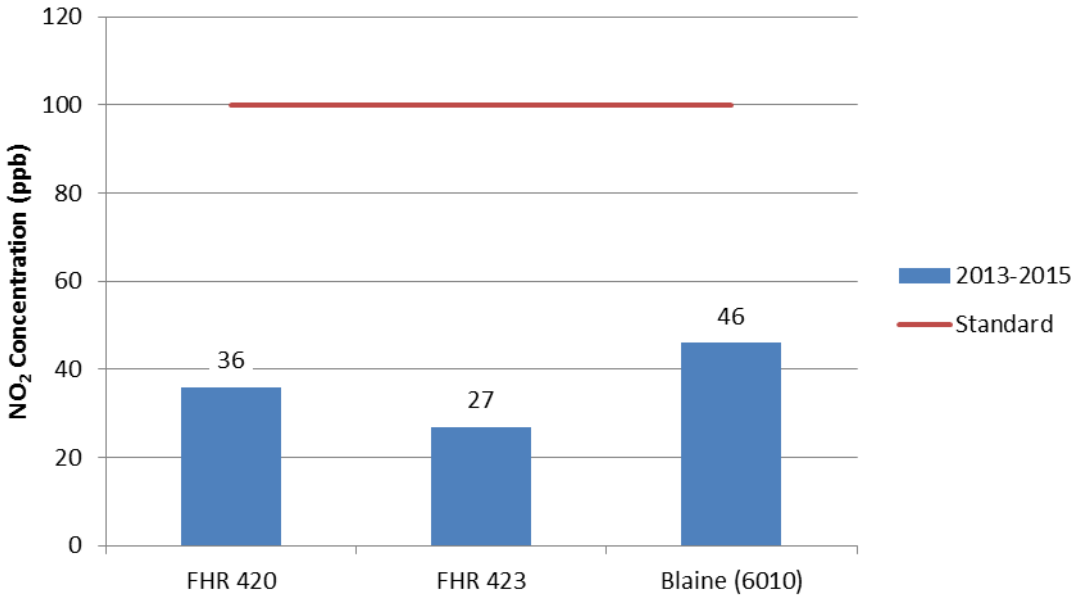


Chart 2 – Hour NO_2 Concentrations Compared to the NAAQs



Sulfur Dioxide

Sulfur dioxide (SO_2) and other sulfur oxide gases (SO_x) are formed when fuel containing sulfur is burned. Sulfur dioxide is a heavy, pungent, colorless gas. Elevated levels can impair breathing, lead to other respiratory symptoms, and at very high levels, can aggravate heart disease. People with asthma are most at risk when SO_2 levels increase. Once emitted into the atmosphere, SO_2 can be further oxidized into sulfuric acid, a component of acid rain. Emissions of sulfur oxides from transportation sources are a small component of overall emissions and continue to decline due to the desulphurization of fuels.

The MPCA monitors air quality across the state and compares those results to national standards. In 2015, monitoring shows ambient SO_2 concentrations were at less than 20 percent of federal standards. (*The Air We Breathe: The State of Minnesota's Air Quality,* 2017). MPCA monitoring shows ambient SO_2 concentrations ranging from 2 to 11 ppb for the 2013 to 2015 average 99th percentile daily maximum 1-hour SO_2 concentrations; well below state and federal standard of 75 ppb (Source: *Annual Air Monitoring Network Plan for Minnesota, 2017*). The MPCA has concluded that long-term trends in both ambient air concentrations and total SO_2 emissions in Minnesota indicate steady improvement.

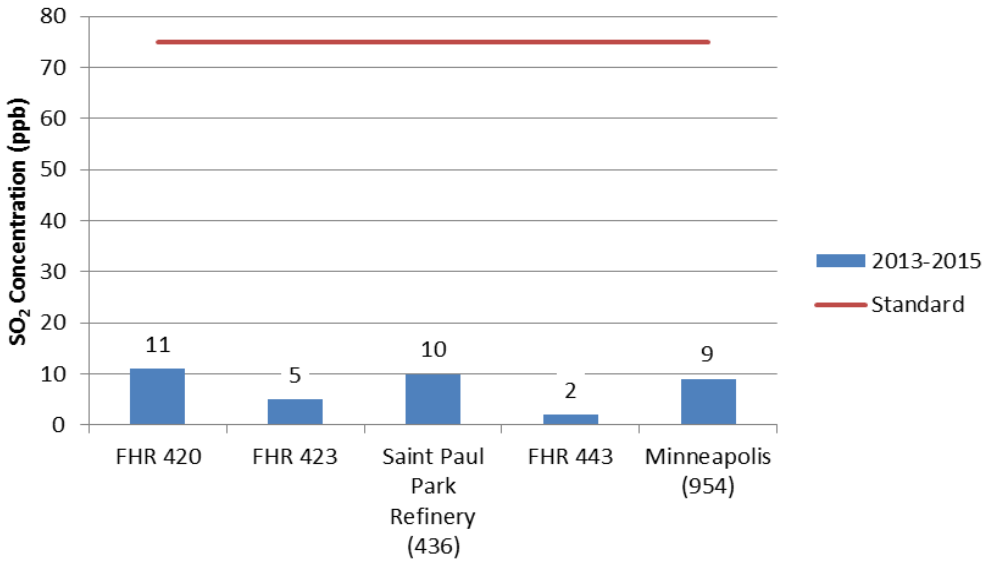
In the *Annual Air Monitoring Network Plan for Minnesota, 2017*, it states the following with regard to SO_2:

> *On June 2, 2010, the EPA finalized revisions to the primary SO_2 NAAQS. EPA established a new 1-hour standard which is met if the three-year average of the annual 99th percentile daily maximum 1-hour SO_2 concentration is less than 75 ppb. In addition to creating the new 1-hour standard, the EPA revoked the existing 24-hour and annual standards. Figure 24 [Chart 3] below describes the 2013-2015 average 99th percentile 1-hour SO_2 concentration and compares them to the 1-hour standard.*

Minnesota averages ranged from 2 ppb at Flint Hills Refinery 443 to 11 ppb at Flint Hills Refinery 420; therefore, all Minnesota sites currently meet the 1-hour NAAQS for SO_2.

Emissions of sulfur oxides from transportation sources are a small component of overall emissions and continue to decline due to the desulfurization of fuels. Additionally, the project area is classified by the EPA as a "sulfur dioxide attainment area," which means that the project area has been identified as a geographic area that meets the national health-based standards for sulfur dioxide levels. Because of these factors, a quantitative analysis for sulfur dioxide was not conducted for this project.

Chart 3 – 1 Hour SO_2 Concentration Compared to the NAAQS



Lead
Due to the phase out of leaded gasoline, lead is no longer a pollutant associated with vehicular emissions.

Carbon Monoxide
In 1999, the EPA redesignated all of Hennepin, Ramsey, Anoka, and portions of Carver, Scott, Dakota, Washington, and Wright counties as a maintenance area for CO. This means that area was previously classified as a nonattainment area but has now been found to be in attainment. This area includes the project area, which is located in Scott County. Evaluation of CO for assessment of air quality impacts is required for environmental approval in NEPA documents.

The EPA issued final rules on transportation conformity (40 CFR 93, Subpart A) which describe the methods required to demonstrate State Implementation Plan (SIP) compliance for transportation projects. This project is currently included in the 2017-2020 Transportation Improvement Program (TIP) for the Twin Cities metropolitan area and in the transportation conformity section of the TIP.

On November 8th, 2010, the EPA approved a limited maintenance plan request for the Twin Cities maintenance area. Under a limited maintenance plan, the EPA has determined that there is no requirement to project emissions over the maintenance period and that "an emission budget may be treated as essentially not constraining for the length of the maintenance period. The reason is that it is unreasonable to expect that our maintenance area will experience so much growth within this period that a violation of CO National Ambient Air Quality Standard (NAAQS) would result" (US EPA Limited Maintenance Plan Option for Nonclassifiable CO Nonattainment Areas, October 6, 1995).

Therefore, no regional modeling analysis for the Long Range Transportation Policy Plan (LRTPP) and TIP is required; however federally funded and state funded projects are still subject to "hot-spot" analysis requirements. The limited maintenance plan adopted in 2010 determines that the level of CO emissions and resulting ambient concentrations will continue to demonstrate attainment of CO NAAQS.

This project does not interfere with implementation of any transportation control measure included in the SIP. The TIP was determined to conform to the requirements of the 1990 Clean Air Act Amendments (CAAA) by MPCA on May 26th, 2016. The project's design concept and scope are not significantly different from that used in the TIP conformity analyses. As demonstrated by the above information, this project conforms to the requirements of the CAAA and to the Conformity Rules, 40 CFR 93.

Furthermore, the EPA has approved a screening method to determine which intersections need hot-spot analysis. The hot-spot screening method uses a traffic volume threshold of 79,400 entering vehicles per day. Intersections with traffic volumes above this threshold must be evaluated using EPA-approved emission and dispersion models. Intersections with traffic volumes below this threshold are not expected to result in CO concentrations that exceed state or federal standards, and detailed modeling is not required. The screening method demonstrates that because this project has less than the benchmark annual average daily traffic (AADT) of 79,400 and does not involve or affect the "Top Ten Intersections," a hot-spot analysis is not needed. Based on the results of the screening, there are no intersections included in the project area that require hot-spot analysis.

Improvements in vehicle technology and in motor fuel regulations continue to result in reductions in vehicle emission rates. The EPA MOVES 2010b emissions model estimates that emission rates will continue to fall from existing rates through year 2030. Consequently, year 2030 vehicle-related CO concentrations in the study area are likely to be lower than existing concentrations even considering any increase in development-related and background traffic.

Mobile Source Air Toxics (MSAT)

Controlling air toxic emissions became a national priority with the passage of the Clean Air Act Amendments (CAAA) of 1990, whereby Congress mandated that the EPA regulate 188 air toxics, also known as hazardous air pollutants. The EPA assessed this expansive list in its latest rule on the Control of Hazardous Air Pollutants from Mobile Sources (Federal Register, Vol. 72, No. 37, page 8430, February 26, 2007), and identified a group of 93 compounds emitted from mobile sources that are part of EPA's Integrated Risk Information System (IRIS).

In addition, the EPA identified nine compounds with significant contributions from mobile sources that are among the national- and regional-scale cancer risk drivers or contributors and non-cancer hazard contributors from the 2011 National Air Toxics Assessment (NATA). These are 1,3-butadiene, acetaldehyde, acrolein, benzene, diesel particulate matter (diesel PM), ethylbenzene, formaldehyde, naphthalene, and polycyclic organic matter. While FHWA considers these the priority mobile source air toxics, the list is subject to change and may be adjusted in consideration of future EPA rules (*Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents*, October 18, 2016).

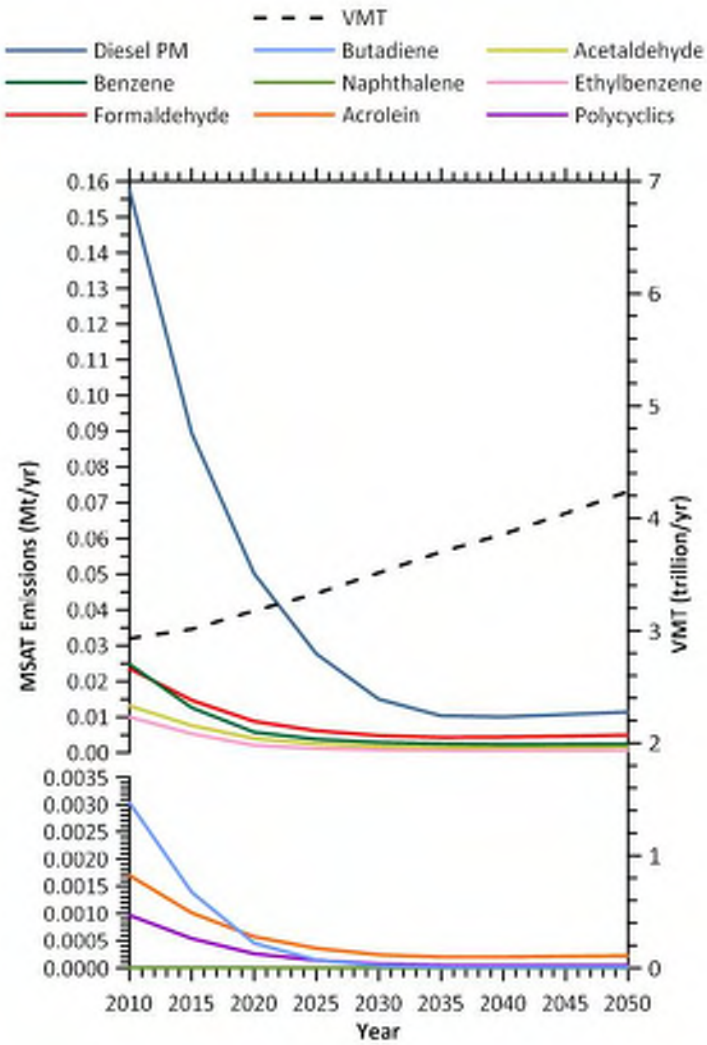
Motor Vehicle Emissions Simulator (MOVES)

According to EPA, MOVES2014 is a major revision to MOVES2010 and improves upon it in many respects. MOVES2014 includes new data, new emissions standards, and new functional improvements and features. It incorporates substantial new data for emissions, fleet, and activity developed since the release of MOVES2010. These new emissions data are for light- and heavy-duty vehicles, exhaust and evaporative emissions, and fuel effects. MOVES2014 also adds updated vehicle sales, population, age distribution, and vehicle miles travelled (VMT) data. MOVES2014 incorporates the effects of three new Federal emissions standard rules not included in MOVES2010. These new standards are all expected to impact MSAT emissions and include Tier 3 emissions and fuel standards starting in 2017 (79 FR 60344), heavy-duty greenhouse gas regulations that phase in during model years 2014-2018 (79 FR 60344), and the second phase of light duty greenhouse gas regulations that phase in during model years 2017-2025 (79 FR 60344). Since the release of MOVES2014, EPA has released MOVES2014a. In the November 2015 MOVES2014a Questions and Answers Guide, EPA states that for on-road emissions, MOVES2014a adds new options requested by users for the input of local VMT, includes minor updates to the default fuel tables, and corrects an error in MOVES2014 brake wear emissions. The change in brake wear emissions results in small decreases in PM emissions, while emissions for other criteria pollutants remain essentially the same as MOVES2014.

Based on an FHWA analysis using EPA's MOVES2014a model, as shown in **Chart 4**, even if vehicle-miles travelled (VMT) increases by 45 percent as assumed from 2010 to 2050, a combined reduction of 91 percent in the total annual emissions for the priority MSAT is projected for the same time period (*Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents*, October 18, 2016).

Diesel PM is the dominant component of MSAT emissions, making up 50 to 70 percent of all priority MSAT pollutants by mass, depending on calendar year. Users of MOVES2014a will notice some differences in emissions compared with MOVES2010b. MOVES2014a is based on updated data on some emissions and pollutant processes compared to MOVES2010b, and also reflects the latest Federal emissions standards in place at the time of its release. In addition, MOVES2014a emissions forecasts are based on lower VMT projections than MOVES2010b, consistent with recent trends suggesting reduced nationwide VMT growth compared to historical trends.

Chart 4 – FHWA Projected National MSAT Emission Trends 2010-2050 for Vehicles Operating on Roadways Using EPA's MOVES2014a Model



Note: Trends for specific locations may be different, depending on locally derived information representing vehicle miles travelled, vehicle speeds, vehicle mix, fuels, emission control programs, meteorology, and other factors.
Source: EPA MOVES2014a model runs conducted by FHWA, September 2016.

MSAT Research

Air toxics analysis is a continuing area of research. While much work has been done to assess the overall health risk of air toxics, many questions remain unanswered. In particular, the tools and techniques for assessing project-specific health outcomes as a result of lifetime MSAT exposure remain limited. These limitations impede the ability to evaluate how potential public health risks posed by MSAT exposure should be factored into project-level decision-making within the context of NEPA.

Nonetheless, air toxics concerns continue to be raised on highway projects during the NEPA process. Even as the science emerges, we are duly expected by the public and other agencies to address MSAT impacts in our environmental documents. The FHWA, EPA, the Health Effects Institute, and others have funded and conducted research studies to try to more clearly define potential risks from MSAT emissions associated with highway projects. The FHWA will continue to monitor the developing research in this field.

NEPA Context

The NEPA requires, to the fullest extent possible, that the policies, regulations, and laws of the Federal Government be interpreted and administered in accordance with its environmental protection goals, and that Federal agencies use an interdisciplinary approach in planning and decision-making for any action that adversely impacts the environment (42 U.S.C. 4332). In addition to evaluating the potential environmental effects, FHWA must also take into account the need for safe and efficient transportation in reaching a decision that is in the best overall public interest (23 U.S.C. 109(h)). The FHWA policies and procedures for implementing NEPA are contained in regulation at 23 CFR Part 771.

Incomplete or Unavailable Information for Project-Specific MSAT Health Impacts Analysis

In FHWA's view, information is incomplete or unavailable to credibly predict the project-specific health impacts due to changes in MSAT emissions associated with a proposed set of highway alternatives. The outcome of such an assessment, adverse or not, would be influenced more by the uncertainty introduced into the process through assumption and speculation rather than any genuine insight into the actual health impacts directly attributable to MSAT exposure associated with a proposed action.

The EPA is responsible for protecting the public health and welfare from any known or anticipated effect of an air pollutant. They are the lead authority for administering the Clean Air Act and its amendments and have specific statutory obligations with respect to hazardous air pollutants and MSAT. The EPA is in the continual process of assessing human health effects, exposures, and risks posed by air pollutants. They maintain the Integrated Risk Information System (IRIS), which is "a compilation of electronic reports on specific substances found in the environment and their potential to cause human health effects" (EPA, https://www.epa.gov/iris). Each report contains assessments of non-cancerous and cancerous effects for individual compounds and quantitative estimates of risk levels from lifetime oral and inhalation exposures, with uncertainty spanning perhaps an order of magnitude.

Other organizations are also active in the research and analyses of the human health effects of MSAT, including the Health Effects Institute (HEI). A number of HEI studies are summarized in Appendix D of FHWA's *Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents*. Among the adverse health effects linked to MSAT compounds at high exposures are; cancer in humans in occupational settings; cancer in animals; and irritation to the respiratory tract, including the exacerbation of asthma. Less obvious is the adverse human health effects of MSAT compounds at current environmental concentrations (HEI Special Report 16, https://www.healtheffects.org/publication/mobile-source-air-toxics-critical-review-literature-exposure-and-health-effects) or in the future as vehicle emissions decrease.

The methodologies for forecasting health impacts include emissions modeling; dispersion modeling; exposure modeling; and then final determination of health impacts – each step in the

process building on the model predictions obtained in the previous step. All are encumbered by technical shortcomings or uncertain science that prevents a more complete differentiation of the MSAT health impacts among a set of project alternatives. These difficulties are magnified for lifetime (i.e., 70 year) assessments, particularly because unsupportable assumptions would have to be made regarding changes in travel patterns and vehicle technology (which affects emissions rates) over that time frame, since such information is unavailable.

It is particularly difficult to reliably forecast 70-year lifetime MSAT concentrations and exposure near roadways; to determine the portion of time that people are actually exposed at a specific location; and to establish the extent attributable to a proposed action, especially given that some of the information needed is unavailable.
There are considerable uncertainties associated with the existing estimates of toxicity of the various MSAT, because of factors such as low-dose extrapolation and translation of occupational exposure data to the general population, a concern expressed by HEI (Special Report 16, https://www.healtheffects.org/publication/mobile-source-air-toxics-critical-review-literature-exposure-and-health-effects).

As a result, there is no national consensus on air dose-response values assumed to protect the public health and welfare for MSAT compounds, and in particular for diesel PM. EPA states that with respect to diesel engine exhaust, “[t]he absence of adequate data to develop a sufficiently confident dose-response relationship from the epidemiologic studies has prevented the estimation of inhalation carcinogenic risk" (EPA IRIS database, Diesel Engine Exhaust, Section II.C. https://cfpub.epa.gov/ncea/iris/iris_documents/documents/subst/0642.htm#quainhal).

There is also the lack of a national consensus on an acceptable level of risk. The current context is the process used by the EPA as provided by the Clean Air Act to determine whether more stringent controls are required in order to provide an ample margin of safety to protect public health or to prevent an adverse environmental effect for industrial sources subject to the maximum achievable control technology standards, such as benzene emissions from refineries.

The decision framework is a two-step process. The first step requires EPA to determine an "acceptable" level of risk due to emissions from a source, which is generally no greater than approximately 100 in a million. Additional factors are considered in the second step, the goal of which is to maximize the number of people with risks less than 1 in a million due to emissions from a source. The results of this statutory two-step process do not guarantee that cancer risks from exposure to air toxics are less than 1 in a million; in some cases, the residual risk determination could result in maximum individual cancer risks that are as high as approximately 100 in a million. In a June 2008 decision, the U.S. Court of Appeals for the District of Columbia Circuit upheld EPA's approach to addressing risk in its two-step decision framework. Information is incomplete or unavailable to establish that even the largest of highway projects would result in levels of risk greater than deemed acceptable (https://www.cadc.uscourts.gov/internet/opinions.nsf/284E23FFE079CD59852578000050C9DA/$file/07-1053-1120274.pdf).

Because of the limitations in the methodologies for forecasting health impacts described, any predicted difference in health impacts between alternatives is likely to be much smaller than the uncertainties associated with predicting the impacts. Consequently, the results of such assessments would not be useful to decision makers, who would need to weigh this information

against project benefits, such as reducing traffic congestion, accident rates, and fatalities plus improved access for emergency response, that are better suited for quantitative analysis.

Qualitative MSAT Analysis

For any future scenario, the amount of mobile source air toxics (MSAT) emitted would be proportional to the average daily traffic (ADT) assuming that other variables such as fleet mix are the same for each alternative. The ADT is not expected to differ significantly between the no build scenario and the preferred build alternative. Small differences in emissions resulting from differences in ADT are offset somewhat by lower MSAT emission rates due to increased speeds and improved mobility under the build alternative. According to EPA's MOVES2014a model, emissions of all of the priority MSATs except for diesel particulate matter decrease as speed increases. The extent to which these speed-related emissions decreases will offset ADT-related emissions increases cannot be reliably projected due to the inherent deficiencies of technical models.

Regardless of the alternative chosen, emissions will likely be lower than present levels in the design year as a result of the EPA's national control programs that are projected to reduce annual MSAT emissions by over 90 percent from 2010 to 2050 (*Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents, Federal Highway Administration*, October 12, 2016). Local conditions may differ from these national projections in terms of fleet mix and turnover, ADT growth rates, and local control measures. However, the magnitude of the EPA-projected reductions is so great (even after accounting for ADT growth) that MSAT emissions in the study area are likely to be lower in the future in virtually all locations.

Under the preferred alternative there may be localized areas where ADT would increase, and other areas where ADT would decrease. Therefore, it is possible that localized increases and decreases in MSAT emissions may occur. The localized increases in MSAT emissions would likely be most pronounced along the section of Louisville Road that would be built east of TH 169 between CSAH 14 and CSAH 78. However, even if these increases do occur, they too will be substantially reduced in the future due to implementation of EPA's vehicle and fuel regulations.

In summary, under the preferred alternative in the design year it is expected there would be reduced MSAT emissions in the immediate area of the project, relative to the no build scenario, due to the reduced ADT associated with more direct routing, and due to EPA's MSAT reduction programs.

Construction-Period Strategies

During project implementation, all strategies should be evaluated to determine their appropriateness and effectiveness at reducing regional and localized criteria pollutant emissions. Strategies that could be considered during construction include:

- Apply water suppression to active construction areas to minimize dust.
- Tarp trucks hauling soil, sand, and other loose materials or require trucks to maintain at least two feet of freeboard.
- Pave, apply water as needed, or apply (non-toxic) soil stabilizers on unpaved access roads, parking areas and staging areas at construction sites.
- Use water sweepers to sweep paved access roads, parking areas and staging areas at construction sites.

- Use water sweepers to sweep streets if visible soil material is carried onto adjacent public streets.
- Hydroseed or apply (non-toxic) soil stabilizers to inactive construction areas (previously graded areas inactive for ten days or more).
- Enclose, cover, water or apply (non-toxic) soil binders to exposed stockpiles (dirt, sand, etc.).
- Limit traffic speeds on unpaved roads to 15 miles per hour.
- Utilize appropriate erosion control measures to reduce silt runoff to public roadways.
- Replant vegetation as quickly as possible to minimize erosion in disturbed areas.
- Use alternative fuels for construction equipment when feasible.
- Minimize equipment idling time.
- Maintain properly tuned equipment.

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

Dust
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 MnDOT specifications in place at the time of project construction.

During construction, particulate emissions would temporarily increase due to the generation of fugitive dust associated with activities such as grading and other soil disturbance. The following dust control measures would be undertaken as necessary:

- Minimize the duration and extent of areas being exposed or regraded at any one time.
- Spray construction areas and haul roads with water, especially during periods of high wind or high levels of construction activity.
- Minimize the use of vehicles on unpaved surfaces when feasible.
- Tarp trucks hauling soil, sand, and other loose materials or require trucks to maintain at least two feet of freeboard.
- Pave, apply water as needed, or apply (non-toxic) soil stabilizers on unpaved access roads, parking areas and staging areas at construction sites.
- Use water sweepers to sweep paved access roads, parking areas and staging areas at construction sites.
- Use water sweepers to sweep streets if visible soil material is carried onto adjacent public streets.
- Hydroseed or apply (non-toxic) soil stabilizers to inactive construction areas (previously graded areas inactive for ten days or more).
- Enclose, cover, water or apply (non-toxic) soil binders to exposed stockpiles (dirt, sand, etc.).
- Limit traffic speeds on unpaved roads to 15 miles per hour.
- Utilize appropriate erosion control measures to reduce silt runoff to public roadways.

- Replant vegetation as quickly as possible to minimize erosion in disturbed areas.
- Use alternative fuels for construction equipment when feasible.
- Minimize equipment idling time.
- Maintain properly tuned equipment.

Odors
Odors could be generated by exhaust from diesel engines engaged in construction activities and fuel storage areas. All machinery would be properly equipped to control emissions.

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

A memo describing the complete noise analysis study for the project is included in **Attachment E**. Information included in this section is a summary. Because this project has federal funding a Categorical Exclusion environmental document was prepared for federal review. The federal review of the project also includes evaluation of federal noise standards which are slightly different than state requirements. Information from the federal review has been incorporated into the text on the following pages so that reviewers of the document have access to all of the criteria that were evaluated as part of the project.

Background
TH 169/TH 41/CSAH 78/CSAH 14 Intersection Improvements Project includes construction of an interchange at the existing signalized TH 169 and TH 41/CSAH 78 intersection and a new overpass near the existing TH 169 and CSAH 14 intersection located in Jackson and Louisville Townships in Scott County. The project also includes construction of frontage roads parallel to TH 169, pedestrian/bicycle accommodations along TH 41 and CSAH 78, and stormwater treatment. The project is intended to improve safety and mobility for commuter and freight traffic.

Sound travels in a wave motion and produces a sound pressure level. This sound pressure level is commonly measured in decibels. For highway traffic noise, an adjustment, or weighting, of the high- and low-pitched sounds is made to approximate the way that an average person hears sounds. The adjusted sound levels are stated in units of "A-weighted decibels" (dBA). A sound increase of three dBA is barely perceptible to the human ear, a five dBA increase is clearly noticeable, and a 10 dBA increase is heard as twice as loud.

In Minnesota, state noise standards are based on the "L_{10}" and "L_{50}" A-weighted noise levels, which are the noise levels that are exceeded 10 percent and 50 percent of the time, respectively, during the hour of the day and/or night when traffic noise is loudest. The L_{10} value is compared with FHWA noise abatement criteria (described below). Minnesota State noise standards have been established specifically for daytime and nighttime periods for three different land use classifications – residential, commercial and industrial. These standards, from the MPCA – Rules sec. 7030.0040, are shown in **Table 6**.

Table 6 - State Noise Standards

Land Use	Noise Area Classification[1]	Exterior Hourly Noise Level Limit, dBA			
		Daytime 7:00 am – 10:00 pm		Nighttime 10:00 pm – 7:00 am	
		L_{10}	L_{50}	L_{10}	L_{50}
Residential	NAC-1	65	60	55	50
Commercial	NAC-2	70	65	70	65
Industrial	NAC-3	80	75	80	75

[1] NAC-1 includes household units, transient lodging and hotels, educational, religious, cultural entertainment, camping and picnicking land uses. NAC-2 includes retail and restaurants, transportation terminals, professional offices, parks, recreational and amusement land uses. NAC-3 includes industrial, manufacturing, transportation facilities (except terminals), and utilities land uses. Source: MPCA, Minn. Rules sec. 7030.0040

While the state has three categories for which noise is evaluated, federal regulations have been established for seven land use categories. The federal standards are for all hours of the day – there are no nighttime or daytime differentials. Locations where noise levels are "approaching" (defined as being within one decibel of the criterion threshold, e.g., 69 dBA for Categories B or C and 74 dBA for Category E) or exceeding the criterion level must be evaluated for noise abatement reasonableness. Federal Noise Abatement Criteria (NAC) are shown in **Table 7**.

Table 7 – Federal Highway Administration (FHWA) Noise Abatement Criteria (NAC)

Activity Category	Activity Criteria L_{10}(h), dBA[(1)]	Description of Activity Category
A	60 dBA (exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B[(2)]	70 dBA (exterior)	Residential.
C[(2)]	70 dBA (exterior)	Active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails and trail crossings.
D	55 dBA (interior)	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools and television studios.
E[(2)]	75 dBA (exterior)	Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A-D or F.
F	NA	Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical) and warehousing.
G	NA	Undeveloped lands that are not permitted.

[(1)] L_{10}(h) shall be used for impact assessment. The L_{10}(h) activity criteria values are for impact determination only, and are not design standards for noise abatement.
[(2)] Included undeveloped land permitted for this activity category.

The project area contains land uses which currently fall under Federal Land Use Categories B, E, F, and G and State Noise Area Classifications 1 through 3.

In addition to criteria for the various land use types, and increase in noise of five dBA or greater also requires evaluation of noise abatement.

State and federal noise standards were both considered as part of this evaluation.

Noise monitoring
Noise monitoring is performed to document existing noise levels. Existing noise levels can be used as a "baseline" against which future scenarios are compared and to validate computer modeling techniques and results. Existing noise levels were monitored at nine sites within the project area chosen to represent areas of normal outdoor human activity. Noise monitoring locations are shown on **Figures 22a** and **22b**.

An existing noise model was created and the monitored levels were used to validate the model. The monitored noise levels were within three decibels of the modeled levels, supporting the validity of the model in predicting future noise levels.

Noise impact assessment and modeling approach
Traffic noise impacts were assessed by modeling noise levels at receptor sites (e.g., residences, commercial businesses, etc.) likely to be most affected by proposed project. Receptor locations are shown on **Figures 22a** and **22b**. Noise modeling receptors were selected at 33 residential sites, 19 commercial sites, 8 industrial sites, 13 undeveloped/agricultural sites, and 27 trail sites (associated with trail segments proposed as part of the project). The state noise standards apply only to properties along TH 169 and TH 41 because county roadways are exempt from state noise standards. Because federal funding would be used for the project, federal noise criteria apply to all roadways.

Noise modeling was completed using the noise prediction program MINNOISEV31, a version of the FHWA STAMINA model adapted by MnDOT and approved by the MPCA. This model uses peak-hour vehicle volume, speed, vehicle class, and the typical characteristics of the roadway being analyzed to estimate traffic noise levels.

Noise modeling results
None of the receptors classified in industrial or undeveloped areas exceed any state or federal standards under existing conditions or either future scenario (No Build or Build). Under the 2040 No Build and 2040 Build scenarios, noise levels in the project area approach or exceed federal thresholds and/or exceed MPCA standards at 45 of the 52 modeled commercial and residential receptor sites, compared with 36 sites under existing conditions. Ten of the 27 trail receptor sites exceed at least one of the federal thresholds and/or MPCA standards under the 2040 Build scenario. The modeling results indicate that the project would result in noise increases at a number of individual receptors near the project area; however, many sites exhibit high noise levels under existing conditions and future increases are anticipated based on forecasted traffic growth (with or without the project). **Table 8a** and **Table 8b** show Existing, 2040 No Build, and 2040 Build noise levels and changes in noise levels for both daytime and nighttime conditions for the receptor sites. These tables also show which receptors exhibit noise levels exceeding state and federal standards. Complete results of the noise analysis are provided in **Attachment E**.

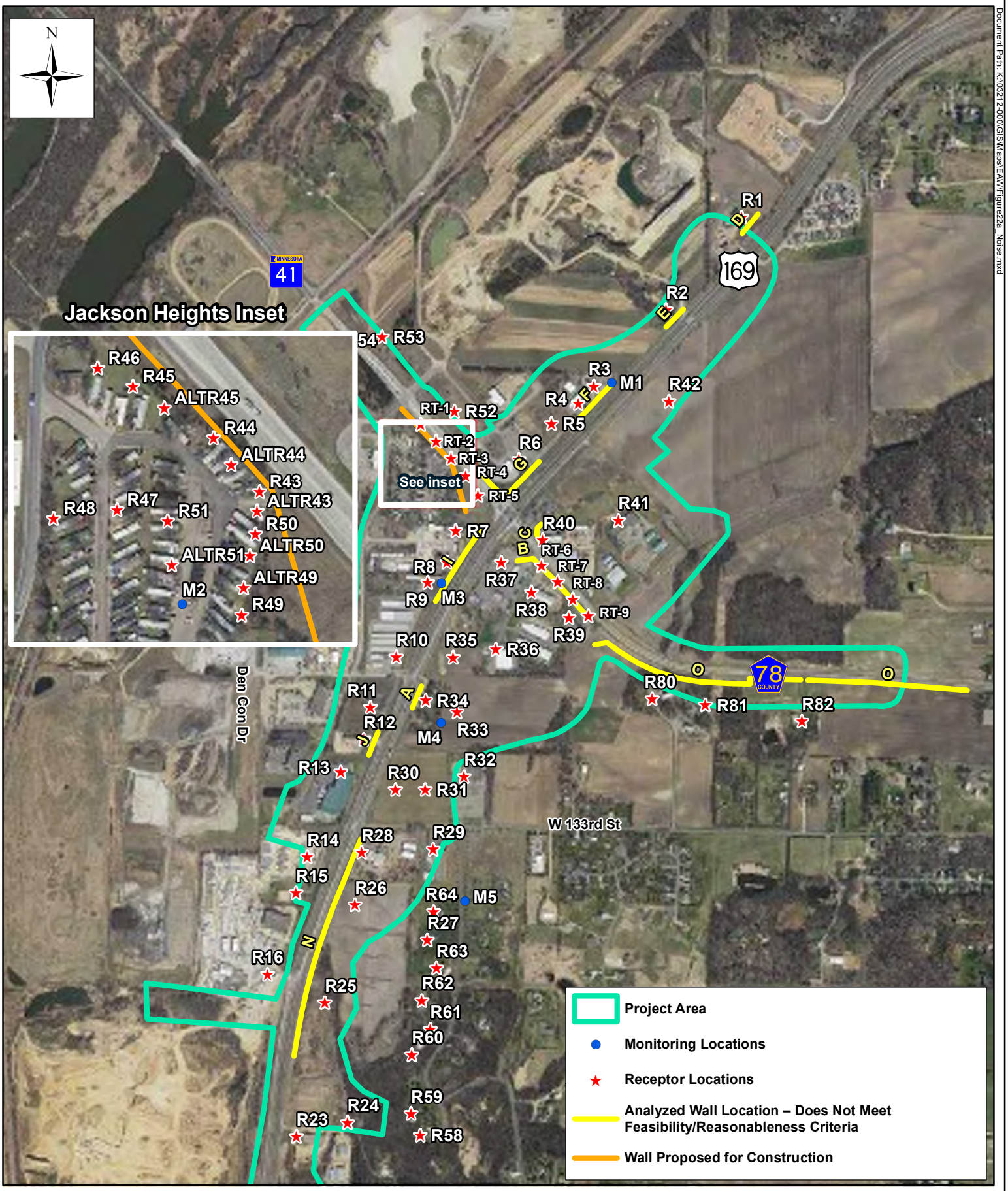


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Figure 22a: Noise Monitoring Sites, Receptors, and Analyzed Noise Wall Locations (North Project Area)

US 169/TH 41/CSAH 78/CSAH 14 Intersection Improvements
SP 070-596-013/7005-121/7009-84/7010-109
Scott County, MN
April 2017

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Figure 22b: Noise Monitoring Sites, Receptors, and Analyzed Noise Wall Locations (South Project Area)

US 169/TH 41/CSAH 78/CSAH 14 Intersection Improvements
SP 070-596-013/7005-121/7009-84/7010-109
Scott County, MN
April 2017

0 1,000 Feet

Table 8a - Daytime Sound Levels

Receptor	Land Use	Existing (2016)		2040 No Build Condition		2040 Build Condition		Difference (Existing to No Build)		Difference (Existing to Build)	
		L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}
R1	Commercial	68.9	65	69.7	**66.1**	**70.2**	**66.8**	0.8	1.1	1.3	1.8
R2	Residential	**74.6**	**70.8**	**75.4**	**71.9**	**75.9**	**72.6**	0.8	1.1	1.3	1.8
R3	Commercial	**73.5**	**69.8**	**74.3**	**70.9**	**74.7**	**71.3**	0.8	1.1	1.2	1.5
R4	Commercial	**74.5**	**70.8**	**75.3**	**71.9**	**75**	**71.8**	0.8	1.1	0.5	1
R5*	Undeveloped	68.7	64.9	69.5	66.1	69.2	65.8	0.8	1.2	0.5	0.9
R6	Commercial	**73.1**	**69.9**	**73.9**	**71.1**	**73.6**	**70.8**	0.8	1.2	0.5	0.9
R7	Commercial	**71.3**	**68.2**	**72.7**	**70**	**72.3**	**69.7**	1.4	1.8	1	1.5
R8	Commercial	**72.7**	**68.8**	**74.2**	**71**	**73.9**	**70.7**	1.5	2.2	1.2	1.9
R9	Commercial	**71.6**	**67.9**	**73.2**	**70.1**	**73**	**70**	1.6	2.2	1.4	2.1
R10	Industrial	73.1	68.8	74.7	71.2	74.7	71.3	1.6	2.4	1.6	2.5
R11*	Undeveloped	67.9	63.3	69.6	65.7	69.9	66.2	1.7	2.4	2	2.9
R12	Commercial	**73.4**	**68.9**	**75.1**	**71.3**	**75.6**	**72**	1.7	2.4	2.2	3.1
R13	Industrial	71.6	67.7	73.2	70	73.8	70.8	1.6	2.3	2.2	3.1
R14	Industrial	71.7	67.7	73.3	70	73.9	70.8	1.6	2.3	2.2	3.1
R15	Industrial	72.1	68	73.8	70.4	74.4	71.2	1.7	2.4	2.3	3.2
R16	Industrial	71.7	67.7	73.4	70	74	70.9	1.7	2.3	2.3	3.2
R17*	Undeveloped	64.3	60.4	66	62.7	66.6	63.6	1.7	2.3	2.3	3.2
R18	Industrial	68.9	65.4	70.6	67.7	69.9	67	1.7	2.3	1	1.6
R19	Commercial	**73.6**	**69**	**75.3**	**71.6**	**72.9**	**69.4**	1.7	2.6	-0.7	0.4
R20	Commercial	65.8	61.6	67.5	64	68.1	64.9	1.7	2.4	2.3	3.3
R21	Commercial	65.5	61.4	67.1	63.7	67.9	64.7	1.6	2.3	2.4	3.3
R22	Residential	57.3	54.6	58.9	56.8	59.3	57.3	1.6	2.2	2	2.7
R23	Industrial	73.4	68.9	75.1	71.3	76.2	72.1	1.7	2.4	2.8	3.2
R24	Commercial	60.8	57.6	62.4	59.9	63.1	60.7	1.6	2.3	2.3	3.1
R25*	Undeveloped	67.2	62.8	68.9	65.2	71.1	64.7	1.7	2.4	3.9	1.9
R26*	Undeveloped	67.4	62.9	69	65.3	69.7	66.2	1.6	2.4	2.3	3.3
R27	Residential	57.5	54.9	59.2	57.1	59.9	57.9	1.7	2.2	2.4	3
R28	Commercial	**75**	**69.9**	**76.7**	**72.4**	**77.3**	**73.3**	1.7	2.5	2.3	3.4
R29	Commercial	60.3	56.8	62	59	64.4	59	1.7	2.2	4.1	2.2
R30*	Undeveloped	69	64.1	70.7	66.5	71.3	67.4	1.7	2.4	2.3	3.3
R31*	Undeveloped	63.3	59.7	64.9	62	73.7	61	1.6	2.3	10.4	1.3
R32	Commercial	59.7	56.9	61.3	59	62.5	60	1.6	2.1	2.8	3.1
R33*	Undeveloped	63.3	59.8	64.9	62	66	62.7	1.6	2.2	2.7	2.9

* Undeveloped Land, Federal NAC not applicable
Bold values exceed MPCA Daytime Standards
Underlined values approach or exceed Federal NAC Standards
Italicized text is a receptor on a parcel that is anticipated to be a total property acquisition.

Table 8a - Daytime Sound Levels (continued)

Receptor	Land Use	Existing (2016)		2040 No Build Condition		2040 Build Condition		Difference (Existing to No Build)		Difference (Existing to Build)	
		L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}
R34	Residential	**74.3**	**69.6**	**76**	**72**	**76.3**	**72.4**	1.7	2.4	2	2.8
R35*	Undeveloped	68.5	63.9	70.2	66.3	70.1	66.2	1.7	2.4	1.6	2.3
R36	Industrial	62.5	59.4	64.1	61.5	64	61.6	1.6	2.1	1.5	2.2
R37	*Commercial*	*74.9*	*70.5*	*76.4*	*72.7*	*76.8*	*72.6*	*1.5*	*2.2*	*1.9*	*2.1*
R38	Commercial	69.5	**66.5**	**70.9**	**68.4**	**71**	**68.6**	1.4	1.9	1.5	2.1
R39	Commercial	67.3	64.2	68.9	**66.1**	**69.9**	**67**	1.6	1.9	2.6	2.8
R40	Commercial	**73.6**	**68.9**	**75.1**	**70.8**	**74.9**	**71.1**	1.5	1.9	1.3	2.2
R41	Commercial	61.2	58.7	62.2	60	62	60	1	1.3	0.8	1.3
R42*	Undeveloped	66.8	63.3	67.5	64.4	67.8	64.8	0.7	1.1	1	1.5
R43	Residential	**73.7**	**68.9**	**74.3**	**70**	**74.4**	**69.9**	0.6	1.1	0.7	1
R43A	Residential	**72.4**	**68.4**	**73.1**	**69.6**	**73.2**	**69.5**	0.7	1.2	0.8	1.1
R44	Residential	**73.5**	**68.5**	**74.1**	**69.5**	**74.2**	**69.3**	0.6	1	0.7	0.8
R44A	Residential	**73.2**	**68.4**	**73.8**	**69.4**	**73.9**	**69.3**	0.6	1	0.7	0.9
R45	Residential	**71.2**	**67.2**	**72**	**68.4**	**71.9**	**68.2**	0.8	1.2	0.7	1
R45A	Residential	**71.9**	**67.7**	**72.6**	**68.8**	**72.6**	**68.5**	0.7	1.1	0.7	0.8
R46	Residential	**70.5**	**66.8**	**71.6**	**68.2**	**71.5**	**67.9**	1.1	1.4	1	1.1
R47	Residential	**66.3**	**63.7**	**67.7**	**65.4**	**67.7**	**65.3**	1.4	1.7	1.4	1.6
R48	Residential	**68.2**	**60.9**	**70.5**	**63.5**	**71.9**	**65.4**	2.3	2.6	3.7	4.5
R49	Residential	**69.5**	**67.1**	**70.6**	**68.5**	**70.4**	**68.3**	1.1	1.4	0.9	1.2
R49A	Residential	**69.8**	**67.3**	**70.7**	**68.6**	**70.6**	**68.4**	0.9	1.3	0.8	1.1
R50	Residential	**71.4**	**68**	**72.1**	**69.2**	**72.1**	**69.1**	0.7	1.2	0.7	1.1
R50A	Residential	**70.5**	**67.6**	**71.3**	**68.8**	**71.3**	**68.7**	0.8	1.2	0.8	1.1
R51	Residential	**66.8**	**64.3**	**67.8**	**65.7**	**67.7**	**65.6**	1	1.4	0.9	1.3
R51A	Residential	**66.4**	**64.1**	**67.5**	**65.6**	**67.4**	**65.5**	1.1	1.5	1	1.4
R52*	Undeveloped	64.9	61.1	65.5	62	65.9	62.3	0.6	0.9	1	1.2
R53*	Undeveloped	65.3	60.5	65.8	61.2	65.8	61.2	0.5	0.7	0.5	0.7
R54*	Undeveloped	67.4	62	67.9	62.7	68.1	62.8	0.5	0.7	0.7	0.8
R55	Residential	58.2	54.7	59.8	57	59.5	56.7	1.6	2.3	1.3	2
R56	Residential	55.8	52.3	57.5	54.7	57.5	54.7	1.7	2.4	1.7	2.4
R57	Residential	57.7	50.1	61.8	55.1	61.4	54.7	4.1	5	3.7	4.6
R58	Residential	53.2	50.9	54.9	53	55.5	53.7	1.7	2.1	2.3	2.8
R59	Residential	53.9	51.5	55.6	53.6	56.2	54.4	1.7	2.1	2.3	2.9
R60	Residential	55.9	53.5	57.6	55.6	58.2	56.4	1.7	2.1	2.3	2.9
R61	Residential	55.2	52.9	56.9	55	57.5	55.7	1.7	2.1	2.3	2.8

* Undeveloped Land, Federal NAC not applicable
Bold values exceed MPCA Daytime Standards
Underlined values approach or exceed Federal NAC Standards
Italicized text is a receptor on a parcel that is anticipated to be a total property acquisition.

Table 8a - Daytime Sound Levels (continued)

Receptor	Land Use	Existing (2016)		2040 No Build Condition		2040 Build Condition		Difference (Existing to No Build)		Difference (Existing to Build)	
		L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}
R62	Residential	56.6	54.2	58.3	56.3	58.9	57.1	1.7	2.1	2.3	2.9
R63	Residential	56.4	53.9	58	56	58.7	56.9	1.6	2.1	2.3	3
R64	Residential	57.8	55.2	59.5	57.3	60.4	58.2	1.7	2.1	2.6	3
R80	Residential	57.7	53.3	59.6	55.8	61	56.9	1.9	2.5	3.3	3.6
R81	Residential	58	52.7	60	55.5	61.6	56.8	2	2.8	3.6	4.1
R82	Residential	55.7	50.7	57.6	53.4	58.3	54.3	1.9	2.7	2.6	3.6
RTRAIL1	Trail	NA	NA	NA	NA	**77.1**	**69.6**	NA	NA	NA	NA
RTRAIL2	Trail	NA	NA	NA	NA	**77.1**	**69.6**	NA	NA	NA	NA
RTRAIL3	Trail	NA	NA	NA	NA	**77.2**	**69.6**	NA	NA	NA	NA
RTRAIL4	Trail	NA	NA	NA	NA	**77.6**	**69.7**	NA	NA	NA	NA
RTRAIL5	Trail	NA	NA	NA	NA	**74.9**	**68.8**	NA	NA	NA	NA
RTRAIL6	Trail	NA	NA	NA	NA	**73.9**	**66.3**	NA	NA	NA	NA
RTRAIL7	Trail	NA	NA	NA	NA	**73.9**	**66**	NA	NA	NA	NA
RTRAIL8	Trail	NA	NA	NA	NA	**73**	**65.6**	NA	NA	NA	NA
RTRAIL9	Trail	NA	NA	NA	NA	**72.9**	**65.5**	NA	NA	NA	NA
RTRAIL10	Trail	NA	NA	NA	NA	59.4	53	NA	NA	NA	NA
RTRAIL11	Trail	NA	NA	NA	NA	60.1	52.5	NA	NA	NA	NA
RTRAIL12	Trail	NA	NA	NA	NA	60.5	52.7	NA	NA	NA	NA
RTRAIL13	Trail	NA	NA	NA	NA	60.9	53	NA	NA	NA	NA
RTRAIL14	Trail	NA	NA	NA	NA	61.5	53.1	NA	NA	NA	NA
RTRAIL15	Trail	NA	NA	NA	NA	62.1	52.4	NA	NA	NA	NA
RTRAIL16	Trail	NA	NA	NA	NA	61.9	59.4	NA	NA	NA	NA
RTRAIL17	Trail	NA	NA	NA	NA	64.3	61.7	NA	NA	NA	NA
RTRAIL18	Trail	NA	NA	NA	NA	68.1	64.8	NA	NA	NA	NA
RTRAIL19	Trail	NA	NA	NA	NA	68.7	**65.4**	NA	NA	NA	NA
RTRAIL20	Trail	NA	NA	NA	NA	65	62.2	NA	NA	NA	NA
RTRAIL21	Trail	NA	NA	NA	NA	64.1	56.4	NA	NA	NA	NA
RTRAIL22	Trail	NA	NA	NA	NA	64	55.4	NA	NA	NA	NA
RTRAIL23	Trail	NA	NA	NA	NA	63.9	54.8	NA	NA	NA	NA
RTRAIL24	Trail	NA	NA	NA	NA	64	54.3	NA	NA	NA	NA
RTRAIL25	Trail	NA	NA	NA	NA	63.6	53.4	NA	NA	NA	NA
RTRAIL26	Trail	NA	NA	NA	NA	63.4	52.9	NA	NA	NA	NA
RTRAIL27	Trail	NA	NA	NA	NA	63.4	53	NA	NA	NA	NA

* Undeveloped Land, Federal NAC not applicable
Bold values exceed MPCA Daytime Standards
Underlined values approach or exceed Federal NAC Standards
Italicized text is a receptor on a parcel that is anticipated to be a total property acquisition.

Table 8b - Nighttime Sound Levels

Receptor	Land Use	Existing (2016)		2040 No Build Condition		2040 Build Condition		Difference (Existing to No Build)		Difference (Existing to Build)	
		L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}
R1	Commercial	68.6	64.4	69.4	**65.6**	69.9	**66.3**	0.8	1.2	1.3	1.9
R2	Residential	**74.3**	**70.2**	**75.1**	**71.4**	**75.6**	**72**	0.8	1.2	1.3	1.8
R3	Commercial	**73.1**	**69.2**	**73.9**	**70.3**	**73.8**	**70.2**	0.8	1.1	0.7	1
R4	Commercial	**74.1**	**70.2**	**75**	**71.3**	**74**	**70.5**	0.9	1.1	-0.1	0.3
R5*	Undeveloped	68.4	64.3	69.2	65.5	68	64.3	0.8	1.2	-0.4	0
R6	Commercial	**72.7**	**69.3**	**73.5**	**70.5**	**72.4**	**69.4**	0.8	1.2	-0.3	0.1
R7	Commercial	**70.3**	**67.1**	**71.7**	**68.9**	**71**	**68.2**	1.4	1.8	0.7	1.1
R8	Commercial	**71.5**	**67.4**	**73.1**	**69.5**	**72.6**	**69**	1.6	2.1	1.1	1.6
R9	Residential	**70.5**	**66.5**	**72**	**68.7**	**71.7**	**68.4**	1.5	2.2	1.2	1.9
R10	Industrial	71.9	67.2	73.5	69.6	73.3	69.5	1.6	2.4	1.4	2.3
R11*	Undeveloped	66.6	61.5	68.4	64	68.7	64.5	1.8	2.5	2.1	3
R12	Commercial	**72.2**	**67.2**	**73.9**	**69.7**	**74.4**	**70.4**	1.7	2.5	2.2	3.2
R13	Industrial	70.4	66.1	72	68.4	72.6	69.2	1.6	2.3	2.2	3.1
R14	Industrial	70.4	66	72.1	68.4	72.7	69.3	1.7	2.4	2.3	3.3
R15	Industrial	70.9	66.3	72.6	68.7	73.2	69.6	1.7	2.4	2.3	3.3
R16	Industrial	70.5	66	72.2	68.4	72.8	69.3	1.7	2.4	2.3	3.3
R17*	Undeveloped	63.1	58.8	64.7	61.1	65.3	62	1.6	2.3	2.2	3.2
R18	Industrial	67.7	63.8	69.4	66.2	68.8	65.6	1.7	2.4	1.1	1.8
R19	Commercial	**72.1**	**67.4**	**73.9**	**70**	**71.7**	**68**	1.8	2.6	-0.4	0.6
R20	Commercial	64.4	60	66.1	62.4	66.7	63.3	1.7	2.4	2.3	3.3
R21	Commercial	64.1	59.8	65.8	62.2	66.5	63.1	1.7	2.4	2.4	3.3
R22	Residential	**56**	**53.1**	**57.6**	**55.3**	**57.9**	**55.8**	1.6	2.2	1.9	2.7
R23	Industrial	72	67.3	73.7	69.8	74.8	70.5	1.7	2.5	2.8	3.2
R24	Commercial	59.5	56.1	61.1	58.3	61.8	59.2	1.6	2.2	2.3	3.1
R25*	Undeveloped	65.8	61.2	67.5	63.6	69.7	62.8	1.7	2.4	3.9	1.6
R26*	Undeveloped	65.9	61.3	67.6	63.7	68.3	64.7	1.7	2.4	2.4	3.4
R27	Residential	**56.2**	**53.4**	**57.8**	**55.6**	**58.6**	**56.4**	1.6	2.2	2.4	3
R28	Commercial	**73.5**	**68.4**	**75.3**	**70.9**	**75.9**	**71.8**	1.8	2.5	2.4	3.4
R29	Commercial	58.6	55.4	60.3	57.5	62.9	57.2	1.7	2.1	4.3	1.8
R30*	Undeveloped	67.5	62.4	69.2	64.9	69.9	65.9	1.7	2.5	2.4	3.5
R31*	Undeveloped	61.9	58.1	63.5	60.4	72	59.2	1.6	2.3	10.1	1.1
R32	Commercial	58.4	55.4	60	57.5	61.1	58.4	1.6	2.1	2.7	3
R33*	Undeveloped	61.9	58.3	63.6	60.5	64.5	61	1.7	2.2	2.6	2.7

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Table 8b - Nighttime Sound Levels (continued)

Receptor	Land Use	Existing (2016)		2040 No Build Condition		2040 Build Condition		Difference (Existing to No Build)		Difference (Existing to Build)	
		L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}
R34	Residential	**72.9**	**68.1**	**74.6**	**70.5**	**74.8**	**70.8**	1.7	2.4	1.9	2.7
R35*	Undeveloped	67.1	62.3	68.8	64.7	68.5	64.5	1.7	2.4	1.4	2.2
R36	Industrial	61.3	58	62.8	60.1	62.6	59.9	1.5	2.1	1.3	1.9
R37	*Commercial*	*73.6*	*69.2*	*75.2*	*71.3*	*75.1*	*70.9*	*1.6*	*2.1*	*1.5*	*1.7*
R38	Commercial	68.8	65.4	70	**67.2**	69.8	**67**	1.2	1.8	1	1.6
R39	Commercial	66.2	63.2	67.7	65	68.3	**65.5**	1.5	1.8	2.1	2.3
R40	Commercial	**72.7**	**68**	**74.2**	**69.8**	**73.6**	**69.3**	1.5	1.8	0.9	1.3
R41	Commercial	60.9	58.1	61.8	59.4	60.8	58.7	0.9	1.3	-0.1	0.6
R42*	Undeveloped	66.5	62.8	67.3	64	67.5	64.2	0.8	1.2	1	1.4
R43	Residential	**73.1**	**68.3**	**73.8**	**69.3**	**73.8**	**69**	0.7	1	0.7	0.7
R43A	Residential	**71.9**	**67.8**	**72.5**	**68.9**	**72.5**	**68.5**	0.6	1.1	0.6	0.7
R44	Residential	**73**	**67.9**	**73.6**	**68.9**	**73.6**	**68.6**	0.6	1	0.6	0.7
R44A	Residential	**72.7**	**67.9**	**73.3**	**68.8**	**73.2**	**68.5**	0.6	0.9	0.5	0.6
R45	Residential	**70.7**	**66.6**	**71.4**	**67.7**	**71.3**	**67.3**	0.7	1.1	0.6	0.7
R45A	Residential	**71.4**	**67.1**	**72.1**	**68.1**	**72**	**67.7**	0.7	1	0.6	0.6
R46	Residential	**69.9**	**66.1**	**70.9**	**67.3**	**70.7**	**67**	1	1.2	0.8	0.9
R47	Residential	**65.5**	**62.9**	**66.8**	**64.4**	**66.6**	**64.1**	1.3	1.5	1.1	1.2
R48	Residential	**67**	**59.8**	**69.1**	**61.8**	**70.4**	**63.3**	2.1	2	3.4	3.5
R49	Residential	**68.8**	**66.3**	**69.8**	**67.6**	**69.4**	**67.1**	1	1.3	0.6	0.8
R49A	Residential	**69.1**	**66.5**	**70**	**67.7**	**69.7**	**67.3**	0.9	1.2	0.6	0.8
R50	Residential	**70.8**	**67.3**	**71.5**	**68.4**	**71.4**	**68.1**	0.7	1.1	0.6	0.8
R50A	Residential	**69.9**	**66.9**	**70.7**	**68.1**	**70.5**	**67.7**	0.8	1.2	0.6	0.8
R51	Residential	**66.2**	**63.6**	**67.1**	**64.8**	**66.9**	**64.5**	0.9	1.2	0.7	0.9
R51A	Residential	**65.7**	**63.3**	**66.7**	**64.7**	**66.4**	**64.3**	1	1.4	0.7	1
R52*	Undeveloped	64.5	60.5	65	61.4	65.2	61.5	0.5	0.9	0.7	1
R53*	Undeveloped	64.8	60	65.3	60.7	65.3	60.6	0.5	0.7	0.5	0.6
R54*	Undeveloped	66.9	61.5	67.4	62.2	67.6	62.3	0.5	0.7	0.7	0.8
R55	Residential	**56.9**	**53.1**	**58.6**	**55.4**	**58.7**	**55.7**	1.7	2.3	1.8	2.6
R56	Residential	54.6	**50.7**	**56.2**	**53.1**	**56.7**	**53.7**	1.6	2.4	2.1	3
R57	Residential	**56.3**	48.3	**60.2**	**53.3**	**60**	**53.1**	3.9	5	3.7	4.8
R58	Residential	51.9	49.4	53.6	**51.5**	54.2	**52.3**	1.7	2.1	2.3	2.9
R59	Residential	52.6	50	54.2	**52.1**	54.8	**52.9**	1.6	2.1	2.2	2.9
R60	Residential	54.6	**52**	**56.3**	**54.1**	**56.9**	**54.9**	1.7	2.1	2.3	2.9
R61	Residential	53.9	**51.4**	**55.5**	**53.5**	**56.2**	**54.3**	1.6	2.1	2.3	2.9

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Bold values exceed MPCA Nighttime Standards
Underlined values approach or exceed Federal NAC Standards
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Table 8b - Nighttime Sound Levels (continued)

Receptor	Land Use	Existing (2016)		2040 No Build Condition		2040 Build Condition		Difference (Existing to No Build)		Difference (Existing to Build)	
		L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}
R62	Residential	**55.3**	**52.7**	**57**	**54.8**	**57.6**	**55.6**	1.7	2.1	2.3	2.9
R63	Residential	**55**	**52.5**	**56.7**	**54.6**	**57.3**	**55.4**	1.7	2.1	2.3	2.9
R64	Residential	**56.5**	**53.7**	**58.1**	**55.8**	**59.1**	**56.7**	1.6	2.1	2.6	3
R80	Residential	**56.3**	**52**	**58.2**	**54.4**	**59.4**	**55.2**	1.9	2.4	3.1	3.2
R81	Residential	**56.6**	**51.4**	**58.6**	**54**	**60**	**55.1**	2	2.6	3.4	3.7
R82	Residential	54.3	49.4	**56.2**	**51.9**	**56.8**	**52.6**	1.9	2.5	2.5	3.2
RTRAIL1	Trail	NA	NA	NA	NA	**76.6**	**69**	NA	NA	NA	NA
RTRAIL2	Trail	NA	NA	NA	NA	**76.6**	**69**	NA	NA	NA	NA
RTRAIL3	Trail	NA	NA	NA	NA	**76.7**	**69.1**	NA	NA	NA	NA
RTRAIL4	Trail	NA	NA	NA	NA	**77.1**	**69.1**	NA	NA	NA	NA
RTRAIL5	Trail	NA	NA	NA	NA	**74.3**	**68**	NA	NA	NA	NA
RTRAIL6	Trail	NA	NA	NA	NA	**71.9**	64.5	NA	NA	NA	NA
RTRAIL7	Trail	NA	NA	NA	NA	**71.9**	64.1	NA	NA	NA	NA
RTRAIL8	Trail	NA	NA	NA	NA	**71.1**	63.7	NA	NA	NA	NA
RTRAIL9	Trail	NA	NA	NA	NA	**71**	63.6	NA	NA	NA	NA
RTRAIL10	Trail	NA	NA	NA	NA	58.1	51	NA	NA	NA	NA
RTRAIL11	Trail	NA	NA	NA	NA	58.9	50.5	NA	NA	NA	NA
RTRAIL12	Trail	NA	NA	NA	NA	59.2	50.8	NA	NA	NA	NA
RTRAIL13	Trail	NA	NA	NA	NA	59.6	51.1	NA	NA	NA	NA
RTRAIL14	Trail	NA	NA	NA	NA	60.2	51.2	NA	NA	NA	NA
RTRAIL15	Trail	NA	NA	NA	NA	60.9	50.6	NA	NA	NA	NA
RTRAIL16	Trail	NA	NA	NA	NA	60.7	58	NA	NA	NA	NA
RTRAIL17	Trail	NA	NA	NA	NA	63.1	60.1	NA	NA	NA	NA
RTRAIL18	Trail	NA	NA	NA	NA	66.9	63.2	NA	NA	NA	NA
RTRAIL19	Trail	NA	NA	NA	NA	67.3	63.8	NA	NA	NA	NA
RTRAIL20	Trail	NA	NA	NA	NA	63.7	60.6	NA	NA	NA	NA
RTRAIL21	Trail	NA	NA	NA	NA	62.7	54.7	NA	NA	NA	NA
RTRAIL22	Trail	NA	NA	NA	NA	62.6	53.7	NA	NA	NA	NA
RTRAIL23	Trail	NA	NA	NA	NA	62.5	53.1	NA	NA	NA	NA
RTRAIL24	Trail	NA	NA	NA	NA	62.6	52.7	NA	NA	NA	NA
RTRAIL25	Trail	NA	NA	NA	NA	62.2	51.8	NA	NA	NA	NA
RTRAIL26	Trail	NA	NA	NA	NA	62	51.3	NA	NA	NA	NA
RTRAIL27	Trail	NA	NA	N/A	NA	62	51.5	NA	NA	NA	NA

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Noise mitigation analysis and methodology
Because the federal criterion and/or state standards would be exceeded at many of the modeled residential and commercial receptor sites, mitigation measures were studied. This analysis included the evaluation of the reasonableness and feasibility of noise mitigation. Federal rules (23 CFR 772) do not require that the noise abatement criteria be met in every instance of a traffic noise impact. Rather, they require that every reasonable and feasible effort be made to provide noise mitigation. All receptors that exceed state and/or federal noise standards must be evaluated relative to the MnDOT Noise Barrier Reasonableness and Feasibility Criteria. Noise barriers are a feasible mitigation measure from an engineering standpoint where there are no structural, topographical, safety, drainage or space constraints preventing their construction. Acoustically feasible noise abatement measures must achieve a noise reduction of at least 5 dBA for at least one impacted receptor. For receptor sites associated with the trails, noise barriers were not considered feasible due to maintenance and space constraints.

The analysis considered noise barriers of varying heights (6, 10, 15, and 20 feet) for reasonableness during the daytime worst noise hour. As per MnDOT standard guidelines, the cost effectiveness of the barrier may not exceed $43,500/dBA per benefited receptor. A receptor's inclusion in the cost effectiveness calculation is contingent on the receptor receiving a minimum of 5 dBA reduction due to the construction of the barrier. Additionally, a barrier must reduce noise by 7 dBA for at least one receptor to satisfy the state reasonableness guidelines.

Cost effectiveness is the first consideration in determining the reasonableness of potential noise barriers. If noise mitigation is found to be cost-effective, additional reasonableness factors, such as the desires of benefited property owners and residents, are considered.

Only receptors that experience a five or greater decibel decrease in noise following construction of a noise barrier are considered in this analysis. This overall approach is outlined in MnDOT Noise Policy for Type I and Type II Federal-Aid Projects as per 23 CFR 772.

Noise mitigation results
Fifteen locations for noise barriers were analyzed as part of the mitigation analysis. Eleven of these noise barriers would not reduce noise by the minimum 7 dBA at any receptor and, therefore, do not meet the requirements for feasibility. Three of the studied barriers would achieve a 7 dBA reduction, but would not meet the cost effectiveness criterion as part of the consideration of reasonableness.

One noise barrier analyzed ("Wall H") did meet the cost estimate requirements for reasonableness. This noise barrier, a 1,090-foot-long wall along the southwest quadrant of the TH 169 and TH 41 intersection, would shield modeled receptors R43–R45, R49–R51, R43A–R45A and R49A–R51A. All of the modeled receptors represent one or more single family residences in the Jackson Heights manufactured home community. As a result of this analysis, a 20-foot noise barrier was proposed for this location. The modeled 20-foot barrier would reduce the noise by more than 5 dBA at 14 receptors with a maximum reduction of 12.3 dBA. The cost effectiveness of this barrier would be $33,538, which is less than MnDOT's criterion of $43,500. Because this noise barrier met standards for feasibility and reasonableness, meetings were scheduled and held with the residents and owner of the benefited properties (those that would receive at least a 5-dBA noise reduction as a result of the noise barrier) to get feedback on whether the residents and owner wanted the noise barrier to be constructed. Consistent with MnDOT standards, voting ballots and informational materials were distributed prior to the meeting. Ten completed ballots were received, and each response was a vote

in favor of noise barrier construction. There were not any votes received in opposition to construction of the noise barrier. Because more than half of the available voting "points" were received in favor, a 20-foot noise barrier would be constructed as part of the project.

Alternative noise abatement
Noise abatement measures other than noise barriers were considered for the proposed project. Such measures included traffic control devices, signing for prohibition of certain vehicle types, time-use restrictions for certain vehicle types, modified speed limits, exclusive land use designations, and other methods listed in 23 CFR 772.13c. It was determined that these types of measures would not be feasible or practical for this project. To limit the vehicle types, time of use, and speeds on the roadways would not be consistent with their functions. The existing and proposed land use within the project corridor is consistent with the county's comprehensive plan and changing land use designations would not be practical and would be disruptive to existing land uses.

Construction Noise
The construction activities associated with implementation of the proposed project will result in increased noise levels relative to existing conditions. These impacts will primarily be associated with construction equipment and pile driving.

Table 9 shows peak noise levels monitored at 50 feet from various types of construction equipment. This equipment is primarily associated with site grading/site preparation, which is generally the roadway construction phase associated with the greatest noise levels.

Table 9 - Typical Construction Equipment Noise Levels at 50 feet

Equipment Type	Manufacturers Sampled	Number of Models in Sample	Peak Noise Level (dBA)	
			Range	Average
Backhoes	5	6	74-92	83
Front Loaders	5	30	75-96	85
Dozers	8	41	65-95	85
Graders	3	15	72-92	84
Scrapers	2	27	76-98	87
Pile Drivers	NA	NA	95-105	101

Elevated noise levels are, to a degree, unavoidable for this type of project. The project contract and special provisions will require that construction equipment be properly muffled and in proper working order. Scott County will require contractor(s) to comply with applicable local noise restrictions and ordinances to the extent that is reasonable. Advanced notice will be provided to affected communities of any planned abnormally loud construction activities. It is anticipated that night construction may sometimes be required to minimize traffic impacts and to improve safety. However, construction will be limited to daytime hours as much as possible. This project is expected to be under construction for 18 months. If necessary, a detailed nighttime construction mitigation plan will be developed during the project final design stage.

Any associated high-impact equipment noise, such as pile driving, pavement sawing, or jack hammering, will be unavoidable with construction of the proposed project. Pile-driving noise is associated with any bridge construction and sheet piling necessary for retaining wall construction. While pile-driving equipment results in the highest peak noise level, as shown in **Table 9**, it is limited

in duration to the activities noted above (e.g., bridge construction). The use of pile drivers, jack hammers, and pavement sawing equipment will be prohibited during nighttime hours.

18. Transportation:

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

Existing and Proposed Additional Parking Spaces
The proposed project is a highway project and would not generate additional parking spaces.

Estimated Total Average Daily Traffic Generated
The proposed project would not generate new trips in the same way as a new development because the roadway improvements proposed are not a destination or end point like a business or residential neighborhood.

Estimated Maximum Peak Hour Traffic Generated and Time of Occurrence
As noted above, the proposed project would not generate new trips. Existing peak period travel patterns occur predominately in the northbound direction during the morning and the southbound direction in the afternoon. The peak hours were found to occur from 7:00 AM – 8:00 AM and 4:30 PM – 5:30 PM.

Indicate Source of Trip Generation Rates Used in the Estimates
Future (year 2040) travel demand forecasts for this project were developed using the 2040 Scott County Model, which was based on the Twin Cities Collar County Travel Demand Model and was updated in early 2015 to incorporate Thrive MSP 2040 which was adopted by the Metropolitan Council in May 2014. The travel demand forecast methodology is described in detail in the traffic forecast technical memorandum dated November 3, 2016. A copy of this memorandum is available in **Attachment B**.

Availability of Transit and/or Other Alternative Transportation Modes
Transit within the project area is currently limited to ADA and dial-a-ride type services. The county, in conjunction with MnDOT and the Metropolitan Council, is investigating potential transit service/managed lane alternatives on TH 169 from slightly north of the I-494 beltway to TH 41. That study has not been completed. However, it has been indicated that enhancements at TH 41 would be limited—potentially to a future park and ride lot. No additional travel lanes or managed lanes on TH 169 are expected to reach the study area.

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.

Traffic forecasts for the project area were developed for 2040 using the Scott County travel demand model (**Attachment B**). These forecasts were used to evaluate traffic conditions under the future no build (without project) and future build (with project) conditions. As discussed in **Section 6.d** (Primary Need – Mobility), when projecting out into the future based upon information from the comprehensive plans and demographic forecasts from the Metropolitan Council, traffic volumes on TH 169, CSAH 78, and CSAH 14 increase substantially, with smaller levels of growth on TH 41.

For additional details beyond the summaries provided on the following pages, see the *Existing Conditions and No Build Traffic Operations Memo* (**Attachment C**) and the *Build Alternatives Traffic Operations Memo* (**Attachment D**).

Existing and No Build Conditions
As described in **Section 6.d** (Primary Need – Mobility), congestion has been a long-term issue within the project area. As shown in **Table 10**, segments of TH 169 and TH 41 within the study area are at or nearing capacity under current conditions and will be exceeding capacity in the future on TH 169 and TH 41 if no improvements are constructed in the future.

Table 10 - Average Daily Traffic Volumes and Capacity Thresholds – Existing and Future Conditions

Roadway	Segment	Roadway Design	Roadway Capacity[1]	Existing AADT[2]	2040 No Build AADT[2]
TH 169	CSAH 69 to TH 41	4-lane expressway	36,000	32,000	**41,800**
	TH 41 to CSAH 14	4-lane expressway	36,000	29,000	**40,900**
TH 41	North/West of Dem Con Drive	2-lane rural	14,000 – 15,000	**17,000**	**19,700**
	Dem Con Drive to TH 169	3-lane	14,000 – 17,000	**17,000**	**19,700**
CSAH 78	TH 169 to half mile to the east	2-lane rural	14,000 – 15,000	4,700	10,100
CSAH 14	TH 169 to half mile to the east	2-lane rural	14,000 – 15,000	1,600	6,900

[1] Roadway Capacity Thresholds from Scott County Comprehensive Plan
[2] Values shown in bold are at or exceed capacity of the existing roadway.

In addition to capacity constraints on some of the roadway corridors themselves, there are intersections that are starting to deteriorate in terms of their functionality. These items were discussed in the purpose and need (**Section 6.d**). As explained previously, level of service (LOS) provides a range for how well an intersection or roadway segment operates. LOS A indicates that an intersection or roadway segment is operating well and at free-flow conditions. LOS F indicates

that an intersection is failing and that operations are unacceptable. LOS B – LOS E fall in between LOS A and LOS F, with LOS B – LOS D considered acceptable.

Under existing conditions, the intersection of TH 169 and TH 41/CSAH 78 operates at LOS D during AM and PM peak hours. In the future condition (2040), this intersection is projected to operate at LOS F in the AM peak hour and LOS E in the PM peak hour. Intersection operational analyses (summarized in **Tables 11** and **12**) show that individual movements at the TH 169 and TH 41/CSAH 78 intersection currently operate at Level of Service (LOS) C through E in both the AM and PM peak periods (**Tables 11 and 12**), with some movements within the intersection operating poorly. Under the future 2040 No Build scenario, all left-turning vehicles would experience substantial delays and vehicle storage issues due to the queues not being served within one traffic signal cycle.

The intersection of TH 169 and CSAH 14 currently operates overall at LOS A in the AM and PM peak hours; however, the side street approaches operate at LOS E and F in the AM and C and D in the PM due to delays associated with waiting for gaps in through traffic on TH 169 (**Tables 11 and 12**). In the future condition, it is projected that this intersection will operate at LOS D in the AM peak hour and LOS E in the PM peak hour with significant delays on the side street approaches. The CSAH 14 westbound approach will experience delays exceeding 30 minutes at peak periods (see **Attachment C** for further details).

It should be noted that the information contained in **Attachment C** indicates that many of the minor street intersections and/or driveways are anticipated to experience a substantial increase in delays in accessing TH 169 because the increased traffic on TH 169 would result in fewer gaps for traffic to safely enter the highway.

Table 11 – Existing and 2040 No Build Intersection LOS (TH 41/CSAH 78 and CSAH 14) AM

Intersection	App.	Existing AM Peak Hour			2040 No Build AM Peak Hour		
		Approach Delay	Intersection Delay	Minor Stop-Worst Approach	Approach Delay	Intersection Delay	Minor Stop-Worst Approach
TH 169 at TH 41/CSAH 78	NB	44.6/D	47.9/D		100.5/F	103.2/F	
	SB	27.4/C			41.1/D		
	EB	73.7/E			216.9/F		
	WB	64.2/E			89.7/F		
TH 169 at CSAH 14	NB	2.7/A	4.9/A	54.7/F	4.7/A	28.6/D	2,618.5/F
	SB	3.3/A			5.8/A		
	EB	44.8/E			193.4/F		
	WB				2,618.5/F		

Table 12 – Existing and 2040 No Build Intersection LOS (TH 41/CSAH 78 and CSAH 14) PM

Intersection	App.	Existing PM Peak Hour			2040 No Build PM Peak Hour		
		Approach Delay	Intersection Delay	Minor Stop-Worst Approach	Approach Delay	Intersection Delay	Minor Stop-Worst Approach
TH 169 at TH 41/CSAH 78	NB	33.5/C	37.6/D		48.4/D	67.8/E	
	SB	27.9/C			61.8/E		
	EB	54.2/D			99.2/F		
	WB	58.1/E			68.4/E		
TH 169 at CSAH 14	NB	1.7/A	3.9/A	33.7/D	3/A	39.9/E	1,973.8/F
	SB	4/A			5/A		
	EB	22.5/C			102.3/F		
	WB	33.7/D			1,973.8/F		

The capacity of the roadway segment and its associated intersections influence travel times on the corridor. Under existing conditions, mainline TH 169 travel times between CSAH 14 and the CSAH 69 Overpass in the AM peak period are 5.1 minutes on southbound TH 169 and 5.0 minutes on northbound TH 169. In the PM peak period, mainline travel times between CSAH 14 and the CSAH 69 Overpass are 5.1 minutes on southbound TH 169 and 4.6 minutes along northbound TH 169.

In the future 2040 No Build condition, mainline travel times between CSAH 14 and the CSAH 69 Overpass in the AM peak period would increase to 6.6 minutes on northbound TH 169 and 9.6 minutes on eastbound TH 41 from the Minnesota River Bridge to northbound TH 169 at the CSAH 69 Overpass. In the PM peak period, mainline travel times along these corridors would increase to 6.2 minutes on southbound TH 169 and 5.1 minutes on eastbound TH 41 to northbound TH 169 (**Table 13**).

Table 13 – Corridor Travel Times by Route

Route Description	AM Peak Hour Travel Time (minutes)		PM Peak Hour Travel Time (minutes)	
	2015 Existing	2040 No Build	2015 Existing	2040 No Build
Southbound TH 169 – CSAH 69 Overpass to CSAH 14	5.1	5.4	5.1	6.2
Northbound TH 169 – CSAH 14 to CSAH 69	5.0	6.6	4.6	4.9
EB TH 41 to NB TH 169 – S. River Bridge to CSAH 69 (TH 169)	4.4	9.6	3.8	5.1
SB TH 169 to WB TH 41 – CSAH 69 to S. River Bridge (TH 41)	2.9	3.2	2.8	3.5

Future Build Condition
The 2040 build scenario assumes that a diverging diamond interchange would be constructed at the intersection of TH 169 and TH 41/CSAH 78 and an overpass over TH 169 (147th Street West) would be built north of CSAH 14, changing access to TH 169 at CSAH 14 to right-in/-out only. The speed limit on TH 169 would be changed from 55 miles per hour (mph) to 65 mph between CSAH 69 and TH 41, but speed limits on the other roadways and further to the south on TH 169 would be consistent with existing conditions and no build scenario assumptions. This scenario also includes a change in lane configuration at the TH 41/Dem Con Drive intersection (converting a right turn lane to a shared through-right lane), as well as closure of numerous access points in the study area and construction or extension of frontage roads in order to provide continued access to the roadway network.

With construction of the proposed project, corridor capacities on TH 169 at the northern end of the project are addressed because TH 169 would be a freeway in this location and the capacity of a freeway is higher than 42,000 vehicles per day. Additionally, there would be more travel lanes on TH 41 and CSAH 78 which would reduce the bottlenecks at the intersection with TH 169. As described in **Attachment D**, a volume-to-capacity (V/C) assessment was completed to compare the performance of alternatives in 2040. In the AM peak period, the No Build scenario would result in a highest V/C ratio of 1.13, compared with 0.49 under the proposed project. In the PM peak period, the No Build scenario would result in a highest V/C ratio of 1.06, compared with 0.42 under the proposed project.

In terms of peak period LOS at the intersections, the proposed project would improve operations to LOS B in the AM and LOS B in the PM at the intersection of TH 41/CSAH 78 with the southbound TH 169 ramp. The proposed project would improve operations to LOS A in the AM and LOS A in the PM at the intersection of TH 41/CSAH 78 with the northbound TH 169 ramp. It would also improve operations to LOS A in the AM and LOS A in the PM at TH 169 and CSAH 14. Individual movements at these intersections are also improved, with most operating at a LOS C or higher. **Table 14** shows LOS for the AM in 2040 build conditions and **Table 15** shows LOS for the PM in 2040 build conditions.

Table 14 – Existing and 2040 Build Intersection LOS (TH 41/CSAH 78 and CSAH 14) AM

Intersection	App.	Existing AM Peak Hour			2040 Build AM Peak Hour		
		Approach Delay	Intersection Delay	Minor Stop-Worst Approach	Approach Delay	Intersection Delay	Minor Stop-Worst Approach
TH 169 at TH 41/CSAH 78	NB	44.6/D	47.9/D				
	SB	27.4/C					
	EB	73.7/E					
	WB	64.2/E					
TH 169 at CSAH 14	NB	2.7/A	4.9/A	54.7/F			
	SB	3.3/A					
	EB	44.8/E					
	WB						
TH 41 at SB US 169 Ramp (signal)	SB				15.2/B	15.4/B	
	EB				12/B		
	WB				21.2/C		
TH 41 at NB TH 169 Ramp (signal)	NB				13.4/B	8.9/A	
	EB				6.7/A		
	WB				8.6/A		
TH 169 RI/RO at CSAH 14	NB				3.5/A	3.2/A	3.5/A
	SB				2.7/A		
	EB				2.1/A		
	WB				4.2/A		

Additionally, all maximum queues at the interchange ramp terminals would be less than 320 feet. All approaches at the modified right-in/-out TH 169/CSAH 14 intersection would operate at a LOS A (in both AM and PM peak periods). Of the other intersections studied, some would be closed as part of access management for the project and others indicate an overall acceptable LOS. In terms of individual approaches, many would have reduced delays compared to the existing and no build scenarios.

Following construction of the interchange, analysis indicates that travel times would be reduced compared to existing conditions and the no build scenario. As shown in **Table 16**, mainline travel times under the build scenario are anticipated to be shorter than those under existing conditions or the no build scenario for each route and for AM and PM peak periods. On both northbound and southbound TH 169 and in both the AM and PM peak hours, mainline travel times between the CSAH 69 Overpass and CSAH 14 are anticipated to improve to 3.4 minutes. Travel times on eastbound TH 41 from the Minnesota River Bridge to northbound TH 169 at the CSAH 69 Overpass would improve to 2.7 minutes in the AM peak hour and 2.6 minutes in the PM peak hour.

Table 15 – Existing and 2040 Build Intersection LOS (TH 41/CSAH 78 and CSAH 14) PM

Intersection	App.	Existing PM Peak Hour			2040 Build PM Peak Hour		
		Approach Delay	Intersection Delay	Minor Stop-Worst Approach	Approach Delay	Intersection Delay	Minor Stop-Worst Approach
TH 169 at TH 41/ CSAH 78	NB	33.5/C	37.6/D				
	SB	27.9/C					
	EB	54.2/D					
	WB	58.1/E					
TH 169 at CSAH 14	NB	1.7/A	3.9/A	33.7/D			
	SB	4/A					
	EB	22.5/C					
	WB	33.7/D					
TH 41 at SB US 169 Ramp (signal)	SB				14.8/B	13.5/B	
	EB				10.4/B		
	WB				19/B		
TH 41 at NB TH 169 Ramp (signal)	NB				13.1/B	8.8/A	
	EB				7.4/A		
	WB				8/A		
TH 169 RI/RO at CSAH 14	NB				1.7/A	3.3/A	4.4/A
	SB				4.4/A		
	EB				2.1/A		
	WB				4.3/A		

Table 16 - Mainline Travel Time Changes by Route

Route Description	AM Peak Hour Travel Time (minutes)			PM Peak Hour Travel Time (minutes)		
	2015	2040		2015	2040	
	Existing	No Build	Build	Existing	No Build	Build
Southbound TH 169 – CSAH 69 Overpass to CSAH 14	5.1	5.4	3.4	5.1	6.2	3.4
Northbound TH 169 – CSAH 14 to CSAH 69	5.0	6.6	3.4	4.6	4.9	3.4
EB TH 41 to NB TH 169 – S. River Bridge to CSAH 69 (TH 169)	4.4	9.6	2.7	3.8	5.1	2.6
SB TH 169 to WB TH 41 – CSAH 69 to S. River Bridge (TH 41)	2.9	3.2	2.6	2.8	3.5	2.5

Access Changes

The proposed project would result in numerous access changes. Within the project area, direct public street access to TH 169 would be limited to two locations: the proposed interchange at TH 41/CSAH 78 and right-in/right-out access at CSAH 14. Access to and from TH 169 from the private driveway for Anchor Block/Bryan Rock Products would be modified to provide right-in/right-out access to TH 169. All other public road and private driveway accesses on

TH 169 between CSAH 14 and CSAH 69 would be closed and redirected to the local frontage roadway network. See **Figures 5–7** for proposed access closures.

Access to CSAH 78 within one-quarter mile of the interchange would also be modified. This includes closure of Ventura Court, two commercial business driveways, and one gravel field entrance. Access to Ventura Court and the business along the south side of CSAH 78 would be provided from the extended Emery Way. Access to the business north of CSAH 78 would be provided by the realigned Emery Way, 128th Street W, and Marine Drive. A replacement field entrance would also be constructed from the realigned Emery Way.

Traffic During Construction
Construction staging has not yet been finalized for the project. However, it is anticipated that detours would be required for local roadways. It is not anticipated that detours would be required for traffic on TH 169 or TH 41. There would be decreases in throughput on all roadways during construction; therefore, there would be delays and congestion for those traveling within and through the area. Staging and coordination during the Renaissance Festival (12 weekends in August-October) would be critical as traffic levels increase significantly on TH 169 and 145th Street during festival operations.

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

A primary need for the project is related to mobility, and completion of the project is anticipated to reduce congestion in the area; many of the locations currently exhibiting long delays and operating at unacceptable LOS would be improved by the construction of a diverging diamond interchange, an overpass, and associated access management improvements. Where the project would close public and private access to TH 169 or CSAH 78, new or extended frontage roads and/or relocated driveways would be constructed to ensure continued access to properties in the area, as described above under **Section 18b**.

To minimize impacts during construction, the extent of any detour would be minimized to the extent practicable. Scott County would coordinate with MnDOT, Louisville Township, Jackson Township, and area businesses to maintain direct access to parcels during construction of ramps, bridges, and frontage roads. A traffic management plan would be developed and implemented, and additional information would be provided to the public as it becomes available.

Efforts would include coordination with management from the Renaissance Festival, which is located just west of the project, but utilizes transportation facilities that would be under construction. It is anticipated that construction impacts would only occur for 2018 for the Renaissance Festival. The festival should be relocated to its new site in 2019.

19. Cumulative Potential Effects:

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.

Cumulative effects are defined as "the effect on the environment that results from the incremental effects of a project in addition to other projects in the environmentally relevant area that might reasonably be expected to affect the same environmental resources, including future projects planned or for which a basis of expectation has been laid, regardless of who undertakes the projects or what jurisdictions have authority over the projects."

There are two general geographic scales relevant to the project. Some effects are local and would be limited to the project area, while others could spread to other areas based on the nature of the resource or effect (e.g. water quality, traffic). There are also two general timeframes in which project-related environmental effects could occur: effects that are related to construction activities but could last beyond the construction period, and effects that are related to long-term operation of the project. Project-related environmental effects that could combine with other environmental effects are summarized in **Table 17**, along with the relevant geographic extent.

Table 17 – Project-Related Environmental Effects

Reference (Item in EAW)	Topic/Issue	Project-Related Environmental Effects	Geographic Extent and Future Potential Impacts
Item 9	Land Use	Reduction in farmland due to development of commercial/industrial zoned land	Throughout project area. Timing is unknown. One development proposal has been identified for parcels located along the east side of the corridor. This development is located just south of 133rd Street and Lano Implement and comprises two parcels with a total of 41.1 acres of land. One of the parcels – 13.8 acres is considered agricultural use today. Future land use and zoning have this parcel identified as commercial in the future. No other specific development plans have been submitted for agricultural areas – it is possible that construction of the frontage roads would progress the timeline in which land is redeveloped. However, sewer and water are not currently provided within the project area and there is no definitive timeframe to do so. As a result – conversion of farmland would be at lower densities/impacts than in an urbanized area.
Item 10	Geology, Soils and Topography	Disturbed ground/soils	Throughout project area. Timing is unknown. One development proposal has been identified for parcels located along the east side of the corridor. This development is located just south of 133rd Street and Lano Implement and comprises two parcels with a total of 41.1 acres of land. One of the parcels – 13.8 acres is considered agricultural use today. Site plans have not been approved for this location – but soils would be disturbed in this area and grading of the site would occur.
Item 11	Water Resources	▪ Abandonment of three wells ▪ Increase in impervious surface (21.1 acres) ▪ Water appropriation during construction ▪ Impacts to wetlands (2.77 acres)	Throughout project area; wetland impacts largely in southern portion of project area. Future development in the area could result in additional wetland impacts to the south. At the time of development, wetlands would be required to be delineated and impacts would be documented. Future development in the area would result in additional impervious surface. Each development would be required to treat and/or infiltrate water on site per Scott County and/or City of Shakopee rules and guidelines as well as watershed district/management organization requirements.

Reference (Item in EAW)	Topic/Issue	Project-Related Environmental Effects	Geographic Extent and Future Potential Impacts
Item 12	Contamination / Hazardous Materials	Potential disturbance of contamination at 19 sites and removal of regulated materials from structures at six properties.	Potentially contaminated properties: Throughout the project corridor, but concentrated around the TH 169/TH 41/CSAH 78 intersection and the TH 169/CSAH 14 intersection. Regulated waste in structures: Northeast and southeast of the TH 169 intersection with TH 41/CSAH 78 and northeast of the TH 169 intersection with CSAH 14. Future development and/or redevelopment would have the potential to disturb existing contaminated sites identified in this document. Should those sites be developed, property owners would need to address contaminated sites at that time.
Item 13	Fish, wildlife, plant communities, and sensitive ecological resources	▪ Native plant communities and sites of biodiversity significance ▪ Tree removal – bat habitat	Native plant communities and sites of biodiversity significance are located outside the project area, primarily to the west (towards the Minnesota River Valley) Tree removal primarily in the southern half of the project area. Future projects within the project area would have similar impacts as the proposed project. There are few natural resources left in the area due to previous disturbance. Trees are the primary resource that would be impacted and/or removed.
Item 17	Noise	Modeled noise levels increase and exceed federal and state standards	Receptors along TH 169, TH 41, and CSAH 78 within the project area experience sound increases. Future development would have the potential to result in additional traffic and noise in the corridor. This document took into account development of land within the project area and accounted for it in traffic projections and noise. If there are additional highway projects utilizing federal funding noise would have to be evaluated as part of the project. If MnDOT were to initiate a project it would also consider noise impacts along its highways (TH 169 and TH 41).
Item 18	Transportation	▪ Improved operations, mobility, and safety ▪ Access closures and modifications ▪ Disruptions to traffic flow during construction	Impacts are throughout the project area. Future development was expected to generate additional traffic which was considered as part of the development of this document. Future development could include construction of a park and ride lot within or near the project area.

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

The City of Shakopee has an orderly annexation agreement with Jackson Township. The comprehensive plans for Scott County and the City of Shakopee within the project area show primarily industrial and commercial future land uses. Depending on a number of factors, including the timeline for completion of mining activities in the area, the pace of annexation, and market forces, development is anticipated to occur in this area prior to 2040, particularly in the area northeast of the TH 169 intersection with TH 41/CSAH 78 and, to a lesser extent, southeast of the intersection. The analysis in this document took into consideration future development opportunities for the purposes of traffic operations and travel times.

Transit service to the project area also has the potential to occur by 2040. As previously noted, it is not anticipated that facilities beyond a potential park and ride lot would be constructed in the project area.

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.

As described above, the pace and extent of future industrial and commercial development within the project area is unknown, and depends on a number of factors. Nonetheless, such development would be anticipated to result in environmental effects including conversion of farmland, ground disturbance, water quality (increase in impervious surface), potential wetland impacts in the southern portion of the project area, vegetation removal – primarily in the southern half of the project area, and increased traffic. These effects could combine with effects associated with construction of the intersection improvement project.

Traffic forecasts for the project took development into consideration of future traffic volumes when developing forecasts for operations under the future no build and future build scenarios (along with broader socio-economic trends, including population and employment growth across the county and metropolitan area). Therefore, the results described under Item 18 (and in **Attachments B, C,** and **D**) account for traffic associated with some development occurring within the study area.

Effects associated with construction of a park and ride facility would depend largely on the specific location of the facility, but its operation could add to effects in the area associated with traffic, noise, and air quality.

Given the limited environmental resources within the overall project area, few effects would be identified with natural or cultural resources.

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

This project is not believed to cause any anticipated adverse environmental impacts that have not been addressed by this EAW or in the accompanying Categorical Exclusion related to federal issues.

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 4-10-17

Title Assistant Division Director - ESD

Attachments

Attachment A – Purpose and Need Report

Attachment B – Traffic Forecasts Memo

Attachment C – Existing Conditions and No Build Traffic Operations Memo

Attachment D – Build Alternatives Evaluation Traffic Memo

Attachment E – Noise Analysis Memo

Attachment F – Picha Creek Floodplain Assessment and Hydraulic Analysis

Attachment G – Risk Assessments

Attachment H – Soils Maps

Attachment I – Well Logs

Attachment J – Preliminary Drainage Reports

Attachment K – Wetland Delineation

Attachment L – Wetland Assessment and Two Part Finding

Attachment M – Limited Phase I Site Assessments

Attachment N – DNR and MnDOT OES Correspondence

Attachment O – MnDOT Cultural Resource Unit Response

Attachment A – Purpose and Need Memo

Building a legacy – *your* legacy.

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Technical Memorandum

To: ***Craig Jenson***
Lisa Freese, AICP

From: ***Jack Corkle, AICP, PTP***
Adam Smith, AICP

Date: ***February 10, 2017***

Re: ***TH 169 and TH 41/CSAH 78 and TH 169/CSAH 14 Intersection Improvements***
Purpose and Need
S.P. 070-596-013/7005-121/7009-81/7010-109
WSB Project No. 03212-000

Project Study Area and Key Route Information

The proposed project is located in Jackson and Louisville Townships in Scott County Minnesota. For purposes of this document, US Highway 169 will be referred to as Trunk Highway (TH) 169 and will be referred to as the north-south roadway. TH 41, Scott County State Aid Highway (CSAH) 78 and CSAH 14, the cross roadways at the intersections with TH 169, will be referred to as the east-west routes. For purposes of this document, the highway section termini (study area) extend from CSAH 14 north to CSAH 69 along TH 169. From west to east, the termini (study area) extend from the Union Pacific (UP) Railroad to CSAH 69. **Figure 1** shows the study area, the primary transportation corridors and existing developed areas.

Basic information about the key routes includes the following:

- TH 169 is a principal arterial roadway and is designed as a four-lane expressway south of CSAH 69. This means that the corridor has at-grade driveways and intersections and includes traffic signals at key access points. From CSAH 69 to the north, TH 169 is a freeway.

- TH 41 is a principal arterial roadway that serves as a regional river crossing to the Minnesota River between Scott and Carver Counties. It is a two-lane roadway from the City of Chaska on the north side of the Minnesota River in Carver County until Dem Con Drive within the project limits. From Dem Con Drive to TH 169 it is a three-lane roadway. Private driveway access is limited on TH 41 within Scott County; however, there are at-grade intersections with public streets.

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Figure 1: Project Study Area

US 169/TH 41/CSAH 78 Improvements

Scott County, MN

0 2,000 Feet

- CSAH 78 is currently a two-lane, minor arterial roadway east of the TH 169 intersection. There are at-grade connecting roadways and driveways on this corridor. CSAH 78 is expected to take on greater importance in the regional transportation network in the future. The Scott County 2030 Transportation Plan classifies CSAH 78 as a future principal arterial due to its connection to CSAH 42 (an existing principal arterial), creating an extension of the major east-west corridor through the county.

- CSAH 14 is an approximately 4.5-mile two-lane, minor arterial roadway connecting TH 169 and CSAH 17. CSAH 14 is a rural roadway that serves adjacent residential and agricultural uses, as well as provides a connection to Prior Lake and the southern portion of Shakopee from TH 169.

None of the routes currently have transit service beyond dial-a-ride facilities. Scott County and the Minnesota Department of Transportation (MnDOT) are evaluating transit and managed lane options on TH 169; however, no determination has been made on the type of service or improvements that will be made within the project area. It is not expected that managed lanes or fixed guideways would extend to the project limits. Potentially a park and ride facility could be considered within the general study area.

Project Context

The project area is characterized by a unique set of circumstances. To the west of TH 169 there are a number of mining, industrial, and landfill activities that are expected to continue into the future (over the next 20 plus years). These uses attract and generate a large number of heavy truck trips. Along with the industrial uses, there is a manufactured home community, a hotel, and a limited amount of retail. Further to the south, closer to CSAH 14, areas west of TH 169 still include industrial/mining uses, but additionally there is park and wildlife refuge uses. To the east of TH 169, existing land uses are primarily agricultural with some residential uses and a limited number of commercial and light industrial/contractor yard activities. Most of the existing development immediately on the east side of TH 169 is focused at the intersection with CSAH 78 and in the area just north of 145th Street to CSAH 14.

Figure 2 shows existing land uses within and near the study area. The area north of TH 41 is expected to begin urbanizing over the next 10-20 years as development from Shakopee continues south. A mix of industrial, commercial and residential land uses are expected in the future. South of TH 41, land is guided for continued rural commercial/industrial and light industrial/contractor yard uses. **Figure 3** shows proposed future land uses from the Scott County Comprehensive Plan.

Traffic within the study area is also unique. TH 169 and TH 41 serve as key freight corridors - both roadways have a high percent of truck traffic which fluctuates by time of year (between 8 and 15 percent – October/November 2015). TH 169 serves statewide freight movements destined for the Twin Cities as well as agricultural freight destined to the Ports of Savage (access to the Ports is provided off of TH 169 north of the project area). TH 41 is a regional river crossing that also has freight traffic. Freight on this corridor has statewide connections (serving agricultural areas to the west) as well as local freight (gravel, landfill/recycling, local agriculture and building/construction materials). CSAH 78 is identified as a future principal arterial by Scott County and functions as the key east-west route servicing the planned urbanized areas east of TH 169. CSAH 14 provides an alternate route for traffic, and in particular trucks, looking to avoid the TH 169/TH 41/CSAH 78 intersection.

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Figure 2: Existing Land Use

US 169/TH 41/CSAH 78 Improvements

Scott County, MN

0 2,000 Feet

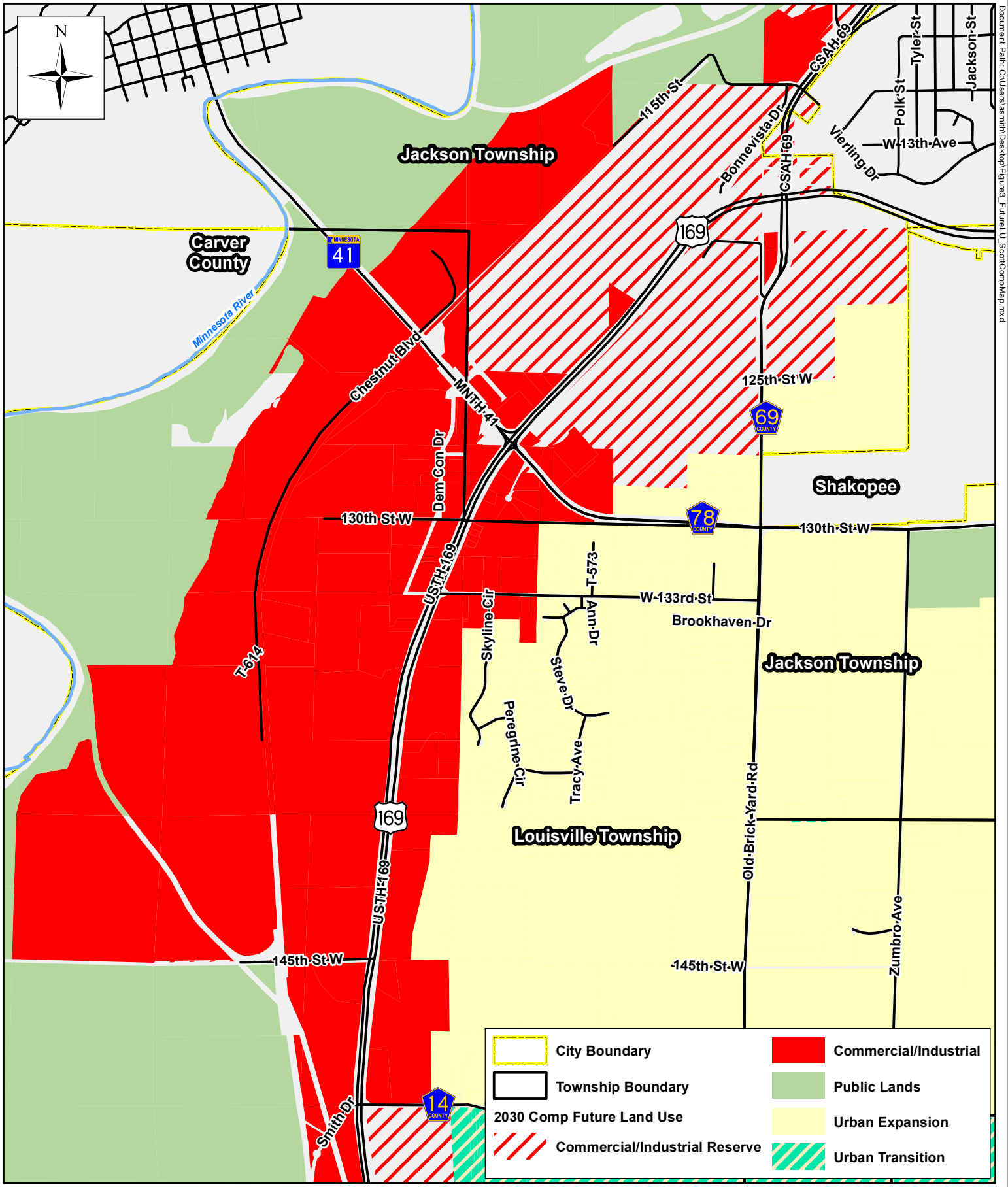

Figure 3: Future Land Use

US 169/TH 41/CSAH 78 Improvements

Scott County, MN

Scott

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Project History

Improvements to this segment of TH 169 and the intersections of TH 169 and TH 41/CSAH 78 and TH 169/CSAH 14 have been recognized in a number of local, regional, and state studies and plans since the late 1990s. Originally studies recommended upgrading TH 41 to a four-lane roadway, making intersection improvements such as lengthening turn lanes, expanding intersection geometrics to include dual left-turn lanes on TH 41, closing nearby access to private property, and modifying traffic signal timing. As time progressed additional development occurred, traffic volumes on TH 169 and TH 41 increased and additional studies were completed. The TH 169 Interregional Corridor Study in 2002 recommended the transition of TH 169 to a limited access highway from Belle Plaine to Edina. The TH 169 Frontage Road Study in 2003 identified potential frontage road alignments that serve commercial and industrial land uses in the corridor and also looked at potential interchange designs at TH 169 and CSAH 14. Other studies included the Congestion Management Safety Plan – Phase II in 2013 and local comprehensive plans. All of these plans recommended replacing the TH 169 and TH 41/CSAH 78 at-grade intersection with an interchange and decreasing access to TH 169 in order to better facilitate traffic movements that were anticipated in the future.

It should also be noted that while there were improvements noted as being needed at the intersection of TH 169 and TH 41/CSAH 78 as part of studies and plans, there were also larger regional and statewide efforts underway to identify a new regional Minnesota River Crossing that studied a range of alternatives. The efforts to study a new regional Minnesota River Crossing began in 1970 when MnDOT commissioned the Corridor Location Study for Trunk Highway 169, 212, 41, which examined the long-term need to improve and realign these roadways within the Chanhassen/Chaska/Shakopee/Jackson Township area.

That study was followed by a draft environmental impact statement (DEIS) for TH 41 in 1974. Those studies did not advance activities on TH 41. In 2004 a Scoping Document (SD) and Draft Scoping Decision Document (DSDD) were prepared. The new documents were consistent with current environmental regulations. Following the SD/DSDD MnDOT completed a new Tier 1 DEIS for TH 41 and a final tier one environmental impact statement (FEIS). The Tier 1 FEIS was completed in 2015 and is intended to be used for right of way preservation for a future regional river crossing of the Minnesota River.

As part of the Tier 1 FEIS document, a preferred alignment was identified that included using portions of existing TH 41 as part of the new regional river crossing. The connection of the new regional river crossing is at the existing TH 169 and TH 41/CSAH 78 intersection with a local movement interchange combined into the design that is shifted to the south of the existing intersection. The Tier 1 FEIS gives no expectations on timing of construction. There is no funding identified for right of way preservation or construction in MnDOT's or the Metropolitan Council's 2040 transportation plans. Because plans do not provide an official timeframe, construction is expected to be beyond the 20-year planning horizon.

Project Purpose

The purpose of this project is to provide added safety, improved traffic flow both now and in the future for the intersections of TH 169 and TH 41/CSAH 78 and TH 169/CSAH 14 while also exploring opportunities for non-motorized traffic to cross the highway corridors and addressing stormwater deficiencies.

Need for the Proposed TH 169 and TH 41/CSAH 78 and TH 169/CSAH 14 Intersection Improvements

As described previously, the need to address congestion at the existing intersection of TH 169 and TH 41/CSAH 78 has been documented in numerous reports and studies, with the recommendation for a grade separated solution emerging in the early 2000s. Since then, additional traffic growth has occurred on TH 169 and CSAH 78. Traffic volumes on TH 41 have remained consistent (the corridor is capacity constrained as a two-lane roadway).

While future traffic is expected to remain fairly static on TH 41, traffic volume increases on TH 169 and CSAH 78 are expected as additional development occurs within Scott and Carver Counties and as freight traffic continues to grow statewide. Scott County has been one of the fastest growing counties in the state since 1990. Future growth for the area as indicated in Metropolitan Council population and employment projections expect the county to add approximately another 80,000 people and 26,000 jobs by 2040. Carver County (located at the northern end of TH 41 and contributing to traffic flow at the TH 169 and TH 41/CSAH 78 intersection) is also expected to experience growth of approximately 71,000 people and 20,000 jobs. Along with the expected regional growth, statewide growth to the south (Mankato, St. Peter, Le Sueur) and growth in freight movements between the Twin Cities metropolitan area and Greater Minnesota will contribute to increased traffic within the project area.

Based upon trends and patterns identified in previous plans, expected growth within and near the study area, and continued freight demands on both TH 169 and TH 41, several different needs have been established for improvements at the TH 169 and TH 41/CSAH 78 and TH 169/CSAH 14 intersections. These needs have been broken down into primary needs and other considerations - they are summarized below and explained in greater detail in the sections that follow.

Primary Needs (summary)

- Safety – MnDOT annually summarizes crash data on over 8,000 highway intersections across the state. The TH 169 and TH 41/CSAH 78 intersection ranks 78th by crash-cost for the 2011-2013 time period (annual crash cost was approximately $650,000). The intersection has crash and severity rates that are higher than statewide averages for similar intersections.

  Along with crashes at the intersection of TH 169 and TH 41/CSAH 78, there are direct driveways and public street access off of TH 169 that contribute to safety concerns. Crashes at these locations, including CSAH 14, are expected to increase as traffic volumes (and corresponding delays) increase on TH 169.

- Mobility – There are two contributing factors to poor mobility on TH 169 and at the intersection of TH 169 and TH 41/CSAH 78. These include the amount of existing and proposed traffic and the high percent of truck traffic for the current design of the intersection. Traffic volumes at the intersection are starting to exceed their planning-level capacities which is reflected in unacceptable levels of service for key movements. Truck traffic (which fluctuates based on the time of the year) can exceed 15 percent of the daily volumes during the peak freight months which also contributes to the unacceptable levels of service for key movements.

  Along with general capacity constraints, direct driveway locations and public street accesses off of TH 169 also contribute to mobility problems due to their proximity to the TH 169 and TH 41/CSAH 78 intersection and other nearby roadways. Future delays at these cross streets, including CSAH 14, are expected to increase substantially, particularly for left-turn and through movements, as demonstrated below in **Table 12**.

Other Considerations (summary)

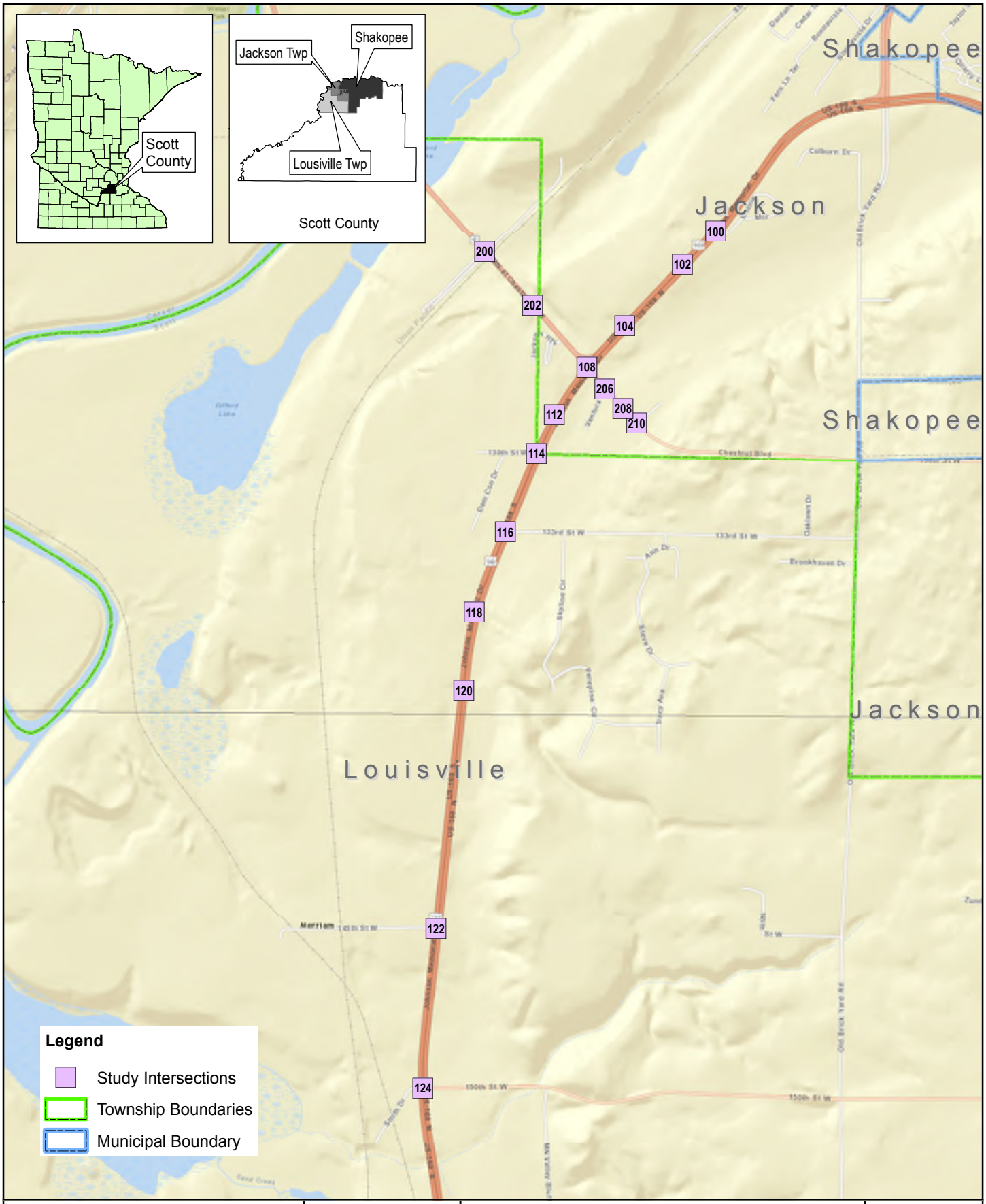
- Non-Motorized Accommodations – Currently there are few pedestrian and bicycle accommodations within the project area. Accommodations are limited to painted crosswalks at the existing signalized intersections on TH 41. With existing geometrics and lack of supporting infrastructure (no sidewalks or trails) it is challenging for pedestrians to cross the corridors in the time allocated in a single signal phase. This is expected to worsen as additional development occurs and there are more attractions and traffic generators on both sides of TH 169 that would increase the amount of non-motorized traffic trying to cross the highway corridors.

- Stormwater deficiencies – Current stormwater standards for treatment and infiltration within the project limits are not being met. Much of the infrastructure (TH 169, TH 41, CSAH 78, etc.) was in place prior to current guidelines and requirements. As a result, there are situations where current standards are not being met and there is some localized backing up of water and pooling. This is especially true in the southern portion of the project limits. Picha Creek, which flows east-west in the project area, has its flow constrained by existing culverts located under TH 169 and under the Union Pacific Railway spur line on the west side of TH 169.

- Consistency with other plans – Other plans identified the need for improvements along TH 169 and at the intersections with TH 41/CSAH 78 and CSAH 14, as well as regional improvements for a new crossing of the Minnesota River, including a Tier 1 EIS that was completed for right of way acquisition purposes for a new river crossing.

Primary Need – Safety

Crash data for the project was collected for the most recent five years (January 1, 2010 – December 31, 2014). During the five-year period, 260 crashes were recorded along TH 169, TH 41, CSAH 78, and CSAH 14. **Figure 4** shows the intersections within the study area.



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Project: WSBAS 134559
Print Date: 12/17/2015

Map by: msteuernagel
Projection:Scott County Coordinates
Source: SEH, Bing, MnDOT

Project Location

US 169 & TH 41 Improvements
Shakopee, Minnesota

Figure 4

This map is neither a legally recorded map nor a survey map and is not intended to be used as one. This map is a compilation of records, information, and data gathered from various sources listed on this map and is to be used for reference purposes only. SEH does not warrant that the Geographic Information System (GIS) Data used to prepare are error free, and SEH does not represent that the GIS Data can be used for navigational, tracking, or any other purpose requiring exacting measurement of distance or direction or precision in the depiction of geographic features. The user of this map acknowledges that SEH shall not be liable for any damages which arise out of the user's access or use of data provided.

Crash Types

Table 1 lists the intersections and shows the number of crashes at each intersection by crash type within the study area. Of the 260 crashes within the study area, 189 of them (73 percent) occurred at intersections. There were no crashes in the five-year period that included pedestrians or bicyclists.

Table 1 – Intersection Crashes by Type (crashes between January 1, 2010 and December 31, 2014)

Int. ID from Figure 4	Location	Rear End	Left Turn	Right Angle	Side Swipe	Head On	Run Off Road	Other	Total
100	TH 169 and Mobile Manor / Mom's Landscaping	6	--	--	--	--	1	1	8
102	TH 169 and private residential driveway (west side)	1	1	--	--	--	--	--	2
104	TH 169 and Holiday Gas Station	5	--	1	--	--	--	--	6
108	TH 169 and TH 41/CSAH 78[1]	80	2	8	12	--	3	2	107
112	TH 169 and Value Inn	2	--	1	1	--	--	1	5
114	TH 169 and 130th Street	3	1	1	--	--	1	--	6
116	TH 169 and 133rd Street	--	1	--	--	--	--	1	2
118	TH 169 and Bryan Rock / Anchor Block	--	--	--	--	--	--	--	0
120	TH 169 and Drew's Concrete	--	--	--	--	--	--	--	0
122	TH 169 and 145th Street	1	--	--	--	--	--	1	2
124	TH 169 and CSAH 14 (150th Street)	2	--	2	--	--	2	1	7
200	TH 41 and mining driveways (north of railroad)	12	--	1	2	--	1	1	17
202	TH 41 and Dem Con Drive[1]	22	--	3	1	--	--	1	27
206	CSAH 78 and Ventura Court	--	--	--	--	--	--	--	0
210	CSAH 78 and Emery Way	--	--	--	--	--	--	--	0
	Total	**134**	**5**	**17**	**16**	**0**	**8**	**9**	**189**

[1] Signalized intersection – all other locations are side street stop controlled.

As shown in **Table 1**, the intersections with the most crashes (and which also have the highest crash and severity rates - see **Table 3**) are located at TH 169 and TH 41/CSAH 78, TH 41 and Dem Con Drive, and at the driveways north of the railway tracks. A vast majority of the crashes that occur at these three locations (71 percent) are rear end crashes. Rear end crashes are generally present in locations where there is congestion and longer traffic queues. It can also be reflective of isolated signalized intersections or transitional areas where a corridor moves from a freeway to an expressway with a traffic signal a short distance away from the last interchange location.

The second most frequent crash type is the right angle crash. There were 17 of these crashes at intersections on the corridors, with approximately half of them occurring at the TH 169 and TH 41/CSAH 78 intersection. Right angle crashes occur when traffic from one direction fails to yield the right of way to traffic travelling perpendicularly.

Charts 1 through **3** show the breakdown of crash types for the intersections with the most crashes as well as the highest crash and severity rates in the study area (see **Table 3**). Please note – crash data is for the years 2010 – 2014.

Chart 1 – Intersection of TH 169 and TH 41/CSAH 78 (intersection # 108 on Figure 4)

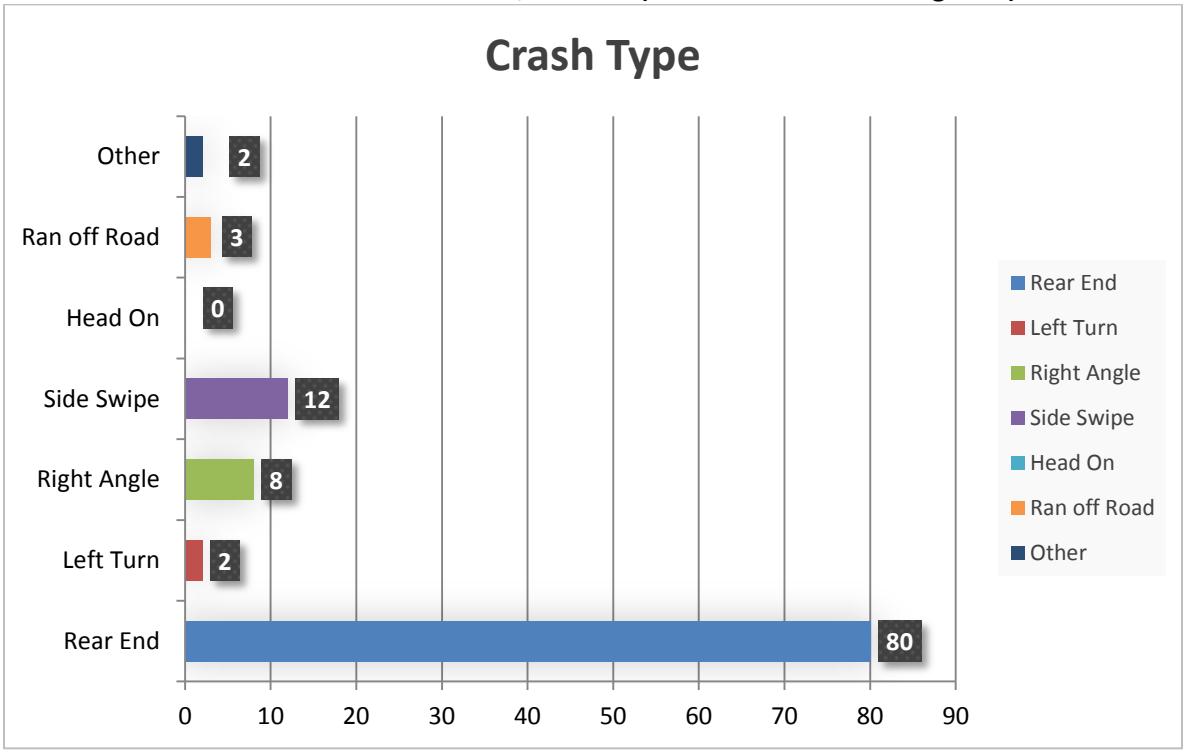


Chart 2 – Intersection of TH 41 and Dem Con Drive (intersection #202 on Figure 4)

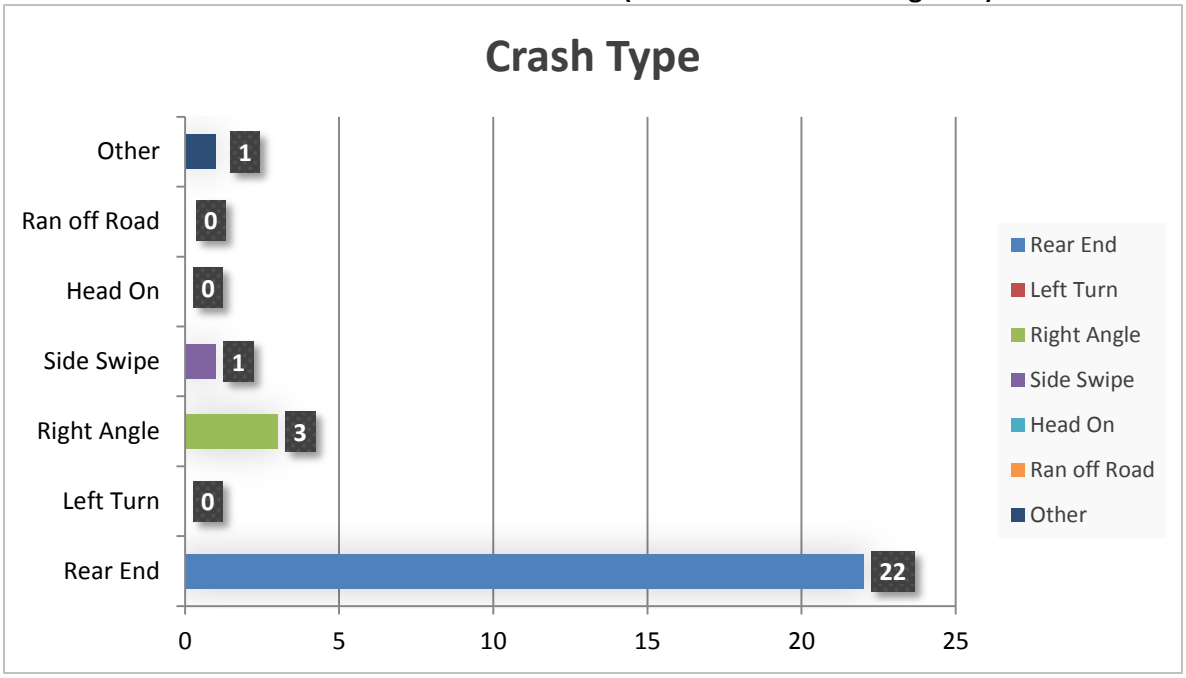
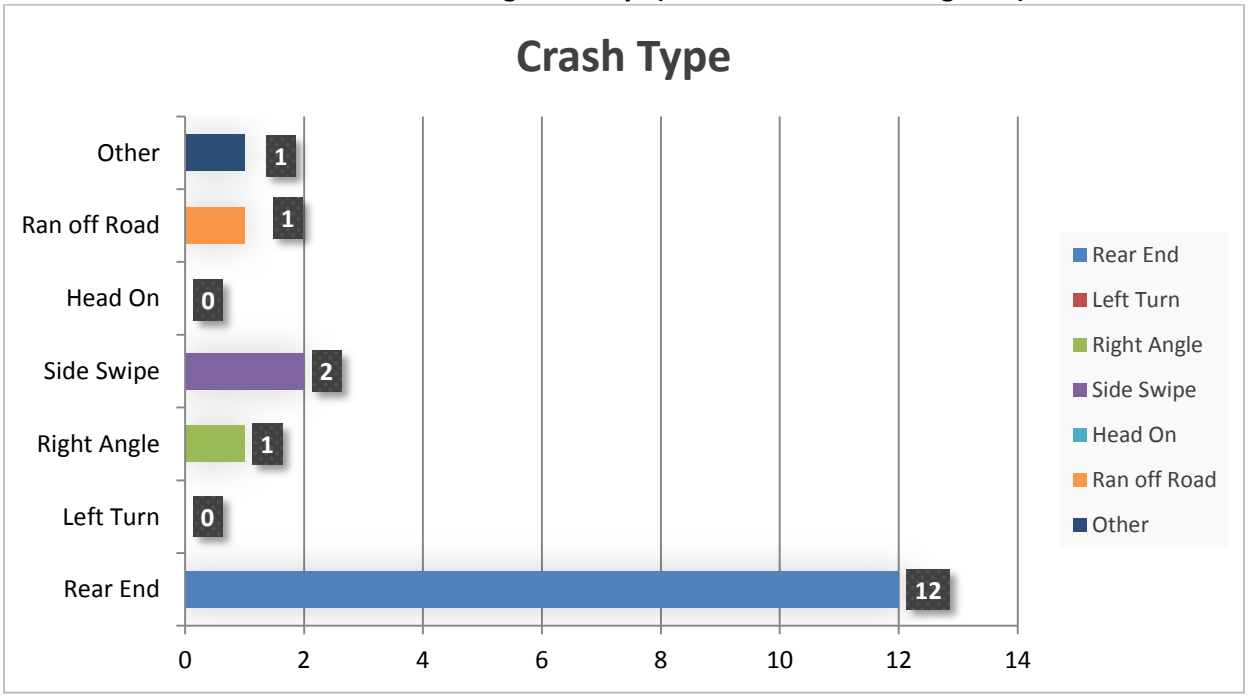


Chart 3 – Intersection of TH 41 and mining driveways (intersection #200 on Figure 4)



Along with identifying crashes by type at the intersections within the study area, an analysis was completed of the types of crashes occurring along the segments of roadways between the intersections. **Table 2** lists the highway segments and summarizes crash types for non-intersection locations. As shown in **Table 2**, 71 crashes (of the 260 that occurred in the study area in the past five years) occurred on the roadway segments between intersections. Segments with the most crashes were located on TH 169 between CSAH 14 and CSAH 69.

Table 2 – Segment Crashes by Type (crashes between January 1, 2010 and December 31, 2014)

Location	Road Section Type	Rear End	Left Turn	Right Angle	Side Swipe	Head On	Run Off Road	Other	Total
TH 169 between CSAH 69 and TH 41/CSAH 78	Rural expressway	16	1	1	1	0	6	1	26
TH 169 between TH 41/CSAH 78 and CSAH 14	Rural expressway	19	2	2	1	1	6	6	37
TH 41 between the railroad and Dem Con Drive	2-lane rural >8,000 ADT	3	--	--	--	--	--	1	4
TH 41 between Dem Con Drive and TH 169	4-lane urban (divided)	1	--	--	2	--	--	1	4
CSAH 78 between TH 169 and a half a mile to the east	2-lane rural 1,500 – 4,999 ADT	--	--	--	--	--	--	--	0
Total		**39**	**3**	**3**	**4**	**1**	**12**	**9**	**71**

Similar to the intersection crashes, a majority of the segment crashes (39 of the 71) were rear end crashes (**Table 2**). This is likely a result of traffic queues from intersections backing up and from vehicles making right- and/or left-turns off of the corridor at locations where there are not dedicated turn lanes. The second most frequent crash type on the segments was the run off the road crash (12 of 39). All of the run off the road crashes occurred on TH 169.

Additional data was explored to better understand the role that heavy commercial trucks played in crashes at the intersection with TH 169 and TH 41/CSAH 78, TH 41 and Dem Con Drive and TH 41 and the driveways adjacent to the railway due to the volume of trucks using these intersections. A review of the data indicated a total of 26 crashes involved heavy commercial vehicles, approximately 10 percent of all crashes. The two highest truck crash locations were the intersections of TH 169 and TH 41/CSAH 78 where 8 crashes occurred and at TH 41 and Dem Con Drive where 6 crashes occurred. At TH 41 and Dem Con Drive, heavy commercial trucks were involved in approximately 22 percent of all collisions.

Crash and Severity Rates

In addition to identifying crash types, the number and severity of crashes were also reviewed to calculate crash and severity rates for intersections and corridor segments. Crash rates are expressed as the number of crashes per million entering vehicles at an intersection and crashes per million vehicles miles along a segment. Severity rates are a weighted average rate based on the different crash severity types. Crash severity comprises five unique severity types including: fatal, incapacitating injury (Type A), non-incapacitating injury (Type B), possible injury (Type C), or property damage crash.

The crash and severity rates for the study area were compared to MnDOT statewide average rates for similar intersection and roadway segments. Critical crash and severity rates were calculated for each intersection and segment. Critical crash and severity rates are based on the amount of vehicle exposure.

If an intersection or segment crash rate is at or above the critical rate, it indicates a sustained crash problem and these locations are considered to be unsafe.

Table 3 on the following page provides information for crash and severity rates at all of the intersections on TH 169, TH 41 and CSAH 78 within the study area. As shown in **Table 3**, there are three locations where crash and severity rates were above the statewide average. These intersections/driveways included the TH 169 and TH 41/CSAH 78 intersection, the intersection of TH 41 and Dem Con Drive and the gravel mining driveways on TH 41 north of the railroad. All three locations were also compared to calculated critical rates. Two of the intersections – TH 169 and TH 41/CSAH 78 and TH 41 and Dem Con Drive are also above the calculated critical rates, indicating that there is a sustained problem at these locations. The intersection with TH 41 and the gravel mining driveways is at the calculated severity rate (which is indicative of a problem) and is just below the critical crash rate – suggesting that this intersection also has a sustained problem. The remaining intersections/driveways have crash rates that are below the statewide average.

While a number of the private driveways and local street intersections on TH 169 (Mobile Manor/Mom's Landscaping, residential driveway, Holiday Driveway, Value Inn, 130th, 133rd, etc.) did not have a high number of crashes individually, cumulatively they contributed to approximately 21 percent of the intersection crashes on TH 169 (there were a total of 145 crashes on TH 169). **Figure 5** shows the relationship between access concentration and crashes.

On TH 169 there are six access points between CSAH 69 and the TH 41/CSAH 78 intersection. South of the TH 41/CSAH 78 intersection to CSAH 14 there are 19 access points. Please note, four of the 25 access points are field entrances.

Figure 5 – Access Concentration and Crashes

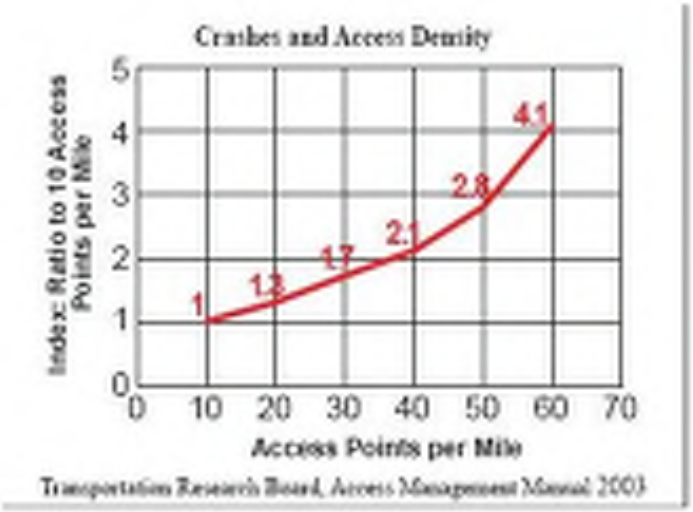


Table 4 provides information for crashes on the segments between intersections for the study area. All of the segment crash and severity rates are below the statewide average, with the northernmost segment of TH 169 closest to the statewide average for crash and severity rates. This segment is a very short segment and may be somewhat inflated due to its limited length.

Table 3 – Intersection Crash Severity (crashes between January 1, 2010 and December 31, 2014)

Intersection ID from Figure 4	Location	Crash Severity						Intersection Rate[2]		State Average Rate		Calculated Critical Rate[3]		Annual Crash Cost[4]
		Fatal	Type A	Type B	Type C	Property	Total	Crash Rate	Severity Rate	Crash Rate	Severity Rate	Critical Crash Rate	Critical Severity Rate	
100	TH 169 and Mobile Manor / Mom's Landscaping	--	--	--	4	4	8	0.15	0.22	0.26	0.42	0.44	0.66	$72,480
102	TH 169 and private residential driveway (west side)	--	--	--	--	2	2	0.04	0.04	0.26	0.42	0.44	0.66	$3,040
104	TH 169 and Holiday Gas Station	--	--	--	2	4	6	0.11	0.15	0.26	0.42	0.44	0.66	$39,280
108	TH 169 and TH 41/CSAH 78[1]	--	1	5	22	79	107	**1.46**	**1.94**	0.41	0.59	**0.62**	**0.83**	$769,280
112	TH 169 and Value Inn	--	--	1	2	2	5	0.07	0.12	0.26	0.42	0.42	0.62	$70,240
114	TH 169 and 130th Street	--	--	--	1	5	6	0.11	0.13	0.26	0.42	0.45	0.66	$24,200
116	TH 169 and 133rd Street	--	--	--	--	2	2	0.04	0.04	0.26	0.42	0.45	0.66	$3,040
118	TH 169 and Bryan Rock / Anchor Block	--	--	--	--	--	0	0.00	0.00	0.26	0.42	0.45	0.66	$0
120	TH 169 and Drew's Concrete	--	--	--	--	--	0	0.00	0.00	0.26	0.42	0.45	0.66	$0
122	TH 169 and 145th Street	--	--	1	0	1	2	0.04	0.08	0.26	0.42	0.45	0.66	$35,520
124	TH 169 and CSAH 14 (150th Street)	--	--	--	3	4	7	0.13	0.19	0.26	0.42	0.45	0.66	$55,880
200	TH 41 and Gravel Mining Driveways (north of railroad)	--	--	2	4	11	17	**0.49**	**0.72**	0.26	0.42	0.50	0.72	$151,120
202	TH 41 and Dem Con Drive[1]	--	--	--	9	18	27	**0.78**	**1.04**	0.41	0.59	**0.71**	**0.95**	$176,760
206	CSAH 78 and Ventura Court	--	--	--	--	--	0	0.00	0.00	0.26	0.42	0.77	1.05	$0
210	CSAH 78 and Emery Way	--	--	--	--	--	0	0.00	0.00	0.26	0.42	0.77	1.05	$0
	TOTAL	**0**	**1**	**9**	**47**	**132**	**189**							

[1] Denotes signalized intersection – all other intersections are side street stop. [2] Items in bold are above statewide averages for crash rate and/or severity rate. Intersections in red have crash and severity rates above the statewide average and exceed critical crash rates. Intersections in orange have crash and severity rates above the statewide average but do not exceed critical crash rates. [3] Items in bold are above critical rates – indicate a serious safety problem. [4] costs calculated based on MnDOT values: Fatal $1,140,000; Type A $570,000; Type B $170,000; Type C $83,000; Property Damage $7,600

Table 4 – Segment Crash Severity (crashes between January 1, 2010 and December 31, 2014)

Location	Road Section Type	Length (mile)	ADT	Access Points[1]	Crash Severity						Segment Rate		State Average Rate		Calculated Critical Rate	
					Fatal	Type A	Type B	Type C	Property	Total	Crash Rate	Severity Rate	Crash Rate	Severity Rate	Critical Crash Rate	Critical Severity Rate
TH 169 between CSAH 69 and TH 41/CSAH 78	Rural expressway	0.78	29,500	6	--	--	1	9	16	26	0.64	0.91	0.66	0.99	1.00	1.41
TH 169 between TH 41/CSAH 78 and CSAH 14	Rural expressway	2.35	26,500	19	--	--	2	9	26	37	0.33	0.44	0.66	0.99	0.86	1.24
TH 41 between the railroad and Dem Con Drive	2-lane rural >8,000 ADT	0.23	18,400	2	--	--	--	3	1	4	0.52	0.92	0.73	1.10	1.59	2.14
TH 41 between Dem Con Drive and TH 169	3-lane Roadway	0.26	16,400	0	--	1	--	1	2	4	0.47	0.93	2.00	2.82	3.30	4.36
CSAH 78 between TH 169 and a half a mile to the east	2-lane rural 1,500 – 4,999 ADT	0.5	4,650	6	--	--	--	--	--	0	0.00	0.00	0.55	0.89	1.60	2.19
TOTAL					**--**	**1**	**3**	**22**	**45**	**71**						

[1] Some access points on TH 169 are field entrances.

Charts 4 through **6** show the number and severity of crashes that are occurring at the intersections with the highest crash and severity rates in the study area (TH 169 and TH 41/CSAH 78, TH 41 and Dem Con Drive, and driveways north of the railroad tracks on TH 41). Crash data is for the years 2010 – 2014.

Along with the information presented in the charts, crash data for heavy commercial vehicles was also reviewed. Of the 26 heavy commercial truck collisions, there were two non-incapacitating crashes and seven possible injury crashes. The 17 remaining crashes involving a heavy commercial vehicle were property damage only.

As shown in the charts, a majority of the crashes at the main intersections are property damage crashes; however there are still a high percent of injury crashes (approximately 28 percent) at these locations. For the intersection of TH 169 and TH 41/CSAH 78, injury crashes represent approximately 35 percent of the crashes at the intersection. This contributes to the overall severity rates on the corridor.

Chart 4 – Intersection of TH 169 and TH 41/CSAH 78 (intersection # 108 on Figure 4)

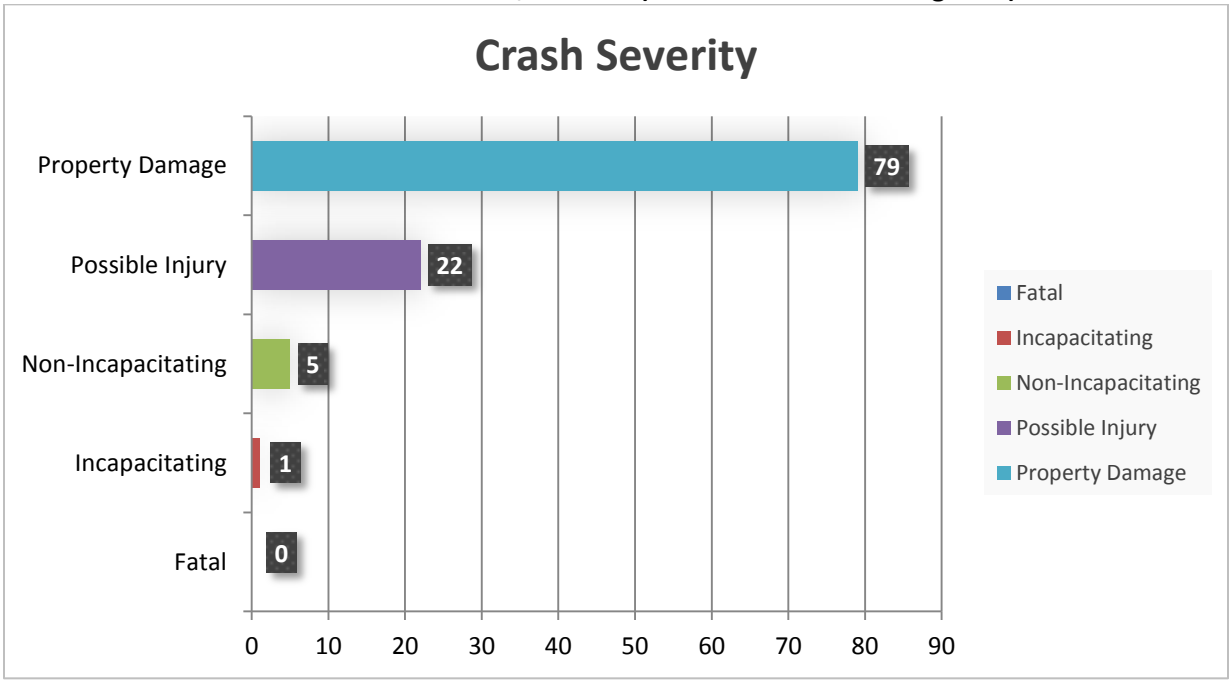


Chart 5 – Intersection of TH 41 and Dem Con Drive (intersection #202 on Figure 4)

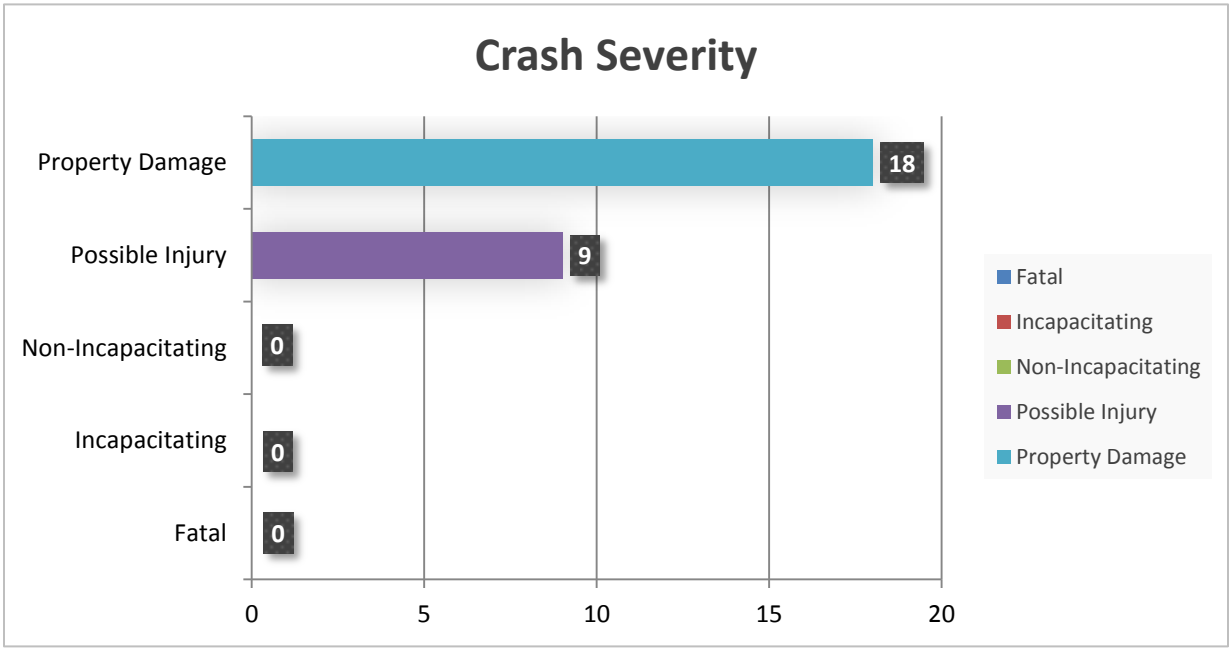
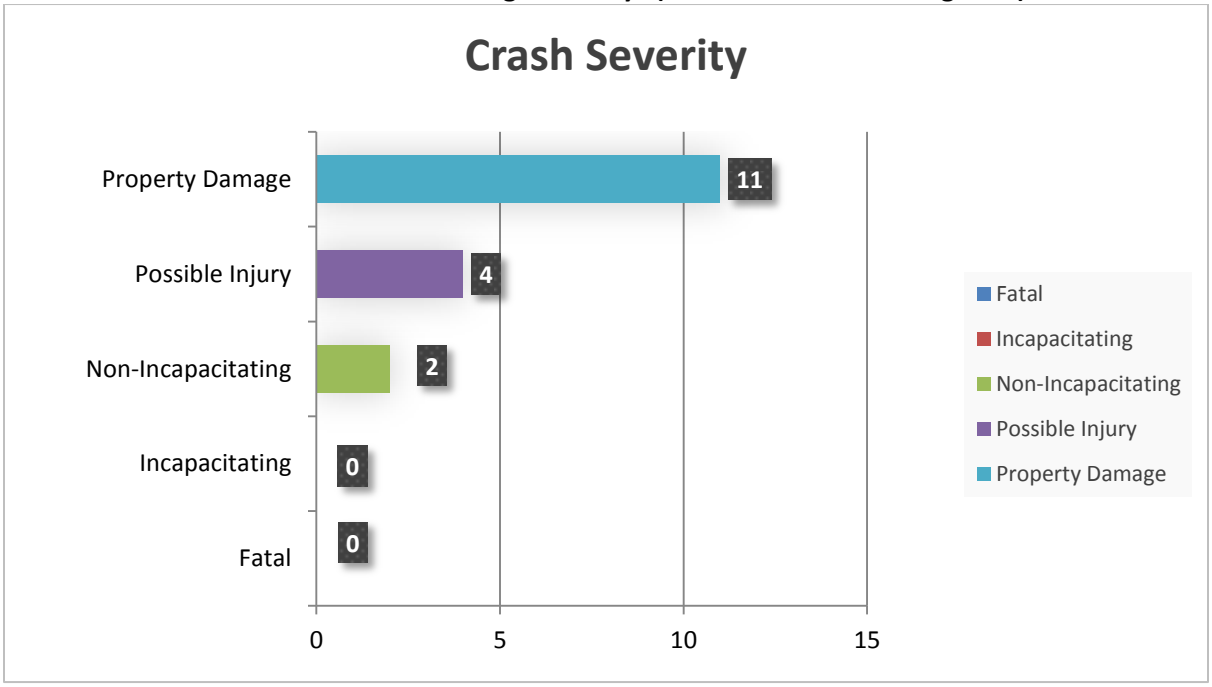


Chart 6 – Intersection of TH 41 and mining driveways (intersection #200 on Figure 4)



Primary Need – Mobility

Congestion has been a long-term issue within the study area as highlighted in local, regional and state plans dating back to the 1970s. Congestion has been broadly noted as an issue on TH 169 and TH 41 as principal arterial corridors as well as specific "hot spots" within the respective corridors. Efforts to document the problems on the corridors and at key intersections have indicated that the overall volumes, mix of traffic (high percent of freight traffic) and limited local supporting roadway network all contribute to existing and future operational problems.

The study area and beyond is expected to continue to experience additional growth that will exacerbate current constraints. The Scott County Comprehensive Plan and the comprehensive plan for the City of Shakopee indicate that there will be growth and development within the project travelshed that, in general, will exceed the average expected growth rates for population and employment within the Twin Cities metropolitan area. Along with the growth within the immediate study area, Carver County (which is connected to the study area via TH 41) is also expected to experience a high percent of growth according to their comprehensive plan and Metropolitan Council demographic data. Coupled with a general increase in traffic volumes since the economy has recovered, it is expected that the study area will continue to experience a corresponding increase in traffic. **Table 5** shows expected growth within the immediate study area (Jackson and Louisville Townships), the City of Shakopee, Scott County, Carver County and the Twin Cities metropolitan area as a whole. The existing and future numbers were provided by the Metropolitan Council.

Table 5 – Population, Household and Employment Forecasts

Area	Year	Population	Household	Employment
Study Area[1]	2010	1,589	604	703
	2040	1,364	524	1,112
	Annual Growth	-0.5 percent	-0.5 percent	1.5 percent
City of Shakopee	2010	37,076	12,772	18,831
	2040	57,400	21,500	31,900
	Annual Growth	1.5 percent	1.8 percent	1.8 percent
Scott County	2010	129,927	45,108	41,526
	2040	201,898	77,800	67,930
	Annual Growth	1.5 percent	1.8 percent	1.7 percent
Carver County	2010	91,042	32,891	31,836
	2040	161,240	62,590	52,240
	Annual Growth	1.9 percent	2.2 percent	1.7 percent
Twin Cities Metro	2010	2,800,469	1,117,635	1,525,048
	2040	3,676,198	1,509,960	2,102,120
	Annual Growth	0.9 percent	1 percent	1.1 percent

[1] Portions of Jackson Township are anticipated to be annexed into the City of Shakopee by 2040. Population, household and employment numbers are then considered as part of the City of Shakopee and show a decrease in population and household numbers for Jackson Township.

The sections below address mobility constraints and problems at the corridor and intersection level for both existing and future conditions.

Corridor Demand

The four primary corridors (TH 169, TH 41, CSAH 78, and CSAH 14) within the study area currently accommodate a substantial amount of traffic given the more rural nature of the location. TH 169 currently has approximately 32,000 vehicles a day north of TH 41 and 29,000 vehicles a day south of TH 41. There are 17,000 vehicles a day on TH 41, approximately 5,000 vehicles a day on CSAH 78, and approximately 1,600 vehicles a day on CSAH 14. When projecting out into the future based upon information from the comprehensive plans and demographic forecasts from the Metropolitan Council, traffic volumes on TH 169 and CSAH 78 increase substantially, with smaller levels of growth on TH 41 due to capacity constraints associated with downtown Chaska and the existing river crossing. CSAH 14 also experiences an increase in traffic primarily as an alternate route to avoid the congested TH 169 and TH 41/CSAH 78 intersection. As shown in **Table 6,** TH 169 and TH 41 within the study area are at or nearing capacity and are expected to be so in the future. CSAH 14 is not currently at capacity and is not expected to approach capacity in the planning timeframe. **Figure 6** shows existing and future traffic volumes on the various corridors.

Table 6 – Average Daily Traffic Volumes and Capacity Thresholds

Roadway	Segment	Roadway Design	Roadway Capacity[1]	Existing AADT[2]	2040 No Build AADT[2]
TH 169	CSAH 69 to TH 41	4-lane expressway	36,000	32,000	**41,800**
	TH 41 to CSAH 14	4-lane expressway	36,000	29,000	**40,900**
TH 41	North/West of Dem Con Drive	2-lane rural	14,000 – 15,000	**17,000**	**19,700**
	Dem Con Drive to TH 169	3-lane	14,000 – 17,000	**17,000**	**19,700**
CSAH 78	TH 169 to half a mile to the east	2-lane rural	14,000 – 15,000	4,700	10,100
CSAH 14	TH 169 to a half mile to the east	2-lane rural	14,000 – 15,000	1,600	6,900

[1] Roadway Capacity Thresholds from Scott County Comprehensive Plan
[2]Values shown in bold are at or exceed capacity of the existing roadway.

The traffic volumes shown for the corridors indicate that travel times on the mainlines of TH 169, TH 41 and CSAH 78 are likely to increase due to the amount of congestion that will be occurring by 2040. Traffic models were used to simulate existing and future travel times on the mainline with the additional traffic. Results indicate that travel times will increase between approximately 20 seconds to over five minutes. **Tables 7** and **8** show the AM and PM travel time changes on the mainlines between 2015 and 2040.

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Project: WSBAS 134559
Print Date: 10/28/2016

Map by: hxiao
Projection:Scott County Coordinates
Source: SEH, Bing, MnDOT

Existing and 2040 Daily Traffic Forecasts

US 169 & TH 41 Improvements
Scott County, Minnesota

Figure 6

This map is neither a legally recorded map nor a survey map and is not intended to be used as one. This map is a compilation of records, information, and data gathered from various sources listed on this map and is to be used for reference purposes only. SEH does not warrant that the Geographic Information System (GIS) Data used to prepare this map are error free, and SEH does not represent that the GIS Data can be used for navigational, tracking, or any other purpose requiring exacting measurement of distance or direction or precision in the depiction of geographic features. The user of this map acknowledges that SEH shall not be liable for any damages which arise out of the user's access or use of data provided.

Table 7 – AM Mainline Travel Time Changes

AM Peak Hour		2015	2040
Description		Existing	No Build
Southbound TH 169 -	Distance (mi)	3.6	3.6
CSAH 69 to CSAH 14	Time (min)	5.1	**5.4**
Northbound TH 169 -	Distance (mi)	3.6	3.6
CSAH 14 to CSAH 69	Time (min)	5.0	**6.6**
EB TH 41 to NB TH 169 -	Distance (mi)	2.1	2.1
S. River Bridge to CSAH 69 (169)	Time (min)	4.4	**9.7**
SB TH 169 to WB TH 41 -	Distance (mi)	2.0	2.0
CSAH 69 to S. River Bridge (TH 41)	Time (min)	2.9	**3.2**

Table 8 – PM Mainline Travel Time Changes

PM Peak Hour Comparison		2015	2040
Description		Existing	No Build
Southbound TH 169 -	Distance (mi)	3.6	3.6
CSAH 69 Overpass to CSAH 14	Time (min)	5.2	**6.2**
Northbound TH 169 -	Distance (mi)	3.6	3.6
CSAH 14 to CSAH 69 Overpass	Time (min)	4.6	**4.9**
EB TH 41 to NB TH 169 -	Distance (mi)	2.1	2.1
S. River Bridge to CSAH 69 Overpass (169)	Time (min)	3.8	**5.1**
SB TH 169 to WB TH 41 -	Distance (mi)	2.0	2.0
CSAH 69 Overpass to S. River Bridge (TH 41)	Time (min)	2.9	**3.6**

Vehicle Mix

In addition to the base traffic volumes and the amount of capacity on the roadways, it is important to understand the types of vehicles using the corridors. The vehicle mix can have an impact on how these roadways operate. Heavy commercial traffic or recreational traffic (vehicles towing boats, recreational vehicles, etc.) can negatively impact corridor and capacity because these types of vehicles take longer to start and stop as they approach traffic signals, because they take up more physical space and because they drive differently (space between following vehicles is usually different – gaps between vehicles are usually larger/longer). This is especially noticeable in locations that have a large number of trucks in the peak traffic periods.

The percent of truck traffic on TH 169 and TH 41 fluctuates seasonally as it does on many roadways within the state. However, there are a number of gravel mining operations, landfills, recycling operations, and asphalt plants that are located within the project area or near the project area that use TH 169 and/or TH 41 to move their product. Truck volumes reported by MnDOT (from 2011 and 2012 on its traffic flow maps) suggest that truck traffic on TH 169 is 8 to 10 percent of the traffic and that the truck traffic on TH 41 is approximately 8 percent.

Traffic counts collected for the TH 169 and TH 41/CSAH 78 intersection study area in October and November of 2015 had between 8 and 15 percent of the traffic being heavy truck traffic. Previous studies on TH 41 (including the Tier 1 FEIS for the regional river crossing) suggest that truck traffic can be as high as 20 percent. Typical truck traffic on similar roadways usually is less than 10 percent and generally ranges between 5 and 10 percent.

Table 9 shows truck volumes and percent from October and November 2015 in relationship to overall traffic volumes and peak travel times. It should be noted that the data in **Table 9** does not reflect seasonal peaks in truck traffic and is a "low" value compared to the months of April through October when mining operations in the area are most active.

Table 9 – Daily Truck Volumes and Percent (data collected November and October 2015)

Roadway	Segment	Traffic Volumes	Truck Volumes	Truck Percent	Truck Traffic in AM Peak[1] (#/%)	Truck Traffic in PM Peak[1] (#/%)
TH 169	CSAH 69 to TH 41[2]	28,580	2,940	10.3	403/8.8	179/5.0
	CSAH 69 to TH 41[3]	33,055	4,470	13.5	474/10.3	337/6.5
	TH 41 to CSAH 14[3]	25,915	3,960	15.3	396/11.8	290/7.2
TH 41	North/West of Dem Con Dr.[2]	16,500	1,345	8.1	221/6.9	101/4.0
	Dem Con Dr. to TH 169[3]	17,725	1,915	10.8	216/7.5	158/5.3
CSAH 78	TH 169 to half a mile east	5,655	895	15.8	58/11.7	29/8.4

[1] AM peak is the two-hour period between 6:00 and 8:00 AM and the PM peak is the two-hour period between 4:00 and 6:00 PM.
[2] November 2015 Vehicle Class Count Data, includes all 3 or more axle vehicles
[3] October 2015 48-hr turning movement data

Intersection Congestion

The previous section described existing and future daily travel demands for the key transportation corridors within the study area as well as the role that the vehicle mix can have on operations. This section provides more detail about how intersections along TH 169, TH 41 and CSAH 78 operate in terms of level of service and queue lengths (how far vehicles back up on a particular approach).

Level of Service (LOS) and Delay

Existing intersection level of service (LOS) was modeled for key intersections/driveways on TH 169 between CSAH 69 and CSAH 14; on TH 41 at Dem Con Drive and the intersections immediately north of the railroad; and on CSAH 78 at Ventura Court and Emery Way. Due to seasonal fluctuations of truck traffic on the corridors, a value was chosen for each corridor that represents a more conservative approach. For terms of this document, the peak percentages shown in **Table 9** were used in the existing and future conditions analyses. For CSAH 14, which did not have truck data collected at the same time as the other routes, a standard 5 percent was used.

The analysis identifies how well intersections are currently accommodating existing traffic volumes. Intersections are ranked in terms of delay for individual vehicles on a scale from a LOS A to LOS F. LOS A represents the best operating conditions from a traveler's perspective and LOS F the worst. LOS F is considered to be severely congested with substantial delays. LOS A – D are generally considered acceptable to travelers and to agencies responsible for the different roadways. LOS E indicates that the roadway or intersection is operating at or very near its capacity – drivers can experience substantial delays.

Table 10 lists LOS criteria 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 also usually greater at a signal than it is at a stop sign. Therefore the LOS thresholds for each LOS category are lower for unsignalized intersections than for signalized ones.

Table 10 – Level of Service (LOS) Criteria[1]

LOS	Signalized Intersection (average delay per vehicle – in seconds)	Unsignalized Intersection (average delay per vehicle – in seconds)
A	<10	<10
B	10 – 20	10 – 15
C	20 – 35	15 – 25
D	35 – 55	25 – 35
E	55 – 80	35 - 50
F	>80	>50

[1] Thresholds per the American Association of State Highway Transportation Officials – A Policy on Geometric Design of Highways and Streets (also known as the "Green Book")

For each level of service, there is a time delay (in seconds) that is expected to occur. This delay is the average delay experienced by every vehicle. So for an intersection, the overall delay may be fairly low – less than 10 seconds per vehicle, but a particular movement may experience substantial delay – more than 50 seconds per vehicle based upon the traffic control and traffic volumes in the area. This is especially true for private driveways or unsignalized streets that intersect with TH 169. Traffic on TH 169 experiences no or very little delay and the traffic waiting at the side street or driveway can experience a lot of delay as they wait for a gap in traffic to access TH 169.

The LOS analysis was completed for existing conditions (2015) and future conditions (2040). The sections that follow provide more detail on how intersections along the respective corridors operate.

Existing Conditions

Figures 7 and **8** show existing intersection traffic control, lane configurations and turning movement counts for the morning and evening peak periods. **Table 11** shows LOS for the intersections for the morning (AM) and afternoon (PM) conditions. For each intersection the overall LOS is displayed, the LOS for each approach is highlighted and the worst approach is listed. Delay per vehicle is also presented for each movement and the overall intersection.

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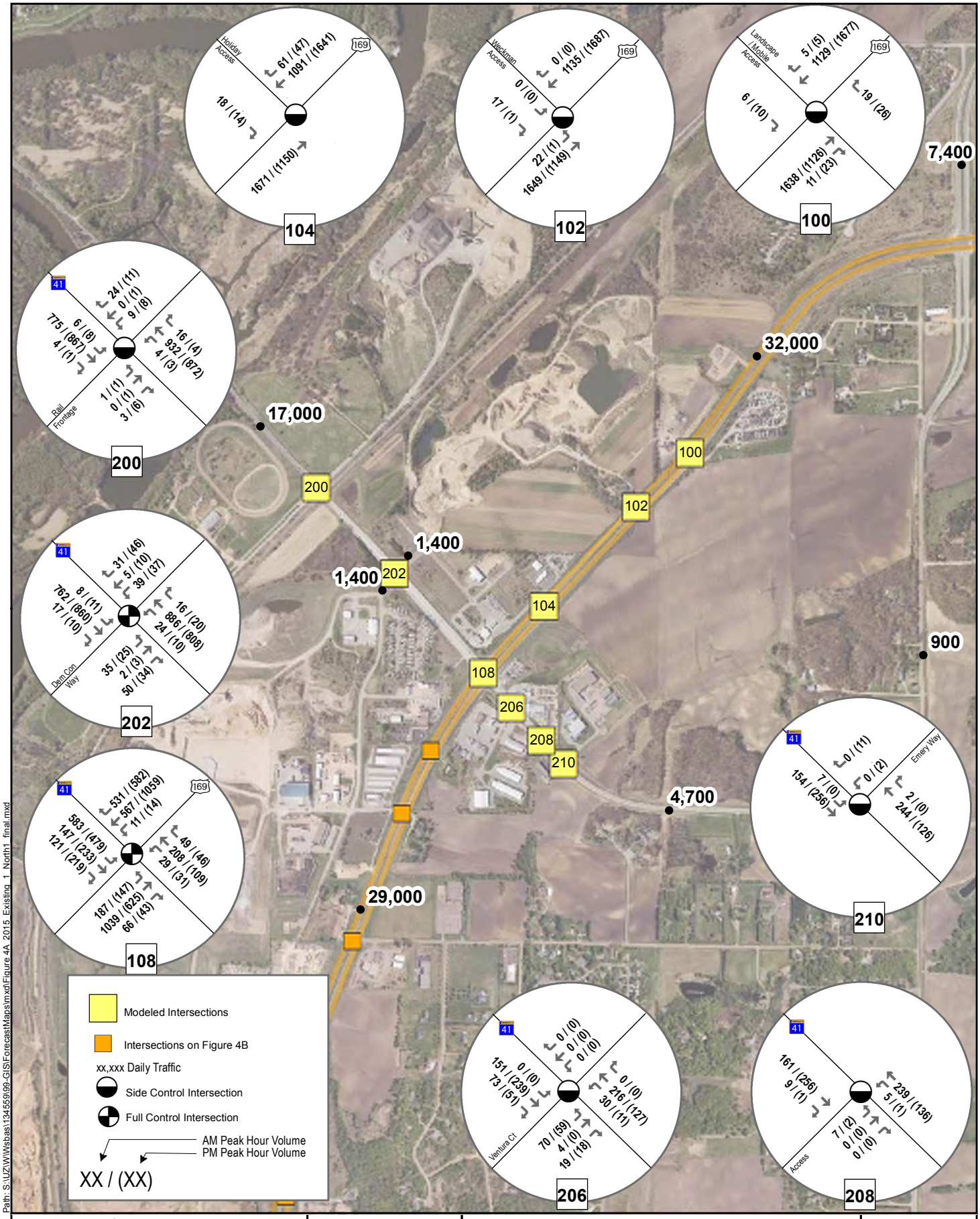

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Project: WSBAS 134559
Print Date: 10/28/2016

Map by: hxiao
Projection:Scott County Coordinates
Source: SEH, Bing, MnDOT

2015 Counts

US 169 & TH 41 Improvements
Scott County, Minnesota

Figure 7

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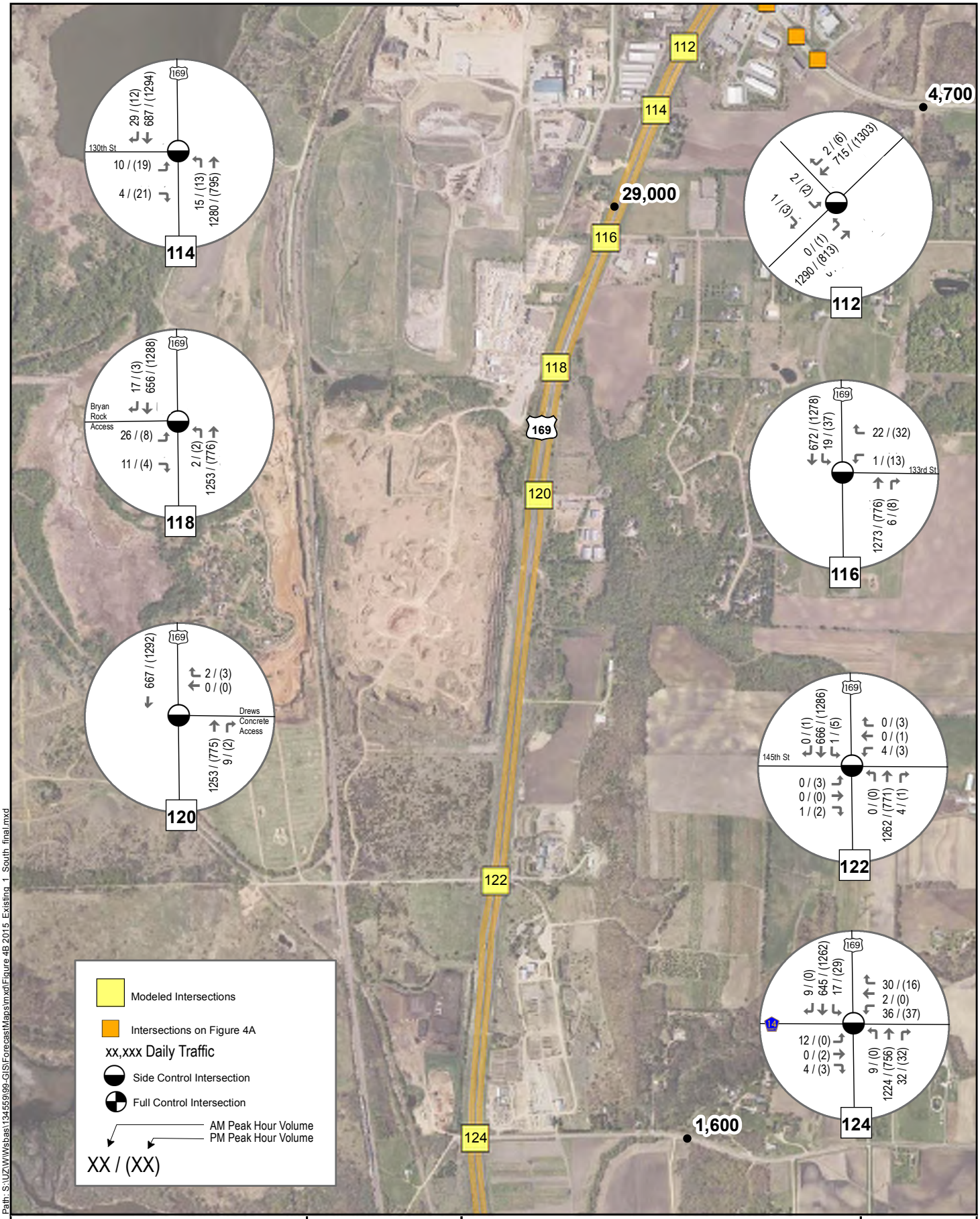

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0 0.125 0.25 Miles

Project: WSBAS 134559
Print Date: 10/28/2016

Map by: hxiao
Projection:Scott County Coordinates
Source: SEH, Bing, MnDOT

2015 Counts

US 169 & TH 41 Improvements
Scott County, Minnesota

Figure 8

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Table 11 – Existing LOS – AM and PM Peak Periods

Intersection ID from Figure 4	Intersection	Approach	AM Peak Period			PM Peak Period		
			Approach LOS & Delay Per Vehicle (seconds)[1]	Intersection LOS & Delay Per Vehicle (seconds)[1]	Worst Approach	Approach LOS & Delay Per Vehicle (seconds)[1]	Intersection LOS & Delay Per Vehicle (seconds)[1]	Worst Approach
100	TH 169 at Mobile Manor / Mom's Landscaping	NB	A – 1.0	A – 1.8	Westbound	A – 0.8	A – 2.9	Eastbound
		SB	A – 2.6			A – 4.2		
		EB	B – 13.9			C -15.9		
		WB	C – 15.8			A – 7.1		
102	TH 169 and Private Driveway (west side)	NB	A – 2.9	A – 2.2	Eastbound	A – 1.5	A – 1.2	Eastbound
		SB	A – 1.0			A – 1.0		
		EB	B – 10.4			B – 13.1		
104	TH 169 and Holiday Gas Station	NB	A – 6.4	A – 4.6	Eastbound	A – 3.9	A – 3.3	Eastbound
		SB	A – 2.0			A – 2.6		
		EB	A – 7.0			E – 36.9		
108	TH 169 and TH 41 (signalized intersection)	NB	D – 44.6	D – 47.9	Eastbound	C – 33.5	D – 37.6	Westbound
		SB	C – 27.4			C – 27.9		
		EB	E – 73.7			D – 54.2		
		WB	E – 64.2			E – 56.1		
112	TH 169 and Value Inn Motel	NB	A – 1.3	A – 4.0	Eastbound	A – 0.8	A – 7.1	Eastbound
		SB	A – 8.6			B – 10.6		
		EB	D – 27.6			C – 24.0		
114	TH 169 and 130th Street	NB	A – 1.8	A – 1.9	Eastbound	A – 1.8	A – 2.2	Eastbound
		SB	A – 1.4			A – 1.3		
		EB	D – 31.6			E – 39.3		
116	TH 169 and 133rd Street	NB	A – 2.0	A – 2.1	Westbound	A – 1.5	A – 2.2	Westbound
		SB	A – 2.0			A – 2.2		
		WB	A – 7.8			B – 14.4		
118	TH 169 and Anchor Block / Bryan Rock	NB	A – 1.7	A – 2.1	Eastbound	A – 1.2	A – 1.8	Eastbound
		SB	A – 1.5			A – 1.8		
		EB	D – 25.6			E – 35.5		
120	TH 169 and Drew's Concrete	NB	A – 4.1	A – 3.1	Westbound	A – 2.9	A – 2.1	Westbound
		SB	A – 1.3			A – 1.6		
		WB	A – 5.0			A – 4.0		
122	TH 169 and 145th Street	NB	A – 2.5	A – 3.1	Westbound	A – 1.6	A – 3.9	Eastbound
		SB	A – 3.8			A – 5.1		
		EB	A – 3.0			E – 40.1		
		WB	**F – 56.4**			C – 19.0		
124	TH 169 and CSAH 14	NB	A – 2.7	A – 4.9	Westbound	A – 1.7	A – 3.9	Westbound
		SB	A – 3.3			A – 4.0		
		EB	E – 44.8			C – 22.5		
		WB	**F – 54.7**			D – 33.7		

Table 11 – Existing LOS – AM and PM Peak Periods (continued)

Intersection ID from Figure 4	Intersection	Approach	AM Peak Period			PM Peak Period		
			Approach LOS & Delay Per Vehicle (seconds) [1]	Intersection LOS & Delay Per Vehicle (seconds) [1]	Worst Approach	Approach LOS & Delay Per Vehicle (seconds) [1]	Intersection LOS & Delay Per Vehicle (seconds) [1]	Worst Approach
200	TH 41 and Gravel Mining Driveways (immediately north of railroad)	NB	C – 15.4	A – 5.8	Southbound	C – 17.9	A – 3.8	Southbound
		SB	**F – 67.3**			E – 39.7		
		EB	A – 4.6			A – 4.1		
		WB	A – 4.5			A – 2.7		
202	TH 41 and Dem Con Drive (signalized intersection)	NB	B – 17.2	C – 21.4	Westbound	B – 17.6	B – 17.3	Westbound
		SB	B – 17.7			B – 16.0		
		EB	C – 21.4			B – 15.0		
		WB	C – 22.1			B – 19.9		
206	CSAH 78 and Ventura Court	NB	A – 9.5	A – 4.2	Northbound	A – 8.0	A – 4.6	Northbound
		SB	A – 0.0			A – 0.0		
		EB	A – 4.6			A – 5.4		
		WB	A – 1.9			A – 0.9		
210	CSAH 78 and Emery Way	NB	A – 2.2	A – 0.8	Northbound	A – 2.9	A – 0.5	Northbound
		SB	A – 0.5			A – 0.3		
		WB	A – 0.9			A – 0.8		

[1] Cells shown in yellow are locations at the last level of acceptable LOS. Cells in orange are considered unacceptable/poor. Cells in red are considered unacceptable/failing.

Results of the analysis indicate that overall LOS at all of the intersections along TH 169, TH 41 and CSAH 78 is acceptable (LOS A – D); however there are six approaches in the AM peak period and six approaches in the PM peak period that have unacceptable (LOS E and F) delays at the signalized intersection of TH 169 and TH 41/CSAH 78 as well as at some of the side street stop locations. The intersection of TH 169 and CSAH 14 currently operates overall at LOS A in the AM and PM peak hours; however, the side street approaches operate at LOS E and F in the AM and C and D in the PM due to delays associated with waiting for gaps in through traffic on TH 169.

Future Conditions

Travel forecasts for 2040 were used to calculate how the intersections operated in the future without improvements. **Figures 9** and **10** show future intersection traffic control, lane configurations and turning movement counts for the morning and evening peak periods. **Table 12** shows LOS for the intersections along the corridor for the morning (AM) and afternoon (PM) conditions for 2040. For each intersection the overall LOS is displayed, the LOS for each approach is highlighted and the worst approach is listed.

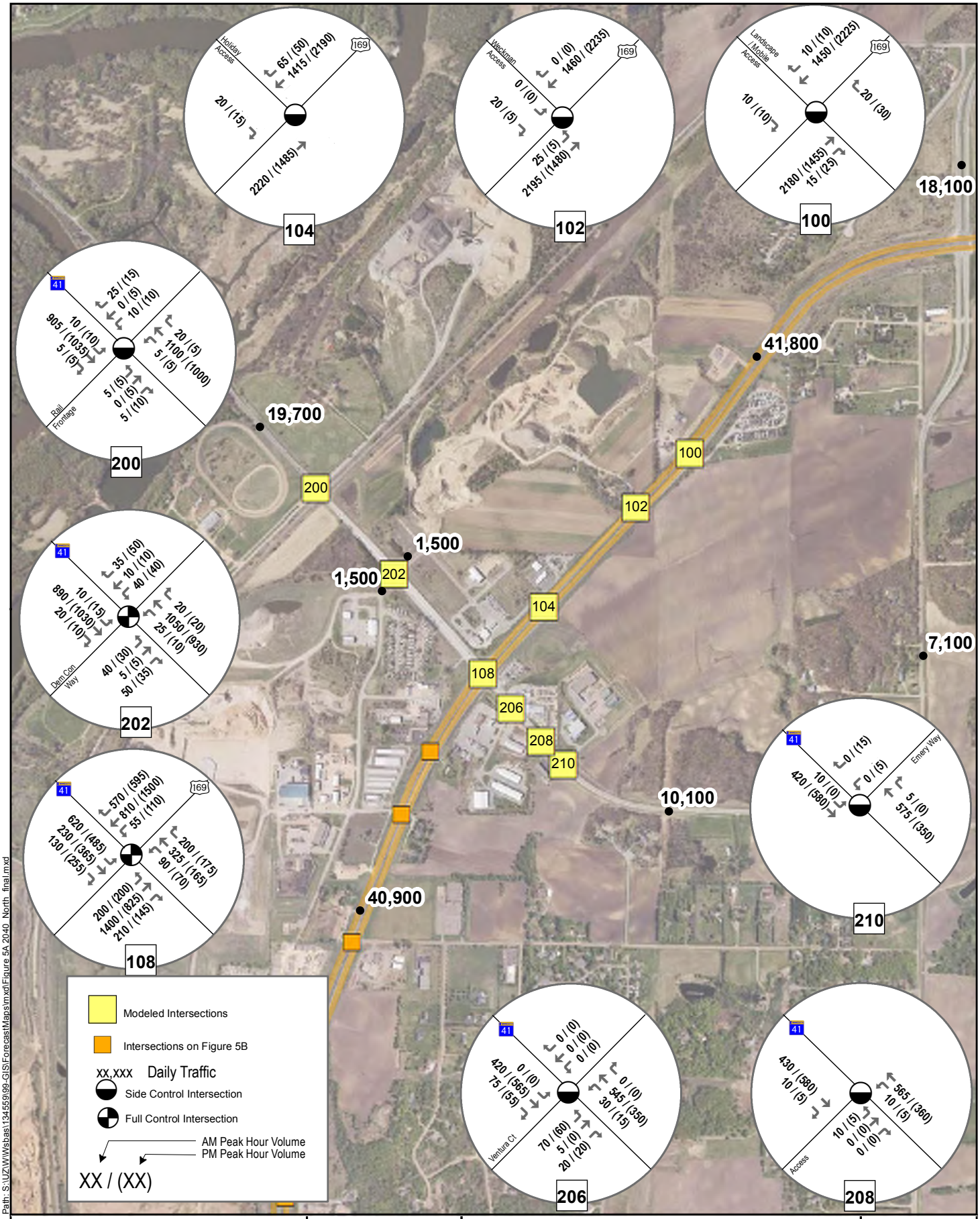
Results of the analysis shown in **Table 12** indicate that operations will deteriorate substantially in the future as traffic volumes increase. By 2040 there are several intersection/driveway approaches that are operating at or near unacceptable levels. In the AM peak period there are 16 approaches that are at LOS E or F (unacceptable) and two that are LOS D (approaching unacceptable). In the PM peak there are 15 approaches that are at LOS E or F and three that are LOS D.

Because multiple intersections have more than one approach that is not operating well, there are more intersections that experience an unacceptable LOS. In the future, the intersection at TH 169 and TH 41 is LOS F in the AM peak and LOS E in the PM peak. The Intersection of TH 169 and CSAH 14 is LOS E in the PM peak and the intersection of TH 41 and the driveways north of the railroad are LOS in the AM peak.

Delay for some movements becomes quite extreme by 2040 under current geometrics. This is represented at TH 169 and the Holiday gas station entrance where delay is expected to exceed 13 minutes in the PM peak period. The reality of a 13 minute delays is unlikely – traffic will divert to other routes or skip going to the gas station if the delay is that long, but it shows the demand that traffic has in the area for access to TH 169. Significant delays of over 30 minutes are anticipated at the side street legs of the TH 169/CSAH 14 intersection, which may lead to safety issues as drivers begin taking more aggressive risks to cross TH 169 traffic.

Queue Lengths

Intersections that have unacceptable levels of service generally have longer traffic queues which can in turn impact operations at adjacent intersections. This happens when the queues from the intersection that is operating at an unacceptable level of service get so long that they extend into and potentially through the next intersection. When an intersection has a lot of heavy commercial vehicles travelling through it, queue lengths can be longer because heavy commercial vehicles are much longer than the typical passenger car. Long queues can also result in drivers taking additional risks because they are tired of waiting for a gap in traffic or for a “green light” and they start to pull out in front of traffic when there is not adequate space to do so, thereby increasing the likelihood of a crash.



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0 0.125 0.25 Miles

Project: WSBAS 134559
Print Date: 10/28/2016

Map by: hxiao
Projection:Scott County Coordinates
Source: SEH, Bing, MnDOT

2040 No-Build Projections

US 169 & TH 41 Improvements
Scott County, Minnesota

Figure 9

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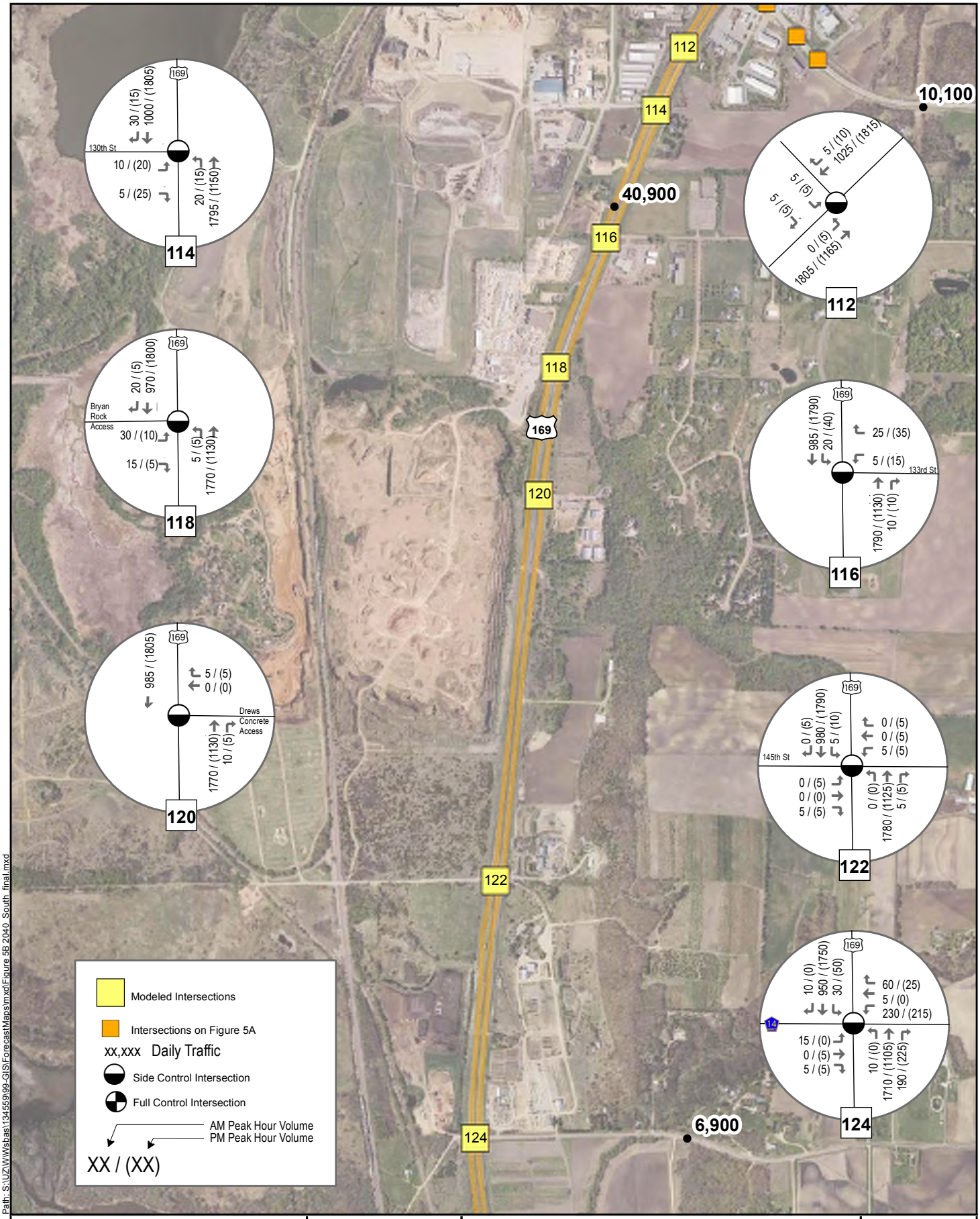

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0 0.125 0.25 Miles

Project: WSBAS 134559
Print Date: 10/28/2016

Map by: hxiao
Projection:Scott County Coordinates
Source: SEH, Bing, MnDOT

2040 No-Build Projections

US 169 & TH 41 Improvements
Shakopee, Minnesota

Figure 10

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Table 12 – 2040 LOS – AM and PM Peak Periods

Intersection ID from Figure 4	Intersection	Approach	AM Peak Period			PM Peak Period		
			Approach LOS & Delay Per Vehicle (seconds/minutes) [1]	Intersection LOS & Delay Per Vehicle (seconds/minutes) [1]	Worst Approach	Approach LOS & Delay Per Vehicle (seconds/minutes) [1]	Intersection LOS & Delay Per Vehicle (seconds/minutes) [1]	Worst Approach
100	TH 169 at Mobile Manor / Mom's Landscaping	NB	A – 1.3	A – 2.6	Westbound	A – 1.0	A – 4.9	Eastbound
		SB	A – 3.9			A – 7.1		
		EB	C – 19.0			E - 44.0		
		WB	E – 41.4			B – 12.2		
102	TH 169 and Private Driveway (west side)	NB	A – 4.6	A – 3.4	Eastbound	A – 2.7	A – 2.5	Eastbound
		SB	A – 1.4			A – 2.3		
		EB	C – 19.7			E – 42.5		
104	TH 169 and Holiday Gas Station	NB	A – 8.7	A – 6.4	Eastbound	A – 4.9	C – 16.1	Eastbound
		SB	A – 2.9			C – 20.3		
		EB	C – 15.1			**F – 784.9/13.1**		
108	TH 169 and TH 41 (signalized intersection)	NB	**F – 100.5/1.7**	**F – 103.2/1.7**	Eastbound	D – 48.4	E – 67.8/1.1	Eastbound
		SB	D – 41.1			E – 61.8/1		
		EB	**F – 216.9/3.6**			**F – 99.2/1.7**		
		WB	E – 89.7/1.5			E – 68.4/1.1		
112	TH 169 and Value Inn Motel	NB	D – 25.4	C – 19.8	Eastbound	A – 1.3	B – 10.3	Eastbound
		SB	B – 9.9			C – 15.4		
		EB	**F – 67.6/1.1**			**F – 68.2 /1.1**		
114	TH 169 and 130th Street	NB	A – 8.4	A – 6.4	Eastbound	A – 2.5	A – 3.7	Eastbound
		SB	A – 1.9			A – 2.3		
		EB	**F – 75.9/1.3**			**F – 96/1.6**		
116	TH 169 and 133rd Street	NB	A – 2.5	A – 3.2	Westbound	A – 1.8	A – 3.0	Westbound
		SB	A – 3.3			A – 3.0		
		WB	E – 38.4			D – 30.9		
118	TH 169 and Anchor Block / Bryan Rock	NB	A – 2.0	A – 2.8	Eastbound	A – 1.6	A – 2.8	Eastbound
		SB	A – 1.8			A – 2.4		
		EB	**F– 58.3**			**F – 119.5/2**		
120	TH 169 and Drew's Concrete	NB	A – 5.2	A – 3.9	Westbound	A – 3.6	A – 2.7	Westbound
		SB	A – 1.5			A – 2.2		
		WB	B – 13.1			A – 5.4		
122	TH 169 and 145th Street	NB	A – 3.4	A – 3.9	Westbound	A – 2.2	A – 5.4	Eastbound
		SB	A – 4.4			A – 6.4		
		EB	A – 7.1			**F – 84.1/1.4**		
		WB	**F – 79.2/1.3**			**F – 78/1.3**		
124	TH 169 and CSAH 14	NB	A – 4.7	D – 28.6	Westbound	A – 3.0	E – 39.9	Westbound
		SB	A – 5.8			A – 5.0		
		EB	**F –193.4/3.2**			**F – 102.3/1.7**		
		WB	**F – 2618.5/43.6**			**F – 1973.8/32.9**		

Table 12 – 2040 LOS – AM and PM Peak Periods (continued)

Intersection ID from Figure 4	Intersection	Approach	AM Peak Period			PM Peak Period		
			Approach LOS & Delay Per Vehicle (seconds/minutes) [1]	Intersection LOS & Delay Per Vehicle (seconds/minutes) [1]	Worst Approach	Approach LOS & Delay Per Vehicle (seconds/minutes) [1]	Intersection LOS & Delay Per Vehicle (seconds/minutes) [1]	Worst Approach
200	TH 41 and Gravel Mining Driveways (immediately north of railroad)	NB	F – 149.8/2.5	E – 37.2	Southbound	F – 95.9/1.6	A – 11.2	Southbound
		SB	F – 553.0/9.2			F – 228.6/3.8		
		EB	F – 57.6			B – 10.3		
		WB	A – 7.5			A – 5.2		
202	TH 41 and Dem Con Drive (signalized intersection)	NB	C– 25.5	D – 42.6	Eastbound	C – 22.0	C – 25.8	Westbound
		SB	C – 23.6			B – 18.8		
		EB	E – 59.9			C – 25.8		
		WB	C – 31.8			C – 26.9		
206	CSAH 78 and Ventura Court	NB	F – 231.9/3.9	D – 32.0	Northbound	D – 26.8	A – 7.2	Northbound
		SB	A – 0.0			A – 0.0		
		EB	A – 5.7			A – 7.4		
		WB	A – 25.4			A – 2.8		
210	CSAH 78 and Emery Way	SB	A – 0.0	A – 3.0	Westbound	A – 4.5	A – 0.8	Southbound
		EB	A – 0.9			A – 0.5		
		WB	A – 4.4			A – 1.1		

[1] Cells shown in yellow are locations at the last level of acceptable LOS. Cells in orange are considered unacceptable/poor. Cells in red are considered unacceptable/failing.

Queue lengths are also a good way to show the general public how bad delay is at an intersection. Most drivers do not accurately perceive how long they have waited to enter traffic flow (most overestimate their delay) from either a signalized or unsignalized intersection. Demonstrating how long queues are in terms of distance and showing how far they extend is something that most users can better understand.

Figures 11 and **12** illustrate the average maximum queue lengths at the TH 169 and TH 41/CSAH 78, and the TH 41 and Dem Con Drive intersections. **Figure 11** depicts queue lengths in the AM peak period for both the existing and forecast (year 2040) conditions. **Figure 12** depicts queue lengths for the existing and forecast year conditions during the pm peak period.

Figure 11 indicates that traffic queues will increase dramatically between the existing and forecast year conditions. The greatest queue length is at the TH 41 approach to the TH 169 intersection where the queue is forecasted to extend approximately 3,700 feet through the Dem Con Drive intersection and across the UP railroad crossing. This traffic queue, along with the long queues at the other approaches to the TH 169 and TH 41/CSAH 78 intersection, clearly illustrate the severely degraded traffic operations that will be common with existing geometrics and traffic control. The queue lengths illustrated in **Figure 12** reflect similar conditions to what is forecasted to occur during the AM peak hour except that the longest queue for the TH 169 intersection approaches switches from northbound to southbound.

A similar exercise was completed for the intersection at TH 169 and CSAH 14. Because there are no stop conditions on TH 169, traffic on it is free-flowing, with the exception of vehicles making a left-turn from TH 169 southbound to CSAH 14. Traffic generally does not have an extensive queue waiting to make this move under present and future conditions. Traffic on CSAH 14; however does queue. Under current conditions, the queueing is fairly limited, between 30 and 45 feet on average during the evening and morning peaks respectively. Maximum queue lengths under current conditions extend between 105 and 140 feet. By 2040, queuing lengths reach an average of 3,275 feet during the morning peak and 2,860 during the evening peak on CSAH 14. Maximum queue lengths of the model are exceeded for the morning peak in 2040 and are estimated at 3,880 feet during the evening peak.

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Project: WSBAS 134559
Print Date: 2/19/2016

Map by: lelliot
Projection:Scott County Coordinates
Source: SEH, Bing, MnDOT

Existing and 2040 AM Queue

US 169 & TH 41 Improvements
Scott County, Minnesota

Figure 11

This map is neither a legally recorded map nor a survey map and is not intended to be used as one. This map is a compilation of records, information, and data gathered from various sources listed on this map and is to be used for reference purposes only. SEH does not warrant that the Geographic Information System (GIS) Data used to prepare this map are error free, and SEH does not represent that the GIS Data can be used for navigational, tracking, or any other purpose requiring exacting measurement of distance or direction or precision in the depiction of geographic features. The user of this map acknowledges that SEH shall not be liable for any damages which arise out of the user's access or use of data provided.

Path: S:\UZ\W\Wsbas\134559\99-GIS\Maps\PM Queue.mxd

0 0.05 0.1 Miles

Project: WSBAS 134559
Print Date: 2/19/2016

Map by: lelliot
Projection:Scott County Coordinates
Source: SEH, Bing, MnDOT

Existing and 2040 PM Queue

US 169 & TH 41 Improvements
Scott County, Minnesota

Figure 12

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Mobility – Additional Freight Considerations

As described previously, both TH 169 and TH 41 have a higher percent of truck traffic than similar roadways. Both of these corridors serve important freight connections which result in the higher levels of freight traffic. Based upon the land uses that exist in the project area as well as the greater travelshed area and are anticipated to be perpetuated in the next 20 years, truck traffic is expected to continue to have an influence on how traffic within the study area is expected to operate – even with the percent of trucks as a whole decreasing with corresponding increases in overall traffic.

TH 169 will continue to serve statewide freight movements that are destined to the Ports of Savage (located north off of TH 169 and TH 13) and the greater Twin Cities metropolitan area as well as more local freight destined for locations off of TH 41 in Scott and Carver Counties. Likewise, TH 41 is expected to continue to serve more local/regional freight movements as a result of local mining, garbage, agricultural and asphalt pit uses.

As a result, traffic operations along the corridors and at key intersections are expected to continue to be negatively impacted by the sheer numbers of trucks. Truck traffic takes longer to get up to speed when at a complete stop. This makes merging into existing and future traffic streams more challenging as larger gaps in traffic are needed at locations where a side street stop is present. Additionally, trucks take up more of the "green" time provided at traffic signals when they are at stop – it takes them longer to get started and to get through the intersection. When a larger number / percent of trucks are present, it limits the traffic flow through the intersection (essentially limiting the functional capacity of the intersection) and extends queue lengths, which in turn can negatively impact intersections downstream.

Mobility – Access Considerations

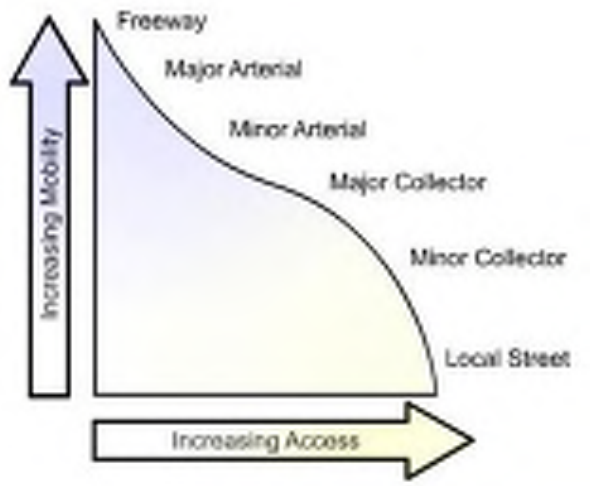
The project area is largely rural in nature, with a concentration of business, mining and industrial uses concentrated along the TH 169 and TH 41/CSAH 78 intersection and along the key study area corridors. This can be seen in **Figures 1** and **2**. **Figure 4** shows the location of intersections (including private driveways and public streets) with direct access to TH 169, TH 41 and CSAH 78.

The amount of access currently on the corridor is inconsistent with MnDOT access spacing for High Priority Interregional corridors – which are to have no private driveway access and are to have limited public street entrances. Because TH 169 was identified as a potential freeway route as part of the Interregional Corridor Study previously, its existing at-grade access points are to be considered interim and should be limited to the extent practical from an operational and safety perspective. [1]

This situation (number of access points) not only has a negative impact on safety (as previously demonstrated), it also results in poorer mobility for traffic on TH 169 that has to slow or anticipate what traffic leaving the corridor or entering the corridor is going to do. The amount of access also results in longer delay for vehicles trying to enter the traffic stream due to a lack of gaps in traffic flow. **Figure 13** shows the relationship between access and mobility.

[1] MnDOT Access Management Manual, January, 2008.

Figure 13 – Relationship between Access and Mobility



Other Considerations

The following describes needs that would be desirable to address.

Non-Motorized Accommodations

There are few opportunities for pedestrians and bicyclists to safely cross TH 169 and TH 41 in the study area. Pedestrian and bicyclist accommodations are limited to crosswalks at each leg of the TH 169 and TH 41/CSAH 78 intersection and on one leg at the TH 41 and Dem Con Drive intersection. Each crosswalk traverses between five to seven traffic lanes, which is a long distance for non-motorized users to cross. It also interrupts traffic operations at the intersection because of longer time needed for the pedestrian/bicyclist to get across either TH 41 or TH 169. In addition, the high travel speeds and heavy traffic volumes within the intersection and on TH 169 and TH 41 generate very unsettling conditions for pedestrians and bicyclists. The safety issues are compounded by the regional nature of much of the traffic (longer average trip distance) and limited residential land uses visible from the intersection. This combination of factors creates an environment in which drivers are not expecting to encounter pedestrians and/or bicyclists.

In the existing condition, residents from the Jackson Heights mobile home neighborhood are required to cross through the TH 169 and TH 41/CSAH 78 intersection to access a convenience store (Super America) located in the southeast quadrant of the intersection. Additionally, guests of the Value Inn hotel (located just south of the TH 169 and TH 41/CSAH 78 intersection) also have to cross the intersection (as well as walk along TH 169) to access the Super America or the Holiday Gas Station (located in the northwest quadrant of the intersection). As traffic increases and traffic operations become worse, crossing the corridor for non-motorized users coming from Jackson Heights, the Value Inn and future residential developments will become even more challenging.

TH 41/CSAH 78 is identified as a Tier 2 corridor in the Metropolitan Council's Regional Bicycle Transportation Network. This means that the corridor has been identified at a regional level as a

transportation route for bicyclists. The current intersection is not consistent with this regional vision for bicycle accommodations.

US Fish and Wildlife Refuge and Minnesota Department of Natural Resources (DNR) parkland are located along the Minnesota River, with a series of hiking trails. Access to the lands are provided via the Minnesota Valley State Trail north of TH 41 and a parking lot owned by US Fish and Wildlife west of 145th Street within the project area. Scott County has purchased a former railroad line in this area with the planned intent to construct a regional trail with connections to the existing trails and future connections into Carver County to the west and to the east generally along the CSAH 14 corridor. These planned pedestrian and bicyclist activities are incompatible with current traffic conditions and the lack of non-motorized facilities or accommodations across TH 169.

Stormwater Deficiencies

TH 169, local roadways and the Union Pacific Railway spur were constructed prior to current stormwater infiltration and treatment requirements. As a result, there are situations when current standards are not being met in terms of infiltration and treatment. Existing conditions result in some localized backing up of water and pooling. This is especially true in the southern portion of the project area. In this portion of the project, Picha Creek flows east to west, crossing through dual ten-foot by six-foot box culverts under TH 169 (Bridge #8829) then crossing under the Union Pacific Railroad Spur through 84-inch diameter dual corrugated metal pipe (CMP) culverts. **Figure 14** shows the location of Picha Creek. During the spring melt and periods of heavy rain, the existing culverts restrict the flow of the Creek because they do not have adequate capacity to accommodate additional water flow. As a result, areas within the vicinity of CSAH 14 and TH 169 can retain/pool water.

Consistency with Other Plans

The study area is included in several statewide and local studies. These include the TH 41 Regional River Crossing Tier 1 EIS, the TH 169 Interregional Corridor (IRC) Study, the TH 169 Frontage Road Alignment Study, the Congestion and Mitigation Safety Plan Phase II as well as other completed and on-going study efforts that have assessed and documented issues associated with the TH 169 and TH 41/CSAH 78 intersection area. Each of these studies consistently identify the need to pursue improvements to the intersection and connecting highway segments to address safety and mobility issues. In addition to the studies that have previously been completed, Scott County and MnDOT are currently studying the need for transit improvements on TH 169 from north of I-494 to TH 41. No recommendations have been developed at this time; however, it is not anticipated that there will be transit infrastructure (bus lanes, HOV lanes, etc.) that will need to be considered as far south as the study area.

The TH 41 Regional River Crossing Tier 1 EIS locates a new TH 41 river crossing and a new TH 169 and TH 41/CSAH 78 interchange immediately south of the existing intersection. The Tier 1 EIS is intended to set the course for future right-of-way preservation activities. However, both MnDOT and the Metropolitan Council have acknowledged that funding for the proposed improvements will not be available in the 20-year planning horizon. As a result, considering transportation system improvements that do not directly match the proposed Tier 1 EIS vision is reasonable and practical. That being said, efforts for developing and evaluating alternatives for the study area will actively incorporate opportunities for utilizing potential right of way remnants and designs that can serve future regional movements identified in the Tier 1 EIS.

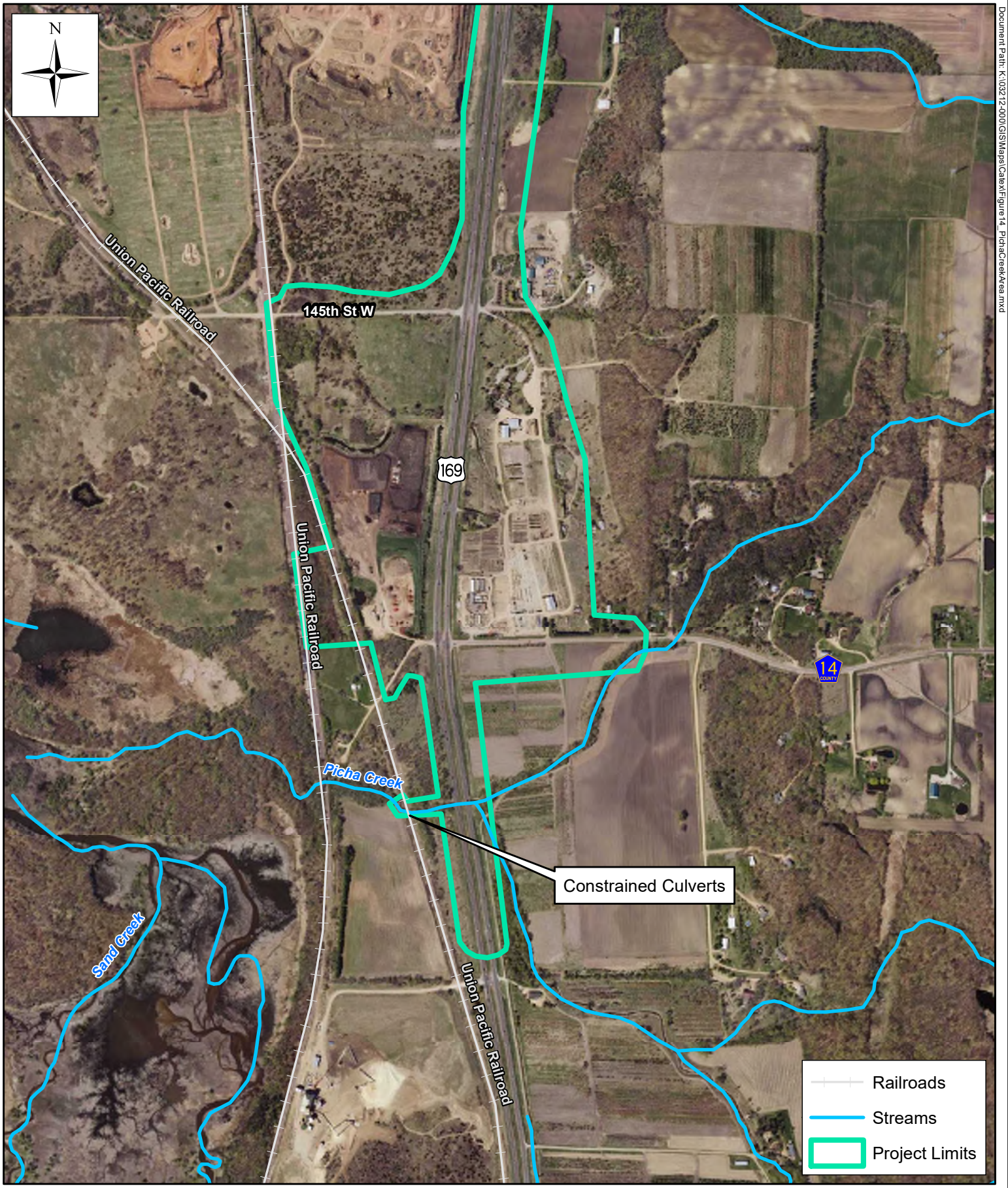


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Figure 14: Picha Creek Area

US 169/TH 41/CSAH 78/CSAH 14 Intersection Improvements
SP 070-596-013/7005-121/7009-81/7010-109
Scott County, MN
February 2017

0 500 1,000 Feet

The TH 169 IRC Study identified the TH 169 and TH 41/CSAH 78 intersection as a key issue and documented the need to pursue improvements that would remove the signalized intersection to enable the TH 169 corridor to meet mobility and safety goals as part of the vision to implement a limited access highway from Belle Plaine to Edina. The TH 169 Frontage Road Alignment Study set a vision for establishing a supporting frontage/backage road network along TH 169 through Scott County, including the TH 169 and TH 41/CSAH 78 intersection area. This study set the stage for subsequent and ongoing studies aimed at formalizing the location, funding, and implementation of a local road network that would enable the removal of direct local street and private driveway access onto TH 169. The TH 169 Frontage Road Study in 2003 also identified potential interchange designs at TH 169 and CSAH 14.

Attachment B – Traffic Forecast Memo

Building a Better World for All of Us®

MEMORANDUM

TO: Jon Chiglo, PE

FROM: Haifeng Xiao, PE

DATE: November 3, 2016

RE: US 169 at TH 41 Intersection Study - Traffic Forecasts
SEH No. WSBAS 134559 14.00

Note: this memorandum supersedes the traffic forecast memorandum dated March 2, 2016.

OVERVIEW

Scott County is conducting the US Highway (US) 169 at Trunk Highway (TH) 41/County State Aid Highway (CSAH) 78 Intersection Study in the Jackson Township and Louisville Township area (shown in **Figure 1**). The purpose of this memorandum is to document the methodology, assumptions and results of the traffic forecasting process. In addition to the US 169 at TH 41/CSAH 78 and CSAH 14 intersections, the scope of the traffic forecasting process also includes adjacent intersections along US 169 and TH41/CSAH 78. The study intersections and their IDs assumed for modeling purposes are listed as follows:

Core Study Intersections

- US 169 at TH 41/CSAH 78 (#108, Signal)
- US 169 at CSAH 14 (#124, Side Street Stop)

Intersections North of TH 41/CSAH 78

- US 169 at Mobile Manor access (#100, Side Street Stop)
- US 169 at Weckman Property access (#102, Side Street Stop)
- US 169 at Gas Station access (#104, Side Street Stop)

Intersections South of TH 41/CSAH 78

- US 169 at Valu Stay Inn Access (#112, Side Street Stop)
- US 169 at 130th Street (#114, Side Street Stop)
- US 169 at 133rd Street (#116, Side Street Stop)
- US 169 at Bryan Rock/Anchor Block access (#118, Side Street Stop)
- US 169 at Drew Concrete access (#120, Side Street Stop)
- US 169 at 145th Street (#122, Side Street Stop)

Intersections West of US 169

- TH 41 at Rail Road Frontage Road (#200, Side Street Stop)
- TH 41 at Dem Con Drive (#202, Signal)

Intersections East of US 169

- TH 41 at Ventura Court (#206, Side Street Stop)
- TH 41 at Commercial access (#208, Side Street Stop)
- TH 41 at Emery Way (#210, Side Street Stop)

Daily traffic forecasts were developed for major roadway segments in the study area and A.M. and P.M. peak hour turning movement (TM) traffic forecasts were developed for all the study intersections. The peak hour TM traffic forecasts will be used for the subsequent operations analysis.

TRAFFIC FORECAST SCENARIOS

Daily and peak hour traffic forecasts for this project were developed largely based on the utilization of the 2040 Scott County Model (SC Model), which was based on the Twin Cities Collar County Travel Demand Model (TCCCTD model) and was updated in early 2015 to incorporate Thrive MSP 2040 which was adopted by the Metropolitan Council in May 2014. The 2040 SC model network includes all the roadway improvements completed or in progress, improvements identified in Scott County's 2013 CIP (Capital Improvement Program) and a subset of the more likely fiscally constrained roadway improvements based on input from the County. The improvements are documented in the *Scott County Travel Demand Model Update* dated May 3, 2015.

The original 2040 SC model network includes a diamond interchange as a replacement of the existing US 169/TH 41/CSAH 78 signal intersection. A 2040 No Build Scenario was created by removing the interchange and associated US 169 capacity improvements in the current 2040 SC model. A number of build scenarios have been studied and analyzed for the study. Based on the latest plan, the 2040 build scenario assumes the following roadway network changes:

- Full access interchange to replace the existing US 169/TH 41/CSAH 78 signal
- CSAH 14 Bridge Over US 169 with Right In/Right Out Access at the existing CSAH 14 intersection (#124)
- Right In/Right Out Only Access on US 169 for Bryan Rock/Anchor Block (#118)
- Closure of all other accesses along US 169 between Mobile Manor (#100) and CSAH 14 (#124).
- Frontage Roads on both sides of US 169 to accommodate the access closure.

An evaluation of different options for the US 169/TH 41/CSAH 78 interchange is currently underway. TM traffic forecasts have been developed only for the diamond interchange build option. The TM forecasts will be rerouted as needed to reflect different interchange configurations during the course of the traffic operations analysis.

TRAFFIC FORECAST METHODOLOGY AND STEPS

The daily traffic forecasts for major roadway segments and peak hour turning movements for the study intersections in the study area were developed using the following steps:

1. The existing and historical ADTs were collected from MnDOT GIS database for major roadway segments in the study area. Existing traffic turning movement counts were collected for the study intersections during the weekdays in October, 2015. The peak hours were found to occur from 7:00 AM – 8:00 AM and 4:30 PM – 5:30 PM.
2. The base 2010 and 2040 socio-economic (SE) data in the SC Model were reviewed for accuracy.
3. The base 2010 and latest 2040 SC model was refined in the study area to create corresponding subarea models. The subarea models include a more detailed Traffic Analysis Zones (TAZs) and arterial street networks within the study area to better characterize trip patterns.
4. In addition to the US 169/TH 41/CSAH 78 interchange, the 2040 Build conditions assume that all side street accesses between Mobile Manor and CSAH 14 on US 169 are closed except for Bryan Rock access.
5. All existing, 2040 No Build and Build subarea models were run to produce daily traffic outputs.

6. The 2040 model outputs for major roadway segments and crossing streets in the study area were adjusted to develop final daily traffic forecasts to account for the differences between the actual counts and base year model 2010 outputs.
7. The peak hour turning movement traffic forecasts for the study intersections were developed based on the link level daily forecast growth and were balanced to reflect different growth for different approaches.

SOCIO-ECONOMIC DATA

The SC Model utilizes the traditional four-step modeling process which includes trip generation, trip distribution, mode choice, and trip assignment. The Socio-Economic (SE) data, including household, population and employment, is one of the most important inputs for the model. The 2010 and 2040 SE data for the immediate study area, City of Shakopee, Scott County and the metropolitan area were reviewed for accuracy. The impacts of constrained and non-constrained land use scenarios for the City of Shakopee were analyzed and it was determined that the constrained land use plan developed in February 2016 should be used for this study. **Figure 2** shows the revised SE data for the TAZs in the study area. It is noted that a few TAZs outside the study area in the SC Model were adjusted accordingly so that the projected totals in the county-wide area remained the same as the original plan. **Table 1** summarizes the SE data for different areas in the updated SC Model. The table shows that the City of Shakopee and Scott County have similar growth rates for all the SE data and the rates are higher than those for the metropolitan area. It is noted that the annual employment growth in the immediate study area falls in between the Scott County and the metropolitan area while the households/population are projected to decrease between 2010 and 2040.

Table 1
Socio-Economic Data Summary for Study Area[1], Scott County and Metropolitan Area

Area	Year	Population	Households	Total Employment
Study Area	2010	1,589	604	703
	2040	1,364	524	1,112
	Annual Growth	**-0.5%**	**-0.5%**	**1.5%**
City of Shakopee	2010	37,076	12,772	18,831
	2040	57,400	21,500	31,900
	Annual Growth	**1.5%**	**1.8%**	**1.8%**
Scott County	2010	129,927	45,108	41,526
	2040	201,898	77,800	67,930
	Annual Growth	**1.5%**	**1.8%**	**1.7%**
Metro	2010	2,800,469	1,117,635	1,525,048
	2040	3,676,198	1,509,960	2,102,120
	Annual Growth	**0.9%**	**1.0%**	**1.1%**

[1]Note: The Study Area is bound by CSAH 69 (E), Bluff Drive (S) and the Minnesota River (W & N)

TRAFFIC FORECASTS RESULTS

Based on the methodology and the assumptions, the daily and peak hour traffic forecasts were developed for major roadway segments and study intersections under 2040 No Build and Build conditions. **Figure 3** shows the existing and 2040 No Build and Build daily traffic forecasts.

Figure 4A and **Figure 4B** show the existing peak hour Turning Movements (TM) counts.

Figure 5A and **Figure 5B** show the 2040 No Build peak hour TM traffic forecasts.

Figure 6A and **Figure 6B** show the 2040 Build peak hour TM traffic forecasts assuming a tight diamond interchange configuration and closures of all the side streets except for Right In/Right Out Accesses at Bryan Rock and CSAH 14 in the study area.

Cc:
Graham Johnson, SEH
Chris Hiniker, SEH
Jack Corkle, WSB

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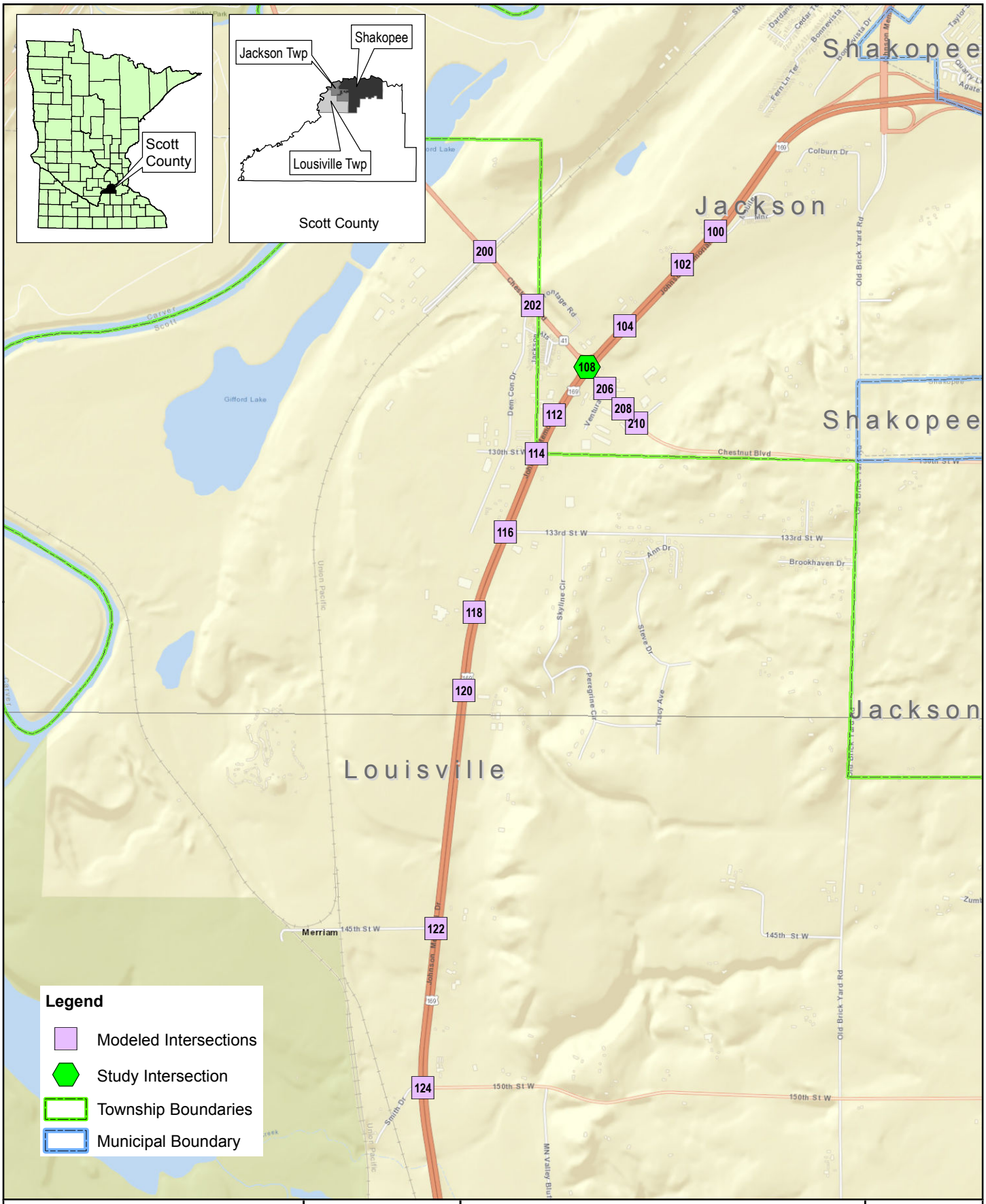

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SEH

0 0.125 0.25 Miles

Project: WSBAS 134559
Print Date: 10/28/2016

Map by: hxiao
Projection:Scott County Coordinates
Source: SEH, Bing, MnDOT

Project Location

US 169 & TH 41 Improvements
Scott County, Minnesota

Figure 1

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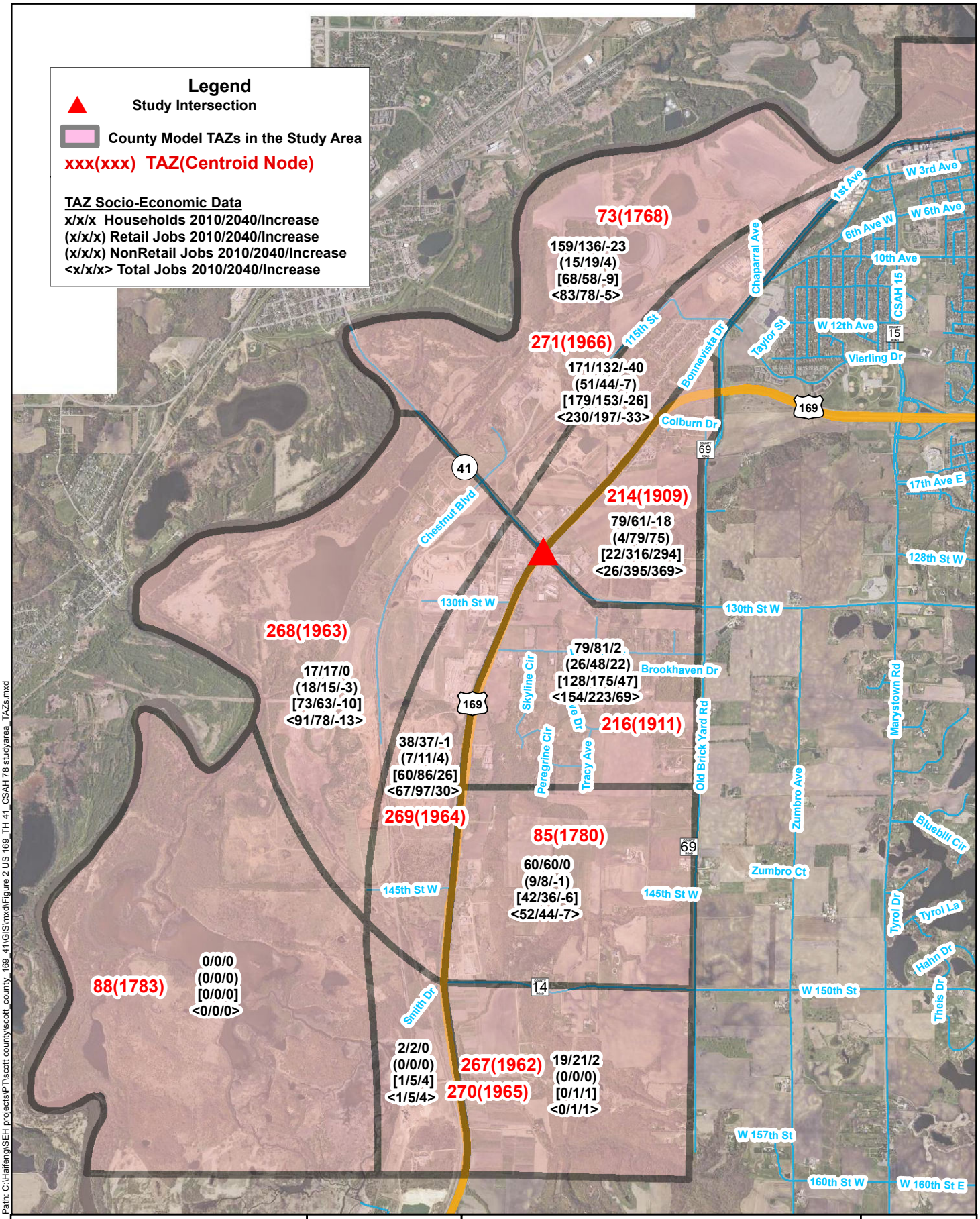

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SEH

0 0.25 0.5 Miles

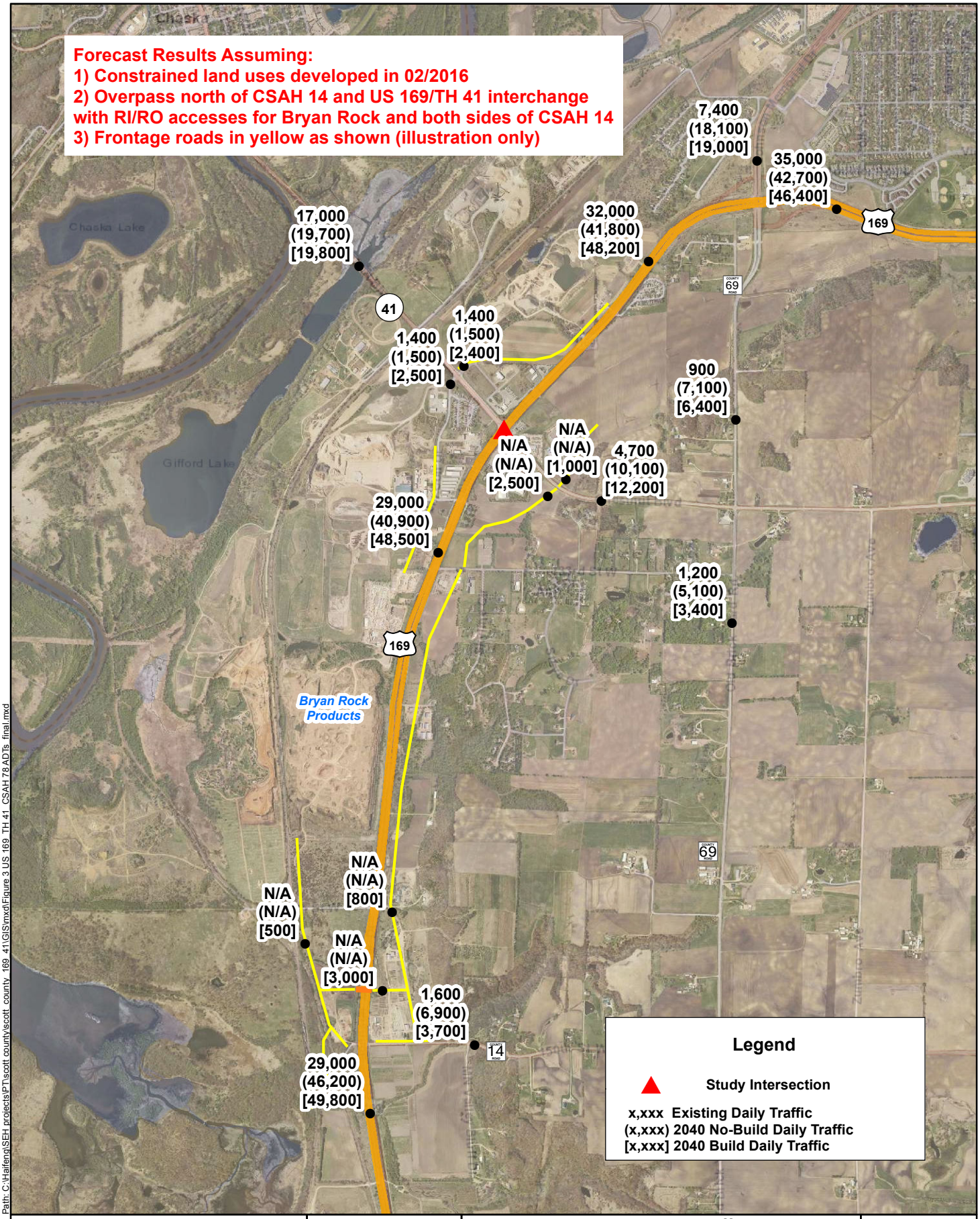
Project: WSBAS 134559
Print Date: 10/27/2016

Map by: hxiao
Projection:Scott County Coordinates
Source: SEH, Bing, MnDOT

Study Area TAZs

US 169 & TH 41 Improvements
Scott County, Minnesota

Figure 2



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SEH

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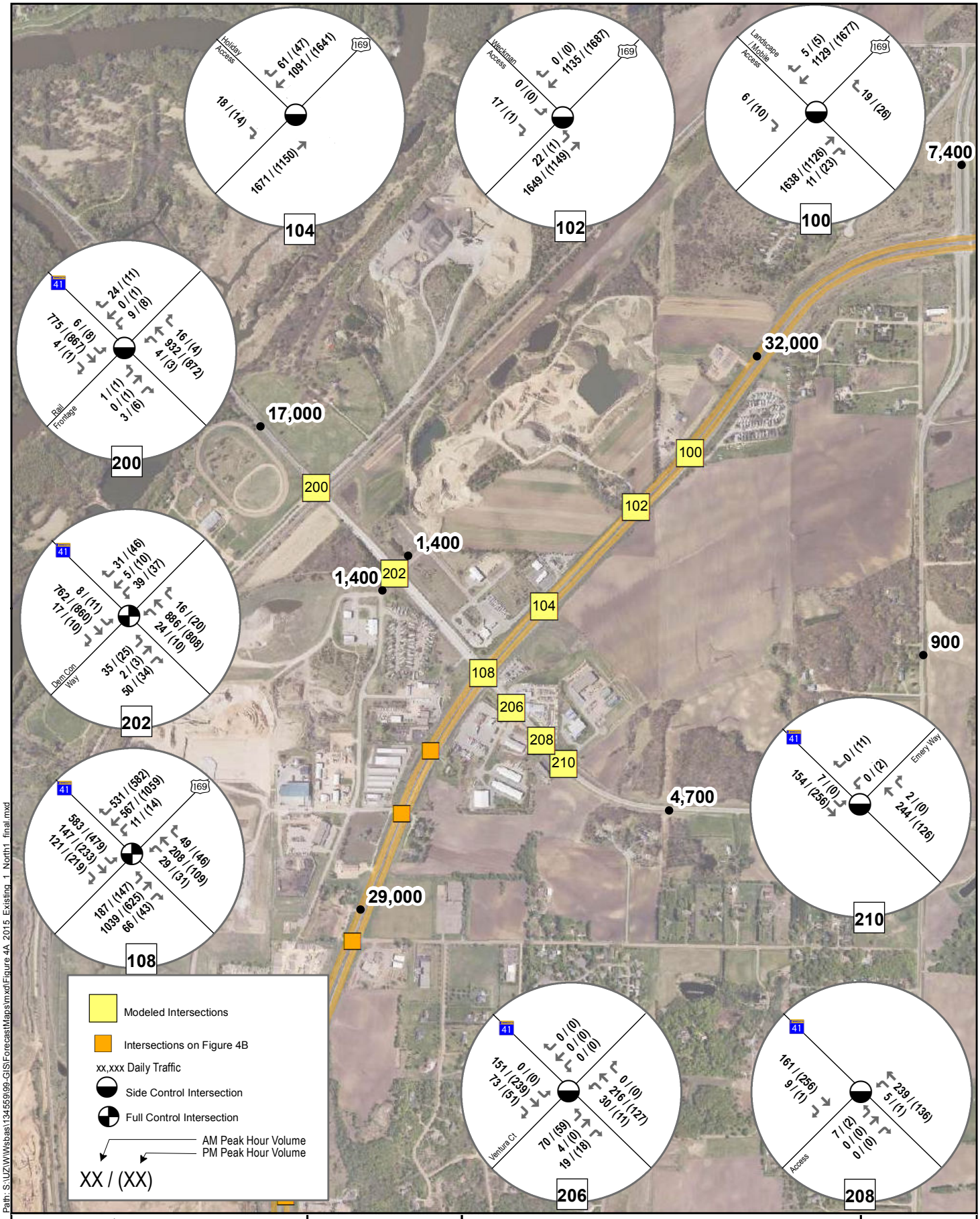
Project: WSBAS 134559
Print Date: 10/28/2016

Map by: hxiao
Projection:Scott County Coordinates
Source: SEH, Bing, MnDOT

Existing and 2040 Daily Traffic Forecasts (October 2016 Update)

US 169 & TH 41 Improvements
Scott County, Minnesota

Figure 3



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SEH

0 0.125 0.25 Miles

Project: WSBAS 134559
Print Date: 10/28/2016

Map by: hxiao
Projection:Scott County Coordinates
Source: SEH, Bing, MnDOT

2015 Counts

US 169 & TH 41 Improvements
Scott County, Minnesota

Figure 4A

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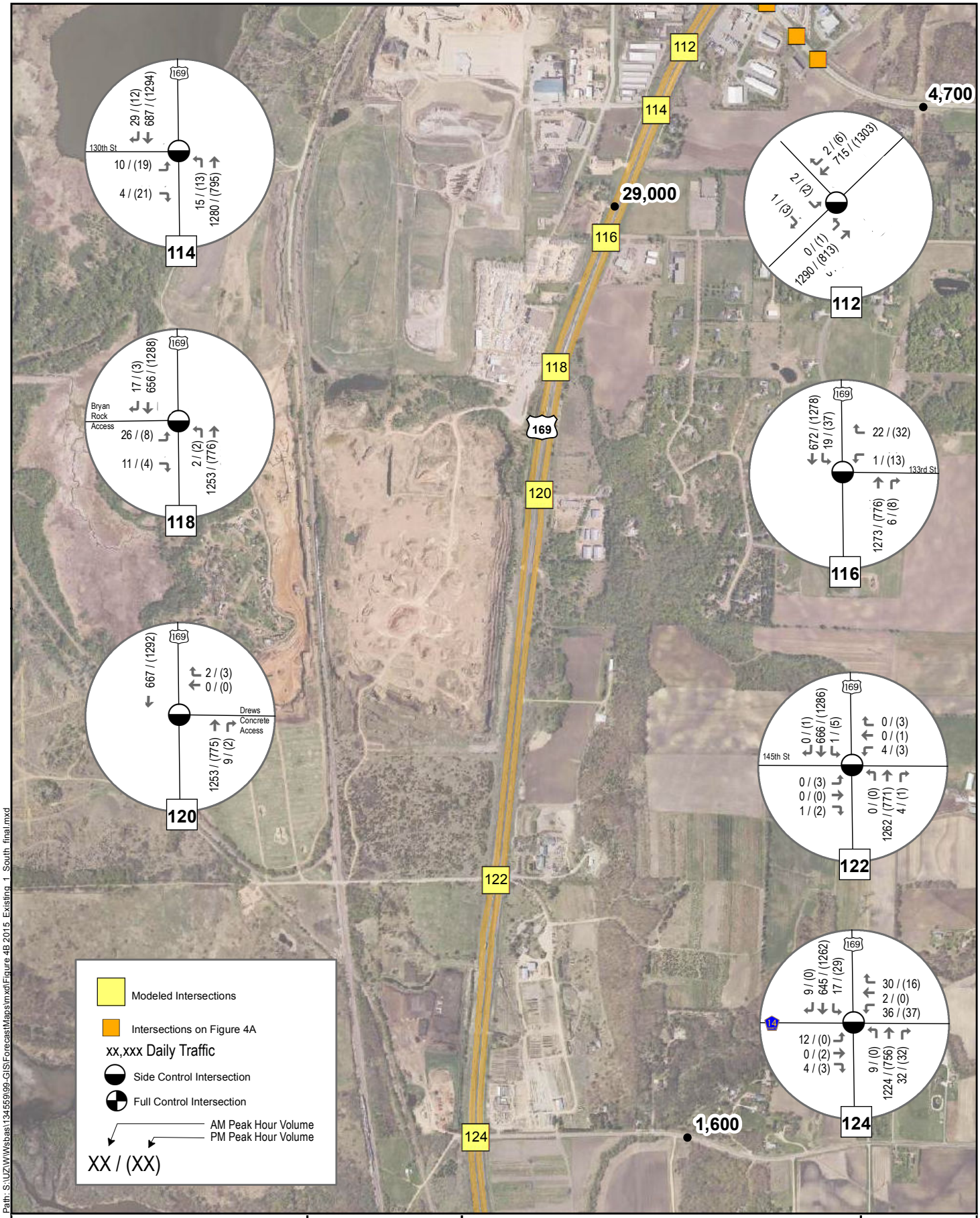

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SEH

0 0.125 0.25 Miles

Project: WSBAS 134559
Print Date: 10/28/2016

Map by: hxiao
Projection:Scott County Coordinates
Source: SEH, Bing, MnDOT

2015 Counts

US 169 & TH 41 Improvements
Scott County, Minnesota

Figure 4B

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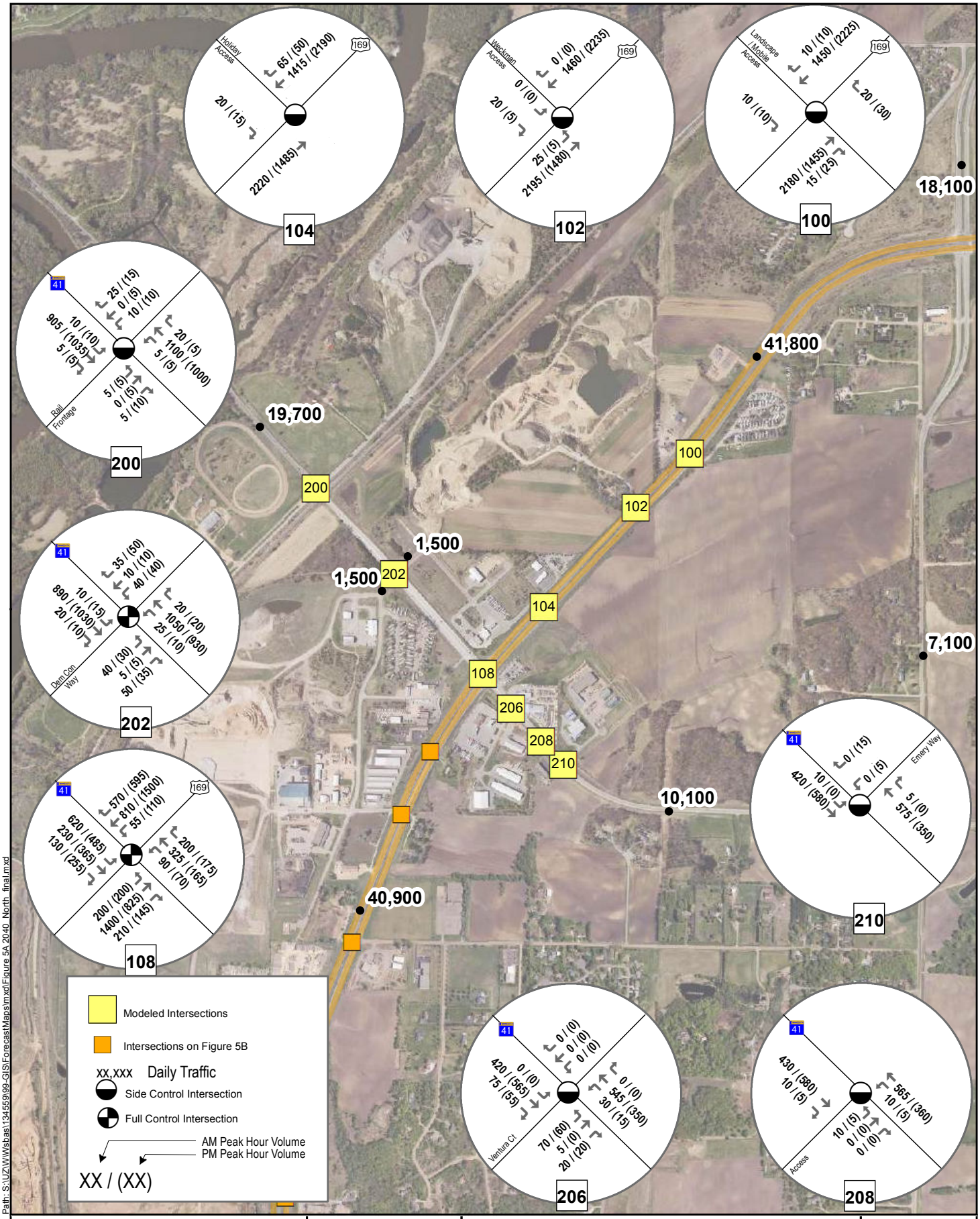


Path: S:\UZW\Wsbas\134559\99-GIS\ForecastMaps\mxd\Figure 5A 2040 North final.mxd

SEH

0 0.125 0.25 Miles

Project: WSBAS 134559
Print Date: 10/28/2016

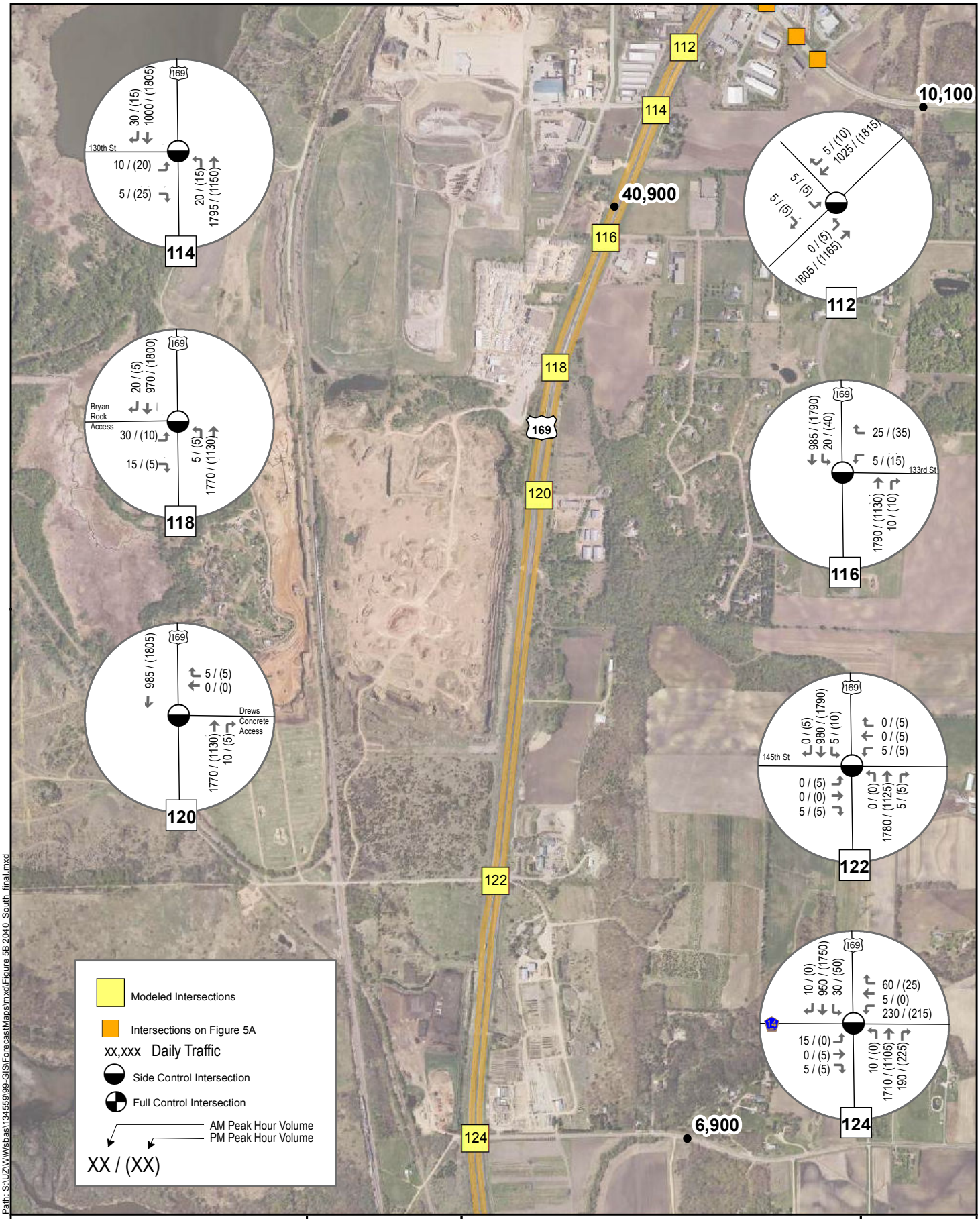
Map by: hxiao
Projection:Scott County Coordinates
Source: SEH, Bing, MnDOT

2040 No-Build Projections

US 169 & TH 41 Improvements
Scott County, Minnesota

Figure 5A

This map is neither a legally recorded map nor a survey map and is not intended to be used as one. This map is a compilation of records, information, and data gathered from various sources listed on this map and is to be used for reference purposes only. SEH does not warrant that the Geographic Information System (GIS) Data used to prepare this map are error free, and SEH does not represent that the GIS Data can be used for navigational, tracking, or any other purpose requiring exacting measurement of distance or direction or precision in the depiction of geographic features. The user of this map acknowledges that SEH shall not be liable for any damages which arise out of the user's access or use of data provided.



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SEH

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Project: WSBAS 134559
Print Date: 10/28/2016

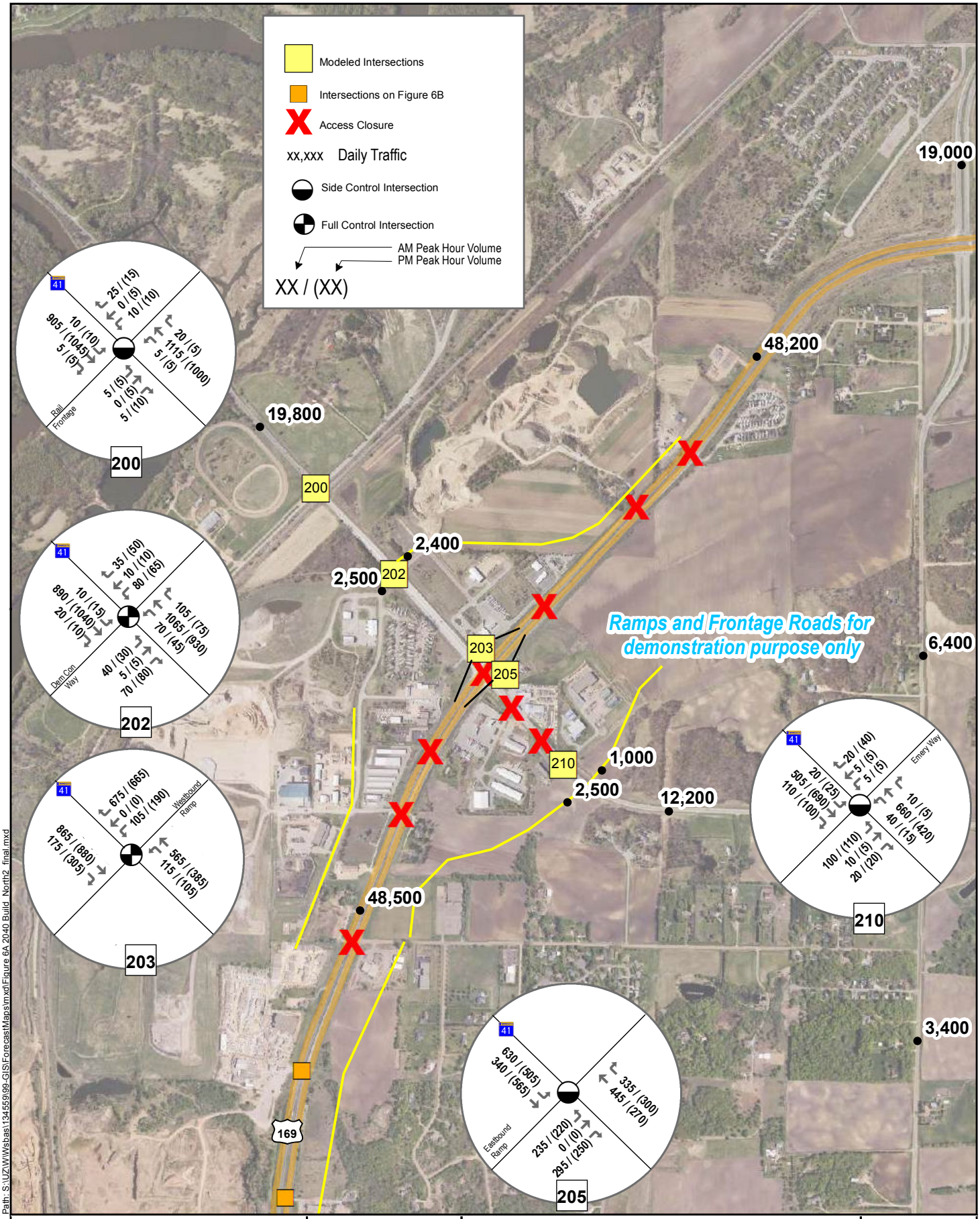
Map by: hxiao
Projection:Scott County Coordinates
Source: SEH, Bing, MnDOT

2040 No-Build Projections

US 169 & TH 41 Improvements
Shakopee, Minnesota

Figure 5B

This map is neither a legally recorded map nor a survey map and is not intended to be used as one. This map is a compilation of records, information, and data gathered from various sources listed on this map and is to be used for reference purposes only. SEH does not warrant that the Geographic Information System (GIS) Data used to prepare this map are error free, and SEH does not represent that the GIS Data can be used for navigational, tracking, or any other purpose requiring exacting measurement of distance or direction or precision in the depiction of geographic features. The user of this map acknowledges that SEH shall not be liable for any damages which arise out of the user's access or use of data provided.



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SEH

0 0.125 0.25 Miles

Project: WSBAS 134559
Print Date: 10/28/2016

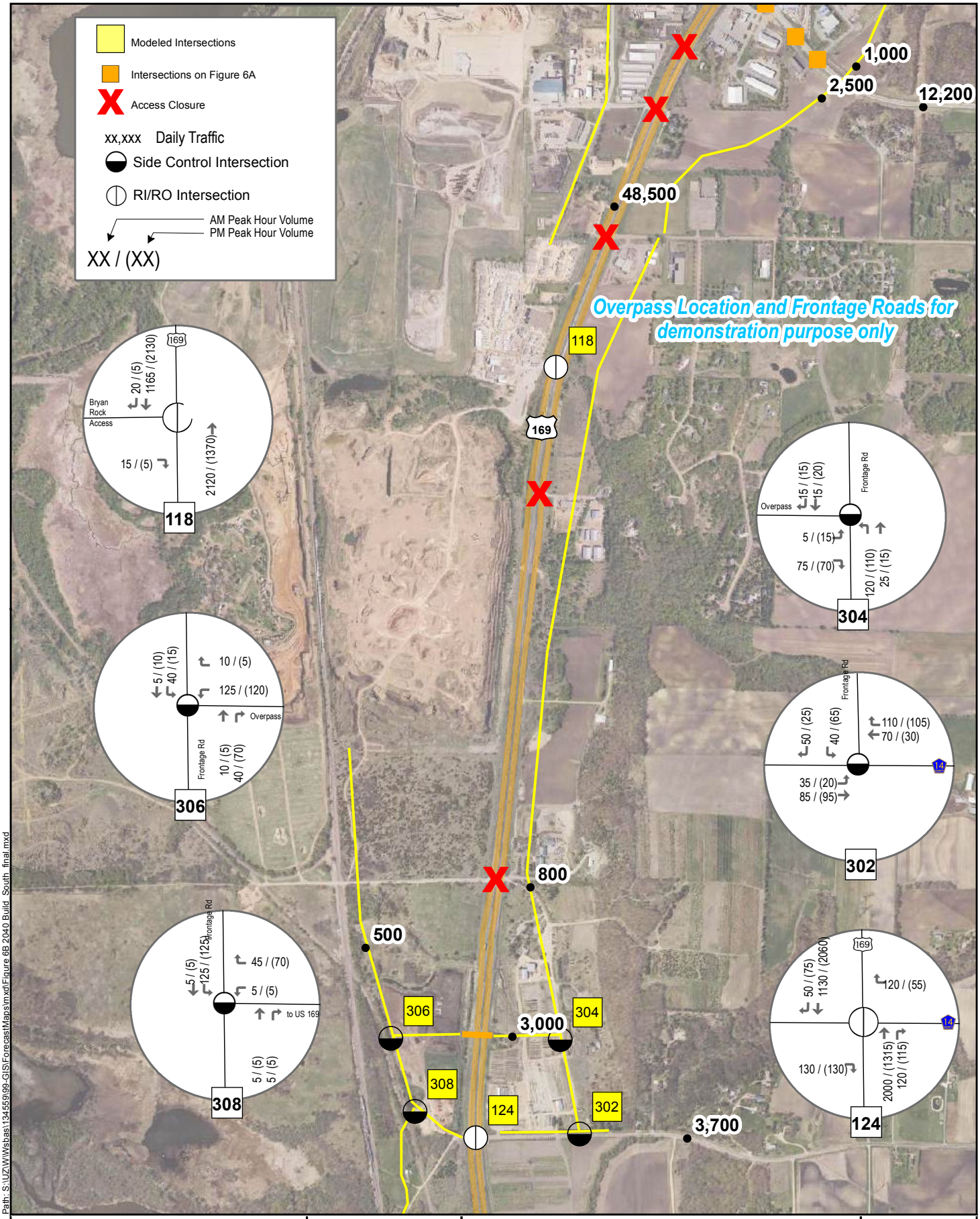
Map by: hxiao
Projection:Scott County Coordinates
Source: SEH, Bing, MnDOT

2040 Build Projections

US 169 & TH 41 Improvements
Scott County, Minnesota

Figure 6A

This map is neither a legally recorded map nor a survey map and is not intended to be used as one. This map is a compilation of records, information, and data gathered from various sources listed on this map and is to be used for reference purposes only. SEH does not warrant that the Geographic Information System (GIS) Data used to prepare this map are error free, and SEH does not represent that the GIS Data can be used for navigational, tracking, or any other purpose requiring exacting measurement of distance or direction or precision in the depiction of geographic features. The user of this map acknowledges that SEH shall not be liable for any damages which arise out of the user's access or use of data provided.



Path: S:\UZ\W\Wsbas\134559\99-GIS\ForecastMaps\mxd\Figure 6B 2040 Build South final.mxd

SEH

0 0.125 0.25 Miles

Project: WSBAS 134559
Print Date: 10/28/2016

Map by: hxiao
Projection:Scott County Coordinates
Source: SEH, Bing, MnDOT

2040 Build Projections

US 169 & TH 41 Improvements
Scott County, Minnesota

Figure 6B

This map is neither a legally recorded map nor a survey map and is not intended to be used as one. This map is a compilation of records, information, and data gathered from various sources listed on this map and is to be used for reference purposes only. SEH does not warrant that the Geographic Information System (GIS) Data used to prepare this map are error free, and SEH does not represent that the GIS Data can be used for navigational, tracking, or any other purpose requiring exacting measurement of distance or direction or precision in the depiction of geographic features. The user of this map acknowledges that SEH shall not be liable for any damages which arise out of the user's access or use of data provided.

Attachment C – Existing Conditions and No Build Traffic Memo

Building a Better World
for All of Us®

MEMORANDUM

TO: Jon Chiglo, PE

FROM: Graham Johnson, PE

DATE: November 4, 2016

RE: US 169 at TH 41 Intersection Study - Existing Conditions and No Build
SEH No. WSBAS 134559 14.00

Note: this memorandum supersedes the traffic operations memorandum dated March 2, 2016.

PROJECT DESCRIPTION

This memorandum summarizes the results of the existing and future no build traffic operations analysis performed along US Highway (US) 169 from County Road (CR) 14 to north of the existing at-grade intersection with Trunk Highway (TH) 41 and County State Aid Highway (CSAH) 78. Many of the smaller intersections or access locations surrounding the main intersections at TH 41/CSAH 78 and CSAH 14 were included in the analysis.

The purpose of this project is to improve both traffic safety and traffic operations at the study intersections as well as the surrounding access locations.

For the purpose of this memorandum, US 169 will be referred to as the north-south roadway and TH 41/ CSAH 78 and CSAH 14 will be referred to as the east-west roadway.

EXISTING CONDITIONS

The existing conditions throughout the project area were reviewed and evaluated. This includes existing traffic demands, crash analysis, traffic field observations, and traffic operations.

US 169 is a four-lane divided north/south Principal Arterial; the speed limit through the project area is 55 mph. The 2012 annual average daily traffic (AADT) was 29,500 vehicles per day (vpd) north of TH 41 and 28,000 vpd south of TH 41. South of TH 41 the draft MnDOT 2015 AADT along US 169 is 26,500 which indicates a slight decrease in traffic along the corridor over the last few years; there is no MnDOT data for 2015 north of TH 41. However, a 48-hour count collected in October 2015 as part of this project resulted in daily numbers of 33,000 north of TH 41 and 26,000 to the south.

TH 41 is an A-Minor Arterial that transitions from a two-lane undivided roadway to a four-lane divided roadway near the US 169 intersection; the speed limit through the project area is 55 mph. The 2012 AADT was 18,400 vpd west of US 169; MnDOT does not have a draft 2015 value. However, a 48-hour count collected in October 2015 as part of this project resulted in a daily numbers of 17,700 west of US 169.

CSAH 78 is an A-Minor Arterial that transitions from a two-lane undivided roadway that is divided at the intersection with US 169 and includes a full complement of turning and through travel lanes; the speed

limit through the project area is 55 mph. The 2011 AADT was 4,150 vpd east of US 169; a draft 2015 AADT of 4,650 indicates an increase in traffic on this leg. A 48-hour count collected in October 2015 as part of this project resulted in a daily numbers of 5,600 east of US 169.

The existing at-grade, signalized intersection is in the transition area along US 169 between a freeway section north of TH 41 and a rural highway with limited access to the south. Currently, vehicles coming from the Twin Cities metro area experience a change in speed limit from a 65 mph freeway to 55 mph and must be prepared to stop at the signalized intersection.

Data Collection

Traffic data was collected during October and November of 2015 at 15 intersections. 24-hour video data was captured at each intersection and 13-hour turning movement counts were collected for all intersections. The key study intersection of US 169/TH 41 included an additional 24-hour video so that a 48-hour turning movement count could be completed. Due to the high number of intersections included in the study, only the turning traffic to and from the minor intersections or access locations was counted and through traffic was balanced from the US 169/TH 41 intersection.

48-Hour directional speed and vehicle classification counts were collected at 2 locations in the project area:

- US 169 north of TH 41
- TH 41 west of Dem Con Drive

Intersection turning movement data was collected at the following intersections (Intersection ID number):

- US 169 at Mobile Manor access (#100)
- US 169 at Weckman Property access (#102)
- US 169 at Gas Station access (#104)
- US 169 at TH 41/CSAH 78 (#108)
- US 169 at 130th Street (#114)
- US 169 at 133rd Street (#116)
- US 169 at Bryan Rock/Anchor Block access (#118)
- US 169 at Drew Concrete access (#120)
- US 169 at 145th Street (#122)
- US 169 at CSAH 14 (#124)
- TH 41 at Rail Road Frontage Road (#200)
- TH 41 at Dem Con Drive (#202)
- TH 41 at Ventura Court (#206)
- TH 41 at Commercial access (#208)
- TH 41 at Emery Way (#210)

The attached Figure 1 shows the project location and study intersections. Attached Figures 2A and 2B show intersection traffic demands for the am and pm peak hour turning movement counts that were collected from the intersection videos.

Heavy Vehicles

US 169 is an Interregional Corridor (IRC) that connects Mankato to the Twin Cities Metropolitan area. The IRC system connects the largest regional trade centers in Minnesota and US 169 is a vital connection between southern Minnesota and the metro area and carries a high volume of truck traffic. TH 41 also carries a high volume of truck traffic in the area due to the surrounding commercial and industrial properties.

MnDOT's official Heavy Vehicle AADT (HCAADT) shows a 10% HCAADT on US 169 north of TH 41 and 8% on US 169 south of TH 41; TH 41 has an 8% HCAADT west of US 169. The 48-hour counts collected in November 2015 as part of this project indicated that approximately 13% to 16% of the daily traffic demands are heavy vehicles. This could indicate considerable seasonal fluctuations in heavy vehicle traffic demands along both corridors.

While the majority of trucks along US 169 are traveling straight through the intersection, there is also a high volume of trucks turning to and from TH 41.

Crash Analysis

Crash information was obtained from the MnDOT Crash Mapping Analysis Tool (MnCMAT) for the previous 5-year timeframe: January 1st, 2010 through December 31st, 2014. During the 5-year analysis period, a total of 260 crashes were recorded along both US 169 and TH 41 in the study area.

Crash and severity rates were calculated for all intersections and segment sections along the corridor. Crash rates are expressed as the number of crashes per million entering vehicles at an intersection and crashes per million vehicles miles along a segment; severity rates are a weighted average rate based on the different severity types. Crash severity comprises 5 separate types including fatal, an incapacitating injury (Severity A), a non-incapacitating injury (Severity B), a possible injury (Severity C), or a property damage crash.

The rates were compared to the MnDOT statewide average rates for similar intersection and section types. A critical crash and severity rate was calculated for each intersection and segment; the critical rates are a statistical rate calculated for each individual intersection or segment based on amount of vehicle exposure. If an intersection or segment crash rate is at or above the critical rate, it indicates a sustained crash problem and these locations are considered to be unsafe.

All sixteen intersection/access locations were evaluated, eleven intersections experienced two or more crashes during the 5-year history. Three of the intersections have higher rates than the statewide average, with two of those intersections above the calculated critical crash rate. The two intersections are US 169/TH 41 and TH 41/Dem Com Drive; TH 41/Rail Road Frontage Road is above the statewide average and just under the calculated critical rate.

At US 169/TH 41 there was a total of 107 crashes during the study period; it is ranked in the Top 100 worst intersections based on MnDOT crash costs. The majority of the crashes were rear end collisions that occurred during the PM peak period (2 p.m. to 7 p.m.). An abnormally high number of crashes occurred in the southbound direction, approximately 68% of all crashes. There is a spike in the frequency of crashes during the month of September, the average per month crash total is approximately 7, while September had 28 crashes; of the 28, 16 occurred on either Saturday or Sunday.

This spike in September could be attributed to two different factors, the beginning of school and the Renaissance Festival. The beginning of school represents different traffic patterns than during the summer as well as the potential for new drivers. The high number of crashes on weekend days in September could be an implication of the congestion related to the Renaissance Festival that can generate significant queues on US 169.

At TH 41 at Dem Con Drive and at the Rail Road Frontage Road, rear end collisions along TH 41 are frequent with approximately 82% and 71% respectively. At Dem Con Drive, the majority of the crashes occur during the PM peak period and in the eastbound direction. At the Rail Road Frontage Road, the majority of the crashes occur between 9 a.m. and 2 p.m. and were rear-end type collisions for southeast bound TH 41. The majority of rear end collisions appear to occur during freight events when the gate

arms close and all traffic must stop at the rail crossing; a total of 9 crashes were coded with the railroad gated as a contributing factor.

Table 1 Existing Intersection Crash Summary 2010 - 2014

Intersection	Fatal	A	B	C	Property	Total	Crash Rate	Statewide Average	Critical Rate
US 169 at Access Moms/Manor	0	0	0	4	4	8	0.15	0.26	0.44
US 169 at Access Weckman	0	0	0	0	2	2	0.04	0.26	0.44
US 169 at Access Holiday	0	0	0	2	4	6	0.11	0.26	0.44
US 169 at TH 41**	0	1	5	22	79	107	**1.46**	**0.41**	**0.62**
US 169 at Value Inn	0	0	1	2	2	5	0.07	0.26	0.42
US 169 at 130th St	0	0	0	1	5	6	0.11	0.26	0.45
US 169 at 133rd St	0	0	0	0	2	2	0.04	0.26	0.45
US 169 at 145th St	0	0	1	0	1	2	0.04	0.26	0.45
US 169 at 150th St (CSAH 14)	0	0	0	3	4	7	0.13	0.26	0.45
TH 41 at Frontage/Rail Crossing	0	0	2	4	11	17	**0.49**	**0.26**	0.50
TH 41 at Dem Com Dr**	0	0	0	9	18	27	**0.78**	**0.41**	**0.71**

Bold/Underlined indicates intersection crash rate is above either average or critical rate.
Bolded Statewide Average or Critical Rate indicates the intersection exceeds the value.

Roadway segments between the major intersections were evaluated for crash and severity rates; the project was divided into 5 roadway segments. No segments are at or above their calculated critical rates or statewide average rates. Along US 169, the majority of crashes were rear end collisions and the southbound direction included over 60% of the collisions. Similar to the intersection crashes, there is a small pronounced spike in crashes during the month of September. Along TH 41, there are limited number of segment crashes to assess crash patterns.

Attached Tables 4, 5, and 6 includes the full crash analysis summary.

Traffic Operations

The existing traffic operations were analyzed using Synchro/SimTraffic (ver 9) software package. Existing traffic signal timings were obtained from MnDOT for US 169 at TH 41/CSAH 78 and at TH 41 at Dem Con Drive. Traffic operations analysis were conducted to determine the level of service (LOS), delay and queuing information at the existing intersections in the project area.

Intersection Level of Service, as defined in the 2010 Highway Capacity Manual, is a qualitative performance measure that represents quality of service. Six LOS are defined, designated by letters A through F. LOS A represents the best operating conditions from the traveler's perspective and LOS F the worst; LOS D is generally considered acceptable by most agencies.

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.

Special emphasis is given to providing an estimate for the side street stop controlled approaches. Traffic operations at unsignalized intersections with side street stop control typically have acceptable overall

intersection delays and LOS due to the mainline approaches not requiring to stop at the intersection. Therefore, all side street stop controlled intersections also include the worst approach LOS.

The existing operational results are summarized in the table below. Not all access intersections are included in the table below; see attached Tables 7 and 8 for the full analysis results. All intersections currently operate at a LOS D or better during both the AM and PM peak hours; however many of the minor street intersections have long delays accessing US 169.

While the intersection of US 169/TH 41 carries a high volume of traffic, the overall LOS is at an acceptable level for the intersection. The left-turn movements at the intersection operate at a LOS E/F during both peak hours and the TH 41/CSAH 78 through traffic is at a LOS E. It should be noted that the existing signal is not coordinated with other traffic signals (including the intersection with TH 41 and Dem Con Drive) which allows for a long cycle length and enough green time to serve most demands in one cycle.

Table 2 2015 Existing Operations

Intersection	App.	AM PEAK HOUR			PM PEAK HOUR		
		Approach Delay	Intersection Delay	Minor Stop - Worst Approach	Approach Delay	Intersection Delay	Minor Stop - Worst Approach
US 169 at TH 41 (Signal)	NB	**44.6 / D**	**47.9 / D**		33.5 / C	**37.6 / D**	
	SB	27.4 / C			27.9 / C		
	EB	**73.7 / E**			**54.2 / D**		
	WB	**64.2 / E**			**58.1 / E**		
US 169 at 130th St	NB	1.8 / A	1.9 / A	**31.6 / D**	1.8 / A	2.2 / A	**39.3 / E**
	SB	1.4 / A			1.3 / A		
	EB	**31.6 / D**			**39.3 / E**		
US 169 at 133rd St	NB	2 / A	2.1 / A	7.8 / A	1.5 / A	2.2 / A	14.4 / B
	SB	2 / A			2.2 / A		
	WB	7.8 / A			14.4 / B		
US 169 at 145th St	NB	2.5 / A	3.1 / A	**56.4 / F**	1.6 / A	3.9 / A	**40.1 / E**
	SB	3.8 / A			5.1 / A		
	EB	3 / A			**40.1 / E**		
	WB	**56.4 / F**			19 / C		
US 169 at CSAH 14	NB	2.7 / A	4.9 / A	**54.7 / F**	1.7 / A	3.9 / A	**33.7 / D**
	SB	3.3 / A			4 / A		
	EB	**44.8 / E**			22.5 / C		
	WB				**33.7 / D**		
TH 41 at Rail Frontage	NB	15.4 / C	5.8 / A	**67.3 / F**	17.9 / C	3.8 / A	**39.7 / E**
	SB	**67.3 / F**			**39.7 / E**		
	EB	4.6 / A			4.1 / A		
	WB	4.5 / A			2.7 / A		
TH 41 at Dem Con Dr (Signal)	NB	17.2 / B	21.4 / C		17.6 / B	17.3 / B	
	SB	17.7 / B			16 / B		
	EB	21.4 / C			15 / B		
	WB	22.1 / C			19.9 / B		
TH 41 at Ventura Ct	NB	9.5 / A	4.2 / A	9.5 / A	8 / A	8.0 / A	5.4 / A
	SB	0 / A			0 / A		
	EB	4.6 / A			5.4 / A		
	WB	1.9 / A			0.9 / A		

FUTURE CONDITIONS

To evaluate the needs for the project area, traffic forecasts and operations were developed for the design year 2040.

Traffic Forecasts

Daily and peak hour traffic forecasts for this project were developed largely based on the utilization of the 2040 Scott County Model (SC Model), which was based on the Twin Cities Collar County Travel Demand Model (TCCCTD model) and was updated in early 2015 to incorporate Thrive MSP 2040 that was adopted by the Council in May 2014. The 2040 SC model network also includes all the roadway improvements completed or in progress, improvements identified in Scott County's 2013 CIP (Capital Improvement Program) and a subset of the more likely fiscally constrained roadway improvements based on input from the County.

More information about the traffic forecast methodology can be found in the Technical Memorandum *US 169 at TH 41 Intersection Study – Traffic Forecast Memorandum*.

Attached Figures 3A and 3B represent the 2040 No Build turning movement traffic demands.

2040 Traffic Operations

The 2040 traffic demands were analyzed under the existing geometry with only changes to the signal timing data; the operational results are summarized in the table below. Not all access intersections are included in the table below; see attached Tables 9 and 10 for the full analysis results.

With the increased demands, the main study intersection of US 169/TH 41 operates at a LOS F/E for the AM and PM peak hours, respectively. All left-turning vehicles have substantial delays and vehicle storage issues due to not being served within one cycle length.

Many of the minor street and access intersection approaches have significantly increased delays attempting to access US 169. The increased demands along US 169 deliver a reduced number of acceptable gaps for traffic to enter the highway. With significant delays on some of these approaches, motorists will tend to make more risky maneuvers in order to access the highway.

In the AM peak hour, the northbound US 169 demands operate at a LOS F with a queue that extends approximately 1800 feet from the TH 41 intersection and impacts access down to 133rd Street. TH 41 also incurs significant queueing problems that impact the adjacent signal at Dem Con Drive to the west and minor street intersections to the east. In the PM peak hour, the southbound US 169 demands operate at a LOS E with a queue that extends approximately 1600 feet and impacts access locations upstream.

The increase in demands at CSAH 14 result in significant delays due to the existing minor street stop control. When these demands are realized and as delays increases, traffic would likely reroute to other roadways without a change in the intersection operations.

Table 3 2040 No Build Operations

Intersection	App.	AM PEAK HOUR			PM PEAK HOUR		
		Approach Delay	Intersection Delay	Minor Stop - Worst Approach	Approach Delay	Intersection Delay	Minor Stop - Worst Approach
US 169 at TH 41 (Signal)	NB	**100.5 / F**	**103.2 / F**		**48.4 / D**	**67.8 / E**	
	SB	**41.1 / D**			**61.8 / E**		
	EB	**216.9 / F**			**99.2 / F**		
	WB	**89.7 / F**			**68.4 / E**		
US 169 at 130th St	NB	8.4 / A	6.4 / A	**75.9 / F**	2.5 / A	3.7 / A	**96 / F**
	SB	1.9 / A			2.3 / A		
	EB	**75.9 / F**			**96 / F**		
US 169 at 133rd St	NB	2.5 / A	3.2 / A	**38.4 / E**	1.8 / A	3 / A	**30.9 / D**
	SB	3.3 / A			3 / A		
	WB	**38.4 / E**			**30.9 / D**		
US 169 at 145th St	NB	3.4 / A	3.9 / A	**79.2 / F**	2.2 / A	5.4 / A	**84.1 / F**
	SB	4.4 / A			6.4 / A		
	EB	7.1 / A			**84.1 / F**		
	WB	**79.2 / F**			**78 / F**		
US 169 at CSAH 14	NB	4.7 / A	**28.6 / D**	**2618.5 / F**	3 / A	**39.9 / E**	**1973.8 / F**
	SB	5.8 / A			5 / A		
	EB	**193.4 / F**			**102.3 / F**		
	WB	**2618.5 / F**			**1973.8 / F**		
TH 41 at Rail Frontage	NB	**149.8 / F**	**37.2 / E**	**553 / F**	**95.9 / F**	11.2 / B	**228.6 / F**
	SB	**553 / F**			**228.6 / F**		
	EB	**57.6 / F**			10.3 / B		
	WB	7.5 / A			5.2 / A		
TH 41 at Dem Con Dr (Signal)	NB	25.5 / C	**42.6 / D**		22 / C	25.8 / C	
	SB	23.6 / C			18.8 / B		
	EB	**59.9 / E**			25.8 / C		
	WB	31.8 / C			26.9 / C		
TH 41 at Ventura Ct	NB	**231.9 / F**	**32 / D**	**231.9 / F**	**26.8 / D**	7.2 / A	**26.8 / D**
	SB	0 / A			0 / A		
	EB	5.7 / A			7.4 / A		
	WB	**25.4 / D**			2.8 / A		

CONCLUSIONS

The existing operations and safety analysis shows problems under today's traffic demands in the study area. Under the expected growth through the design year, 2040, both safety and operations are expected to continue to decline as demand increases.

Under existing conditions, the US 169/TH 41 intersection has a severe crash problem that has it ranked in the Top 100 worst intersections based on MnDOT crash costs. The existing crash rate is over twice the calculated critical crash rate, indicating a severe safety problem at the intersection. On TH 41, the intersections with Dem Con Drive and the Rail Road Frontage Road are both over the statewide average for similar intersections and the Dem Con Drive intersection is over the critical crash rate.

The main study intersection of US 169/TH 41 has an overall intersection LOS of D or better; however the minor approaches are close to failing and all left-turn movements are at a LOS F. Many of the minor intersections along US 169 have long delays for vehicles trying to enter the highway due to limited gaps in mainline US 169 traffic.

As traffic increases to the 2040 demand numbers, the operations will degrade quickly. Under 2040 demands, the US 169/TH 41 will fail and operate at LOS F in the AM peak and a LOS E in the PM peak. All left-turn movements and the minor approach through movements will operate at a LOS F due to the reduction in available traffic gaps. Queuing from the intersection will block many of the adjacent access locations.

Many of the minor street approaches will have significant delay increases trying to enter US 169; these delays could lead to additional safety issues as motorists are more likely to take a riskier maneuver to enter US 169.

The existing at-grade, signalized intersection has current safety and operational problems that will be amplified as demands increase over time. It is recommended to evaluate potential mitigations for the study intersection and surrounding access locations.

gtj
Figure 1 Project Location
Figure 2A and 2B Existing Traffic Demands
Figure 3A and 3B 2040 No Build Traffic Demands
Tables 4 through 6 Crash Summary
Tables 7 and 8 Existing Operational MOE's
Tables 9 and 10 2040 No Build Operational MOE's

c: Chris Hiniker, SEH
Jack Corkle, WSB

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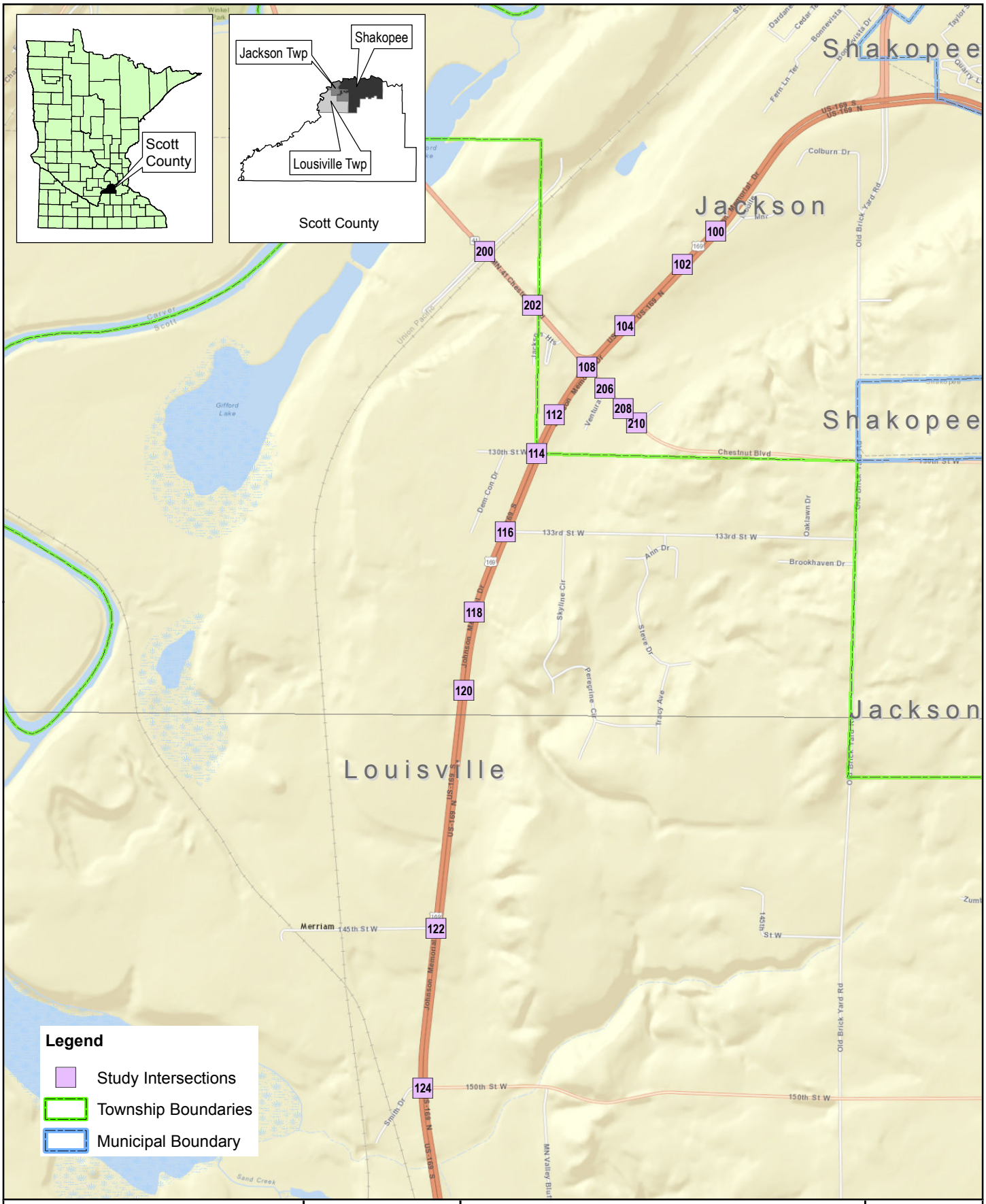

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SEH

0 0.125 0.25 Miles

Project: WSBAS 134559
Print Date: 12/17/2015

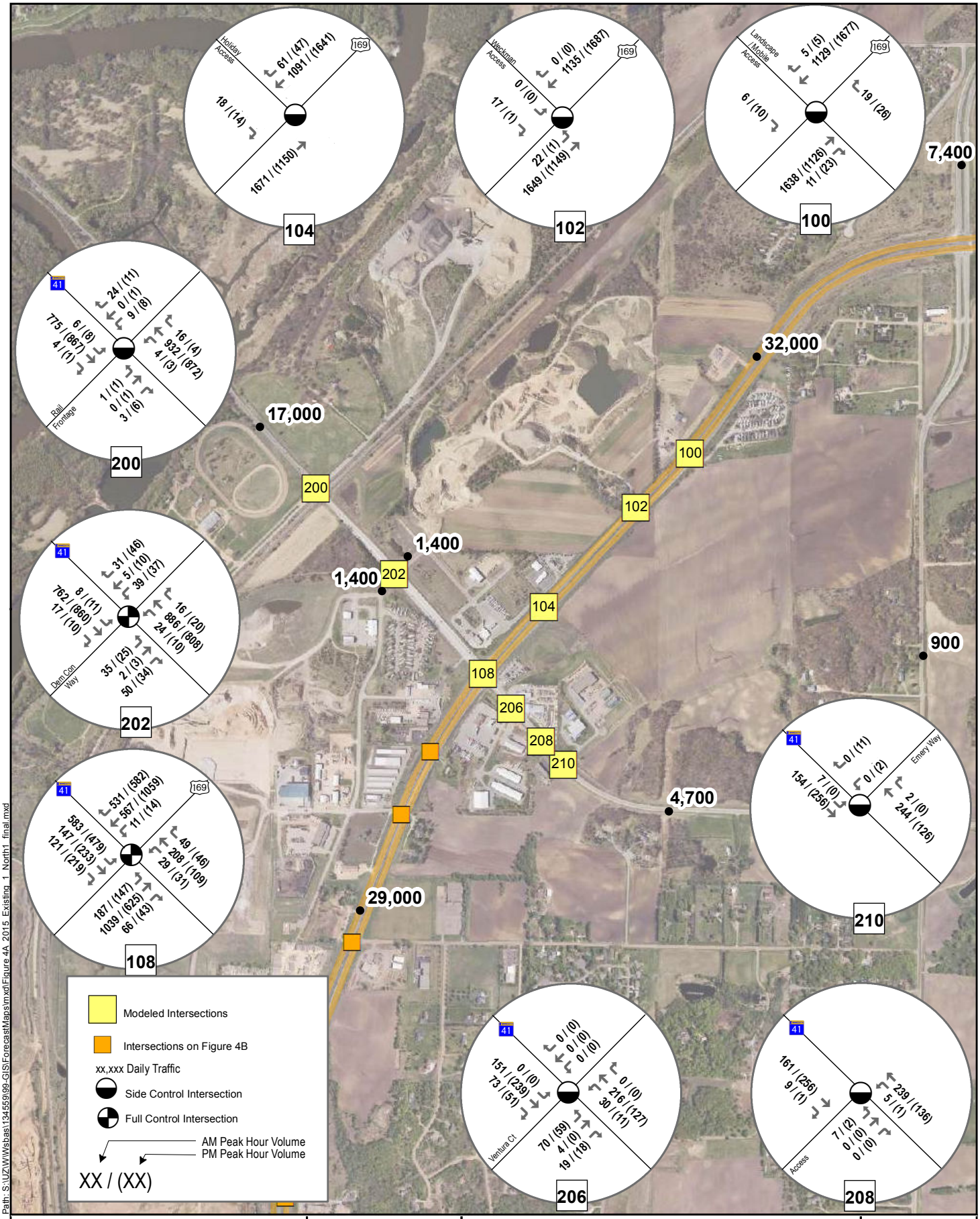
Map by: msteuernagel
Projection:Scott County Coordinates
Source: SEH, Bing, MnDOT

Project Location

US 169 & TH 41 Improvements
Shakopee, Minnesota

Figure 1

This map is neither a legally recorded map nor a survey map and is not intended to be used as one. This map is a compilation of records, information, and data gathered from various sources listed on this map and is to be used for reference purposes only. SEH does not warrant that the Geographic Information System (GIS) Data used to prepare are error free, and SEH does not represent that the GIS Data can be used for navigational, tracking, or any other purpose requiring exacting measurement of distance or direction or precision in the depiction of geographic features. The user of this map acknowledges that SEH shall not be liable for any damages which arise out of the user's access or use of data provided.



Path: S:\UZW\Wsbas\134559\99-GIS\ForecastMaps\mxd\Figure 4A_2015_Existing_1_North1_final.mxd

SEH

0 0.125 0.25 Miles

Project: WSBAS 134559
Print Date: 10/28/2016

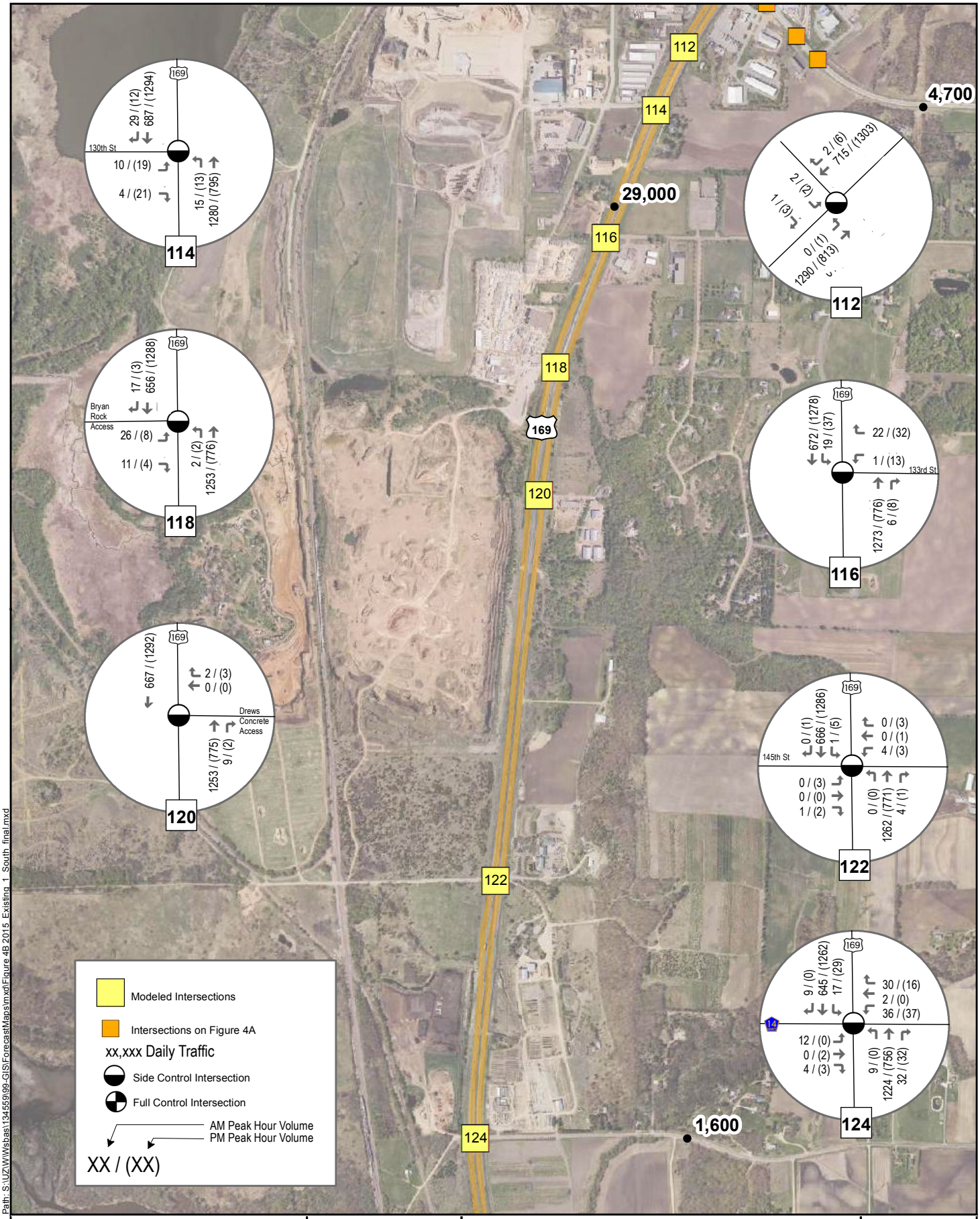
Map by: hxiao
Projection:Scott County Coordinates
Source: SEH, Bing, MnDOT

2015 Counts

US 169 & TH 41 Improvements
Scott County, Minnesota

Figure 2A

This map is neither a legally recorded map nor a survey map and is not intended to be used as one. This map is a compilation of records, information, and data gathered from various sources listed on this map and is to be used for reference purposes only. SEH does not warrant that the Geographic Information System (GIS) Data used to prepare this map are error free, and SEH does not represent that the GIS Data can be used for navigational, tracking, or any other purpose requiring exacting measurement of distance or direction or precision in the depiction of geographic features. The user of this map acknowledges that SEH shall not be liable for any damages which arise out of the user's access or use of data provided.



Path: S:\UZW\Wsbas\134559\99-GIS\ForecastMaps\mxd\Figure 4B 2015 Existing 1 South final.mxd

SEH

0 0.125 0.25 Miles

Project: WSBAS 134559
Print Date: 10/28/2016

Map by: hxiao
Projection:Scott County Coordinates
Source: SEH, Bing, MnDOT

2015 Counts

US 169 & TH 41 Improvements
Scott County, Minnesota

Figure 2B

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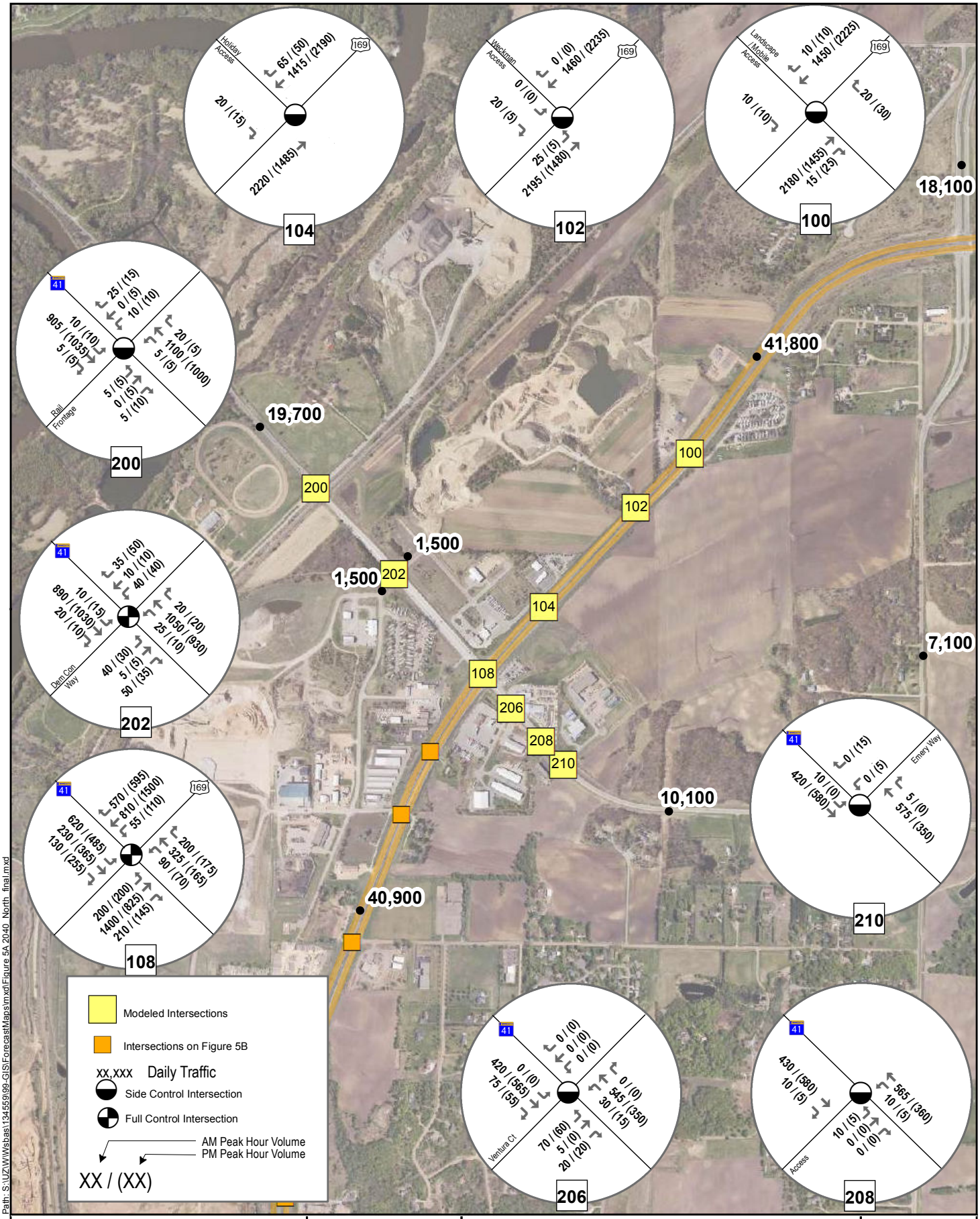


Path: S:\UZW\Wsbas\134559\99-GIS\ForecastMaps\mxd\Figure 5A 2040 North final.mxd

SEH

0 0.125 0.25 Miles

Project: WSBAS 134559
Print Date: 10/28/2016

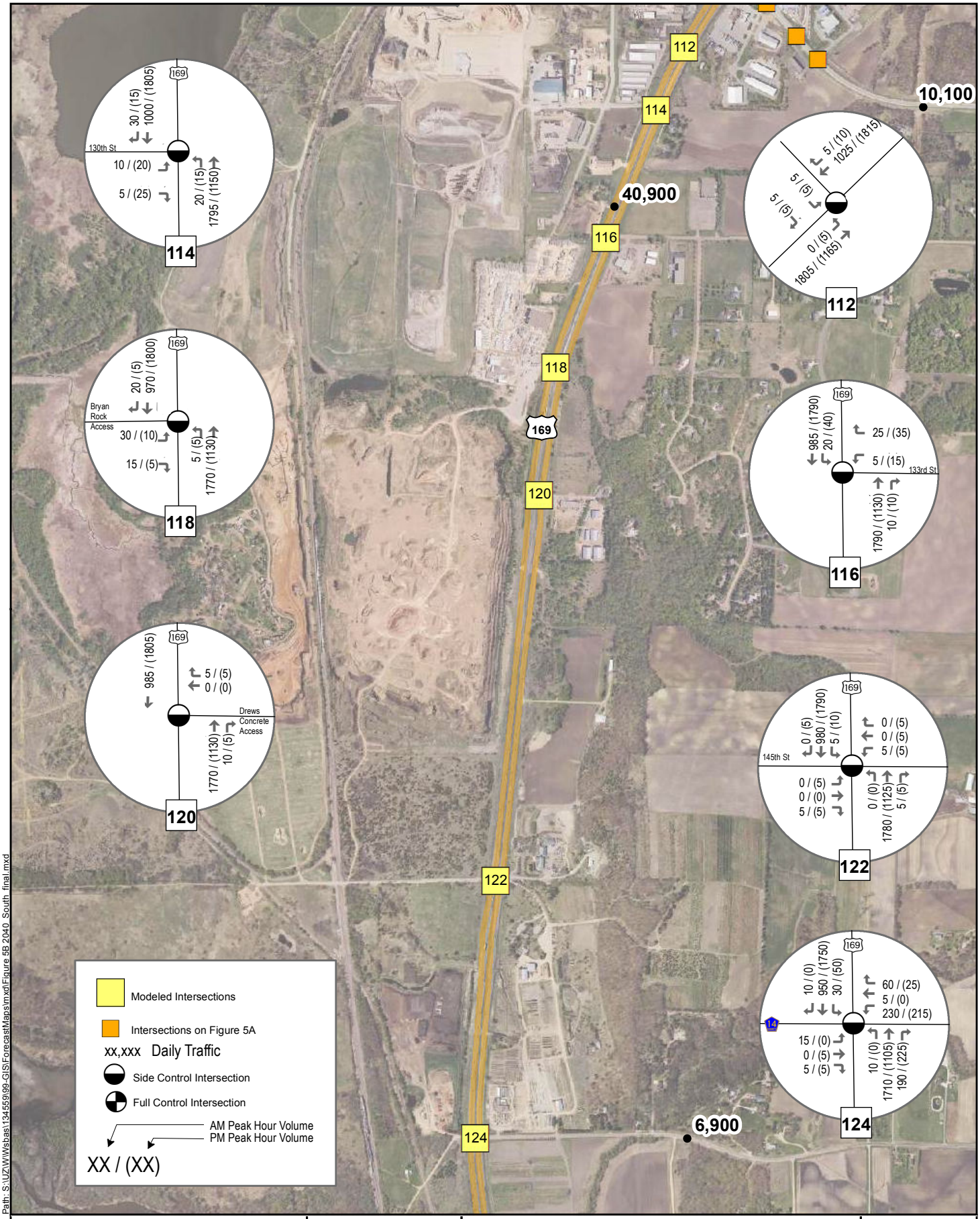
Map by: hxiao
Projection:Scott County Coordinates
Source: SEH, Bing, MnDOT

2040 No-Build Projections

US 169 & TH 41 Improvements
Scott County, Minnesota

Figure 3A

This map is neither a legally recorded map nor a survey map and is not intended to be used as one. This map is a compilation of records, information, and data gathered from various sources listed on this map and is to be used for reference purposes only. SEH does not warrant that the Geographic Information System (GIS) Data used to prepare this map are error free, and SEH does not represent that the GIS Data can be used for navigational, tracking, or any other purpose requiring exacting measurement of distance or direction or precision in the depiction of geographic features. The user of this map acknowledges that SEH shall not be liable for any damages which arise out of the user's access or use of data provided.



Path: S:\UZW\Wsbas\134559\99-GIS\ForecastMaps\mxd\Figure 5B 2040_South_final.mxd

SEH

0 0.125 0.25 Miles

Project: WSBAS 134559
Print Date: 10/28/2016

Map by: hxiao
Projection:Scott County Coordinates
Source: SEH, Bing, MnDOT

2040 No-Build Projections

US 169 & TH 41 Improvements
Shakopee, Minnesota

Figure 3B

This map is neither a legally recorded map nor a survey map and is not intended to be used as one. This map is a compilation of records, information, and data gathered from various sources listed on this map and is to be used for reference purposes only. SEH does not warrant that the Geographic Information System (GIS) Data used to prepare this map are error free, and SEH does not represent that the GIS Data can be used for navigational, tracking, or any other purpose requiring exacting measurement of distance or direction or precision in the depiction of geographic features. The user of this map acknowledges that SEH shall not be liable for any damages which arise out of the user's access or use of data provided.

Table 4
US 169 / TH 41 Project Crash Summary
2010 to 2014 Crash Data
MnDOT Crash Mapping Software Information

US 169 at TH 41 Project	Crash Severity						Intersection Rates		MnDOT* Average Rates		Calculated Critical Rates	
From	**Fatal**	**A**	**B**	**C**	**Property**	**Total**	**Crash Rate**	**Severity Rate**	**Crash Rate**	**Severity Rate**	**Critical Crash Rate**	**Critical Severity Rate**
US 169 at Access Moms/Manor	0	0	0	4	4	8	0.15	0.22	0.26	0.42	0.44	0.66
US 169 at Access Weckman	0	0	0	0	2	2	0.04	0.04	0.26	0.42	0.44	0.66
US 169 at Access Holiday	0	0	0	2	4	6	0.11	0.15	0.26	0.42	0.44	0.66
US 169 at TH 41**	0	1	5	22	79	107	**1.46**	**1.94**	**0.41**	**0.59**	**0.62**	**0.83**
US 169 at Value Inn	0	0	1	2	2	5	0.07	0.12	0.26	0.42	0.42	0.62
US 169 at 130th St	0	0	0	1	5	6	0.11	0.13	0.26	0.42	0.45	0.66
US 169 at 133rd St	0	0	0	0	2	2	0.04	0.04	0.26	0.42	0.45	0.66
US 169 at Access Bryan Rock	0	0	0	0	0	0	0.00	0.00	0.26	0.42	0.45	0.66
US 169 at Access Drews Concrete	0	0	0	0	0	0	0.00	0.00	0.26	0.42	0.45	0.66
US 169 at 145th St	0	0	1	0	1	2	0.04	0.08	0.26	0.42	0.45	0.66
US 169 at 150th St (CR 14)	0	0	0	3	4	7	0.13	0.19	0.26	0.42	0.45	0.66
TH 41 at Frontage/Rail Crossing	0	0	2	4	11	17	**0.49**	**0.72**	**0.26**	**0.42**	0.50	0.72
TH 41 at Dem Con Dr**	0	0	0	9	18	27	**0.78**	**1.04**	**0.41**	**0.59**	**0.71**	**0.95**
TH 41 at Ventura Ct	0	0	0	0	0	0	0.00	0.00	0.26	0.42	0.77	1.05
TH 41 at JustTens	0	0	0	0	0	0	0.00	0.00	0.26	0.42	0.77	1.05
TH 41 at Emery Way	0	0	0	0	0	0	0.00	0.00	0.26	0.42	0.77	1.05
TOTAL	**0**	**1**	**9**	**47**	**132**	**189**						
	0%	**1%**	**5%**	**25%**	**70%**		**XX**					
							Above Avg or Critical Rate		Avg Rate Exceeded		Critical Rate Exceeded	

**Signalized Intersections

NOTES:
Exceeding the Calculated Critical Rates indicated a sustained crash problem.

	MnDOT Statewide Averate Rates (2013 Data; 5-Year)*		
	Intersection Type	Crash Rate	Severity Rate
1	Signal-Low Vol. & Low Speed	0.55	0.75
2	Signal-Low Vol. & High Speed	0.38	0.55
3	Signal-High Vol. & Low Speed	0.69	0.96
4	Signal-High Vol. & High Speed	0.41	0.59
5	Urban Thru/Stop	0.18	0.27
6	Rural Thru/Stop	0.26	0.42
7	All Way Stop	0.34	0.49
8	Other	0.16	0.22

Table 5
US 169 / TH 41 Project Crash Summary
2010 to 2014 Crash Data
MnDOT Crash Mapping Software Information

US 169 at TH 41 Project	Diagram - Crash Type								Intersection Rates	
From	**Rear End**	**Left Turn**	**Right Angle**	**Side Swipe**	**Head On**	**Ran Off Road**	**Other**	**Total**	**Crash Rate**	**Severity Rate**
US 169 at Access Moms/Manor	6	0	0	0	0	1	1	8	0.15	0.22
US 169 at Access Weckman	1	1	0	0	0	0	0	2	0.04	0.04
US 169 at Access Holiday	5	0	1	0	0	0	0	6	0.11	0.15
US 169 at TH 41**	80	2	8	12	0	3	2	107	**1.46**	**1.94**
US 169 at Value Inn	2	0	1	1	0	0	1	5	0.07	0.12
US 169 at 130th St	3	1	1	0	0	1	0	6	0.11	0.13
US 169 at 133rd St	0	1	0	0	0	0	1	2	0.04	0.04
US 169 at Access Bryan Rock	0	0	0	0	0	0	0	0	0.00	0.00
US 169 at Access Drews Concrete	0	0	0	0	0	0	0	0	0.00	0.00
US 169 at 145th St	1	0	0	0	0	0	1	2	0.04	0.08
US 169 at 150th St (CR 14)	2	0	2	0	0	2	1	7	0.13	0.19
TH 41 at Frontage/Rail Crossing	12	0	1	2	0	1	1	17	0.49	0.72
TH 41 at Dem Con Dr**	22	0	3	1	0	0	1	27	**0.78**	**1.04**
TH 41 at Ventura Ct	0	0	0	0	0	0	0	0	0.00	0.00
TH 41 at JustTens	0	0	0	0	0	0	0	0	0.00	0.00
TH 41 at Emery Way	0	0	0	0	0	0	0	0	0.00	0.00
TOTAL	**134**	**5**	**17**	**16**	**0**	**8**	**9**	**189**		
	71%	**3%**	**9%**	**8%**	**0%**	**4%**	**5%**			

**Signalized Intersections

Critical Rate Exceeded

Table 6
US 169 / TH 41 Project Crash Summary
2010 to 2014 Crash Data
MnDOT Crash Mapping Software Information

	US 169 at TH 41 Project			Crash Severity								Intersection Rates		MnDOT* Average Rates		Calculated Critical Rates	
	From	To	Road Section Type	Length (Miles)	Segment ADT	Fatal	A	B	C	Property	Total	Crash Rate	Severity Rate	MnDOT CR	MnDOT SV	Critical Crash Rate	Critical Severity Rate
US 169	West of CR 69	TH 41	Rural Expressway	0.76	29,500	0	0	1	9	16	26	0.64	0.91	0.66	0.99	1.00	1.41
US 169	TH 41	CR 14	Rural Expressway	2.35	26,500	0	0	2	9	26	37	0.33	0.44	0.66	0.99	0.86	1.24
TH 41	Rail Road	Dem Con Dr	2-lane Rural ADT > 8000	0.23	18,400	0	0	0	3	1	4	0.52	0.92	0.73	1.10	1.59	2.14
TH 41	Dem Con Dr	US 169	Three-Lane Roadway	0.26	18,400	0	1	0	1	2	4	0.47	0.93	2.00	2.82	3.30	4.36
TH 41	US 169	1/2 Mile east of US 169	2-Lane Rural ADT 1500 to 4999	0.50	4,650	0	0	0	0	0	0	0.00	0.00	0.55	0.89	1.60	2.19
			TOTALS			**0**	**1**	**3**	**22**	**45**	**71**						
						0%	**1%**	**4%**	**31%**	**63%**							

XX		
Above Avg or Critical Rate	Avg Rate Exceeded	Critical Rate Exceeded

NOTES:

Does not include crashes at major intersections; US 169/TH 41, US 169/CR 14, TH 41/Dem Com.

Segments include crashes at minor intersections/access locations included in Intersection Crash Table.

	US 169 at TH 41 Project			Diagram - Crash Type							
	From	Total	Road Section Type	Rear End	Left Turn	Right Angle	Side Swipe	Head On	Ran Off Road	Other	Total
US 169	West of CR 69	TH 41	Rural Expressway	16	1	1	1	0	6	1	26
US 169	TH 41	CR 14	Rural Expressway	19	2	2	1	1	6	6	37
TH 41	Rail Road	Dem Con Dr	2-lane Rural ADT > 8000	3	0	0	0	0	0	1	4
TH 41	Dem Con Dr	US 169	Three-Lane Roadway	1	0	0	2	0	0	1	4
TH 41	US 169	1/2 Mile east of US 169	2-Lane Rural ADT 1500 to 4999	0	0	0	0	0	0	0	0
			TOTALS	**39**	**3**	**3**	**4**	**1**	**12**	**9**	**71**
				55%	**4%**	**4%**	**6%**	**1%**	**17%**	**13%**	

NOTES:

Does not include crashes at major intersections; US 169/TH 41, US 169/CR 14, TH 41/Dem Com.

Segments include crashes at minor intersections/access locations included in Intersection Crash Table.

	MnDOT Statewide Averate Rates (2013 Data; 5-Year)*		
	Section Type	Crash Rate	Severity Rate
2	2-Lane Rural ADT 1500 to 4999	0.55	0.89
4	2-lane Rural ADT > 8000	0.73	1.10
11	Rural Expressway	0.66	0.99
16	4-Lane Urban Divided	2.80	3.81
17	Three-Lane Roadway	2.00	2.82

SEH

Table 7

US 169 TH 41 Interchange Project

2015 Existing

AM Peak Hour

SimTraffic Ver 9 Results

	Intersection	Approach	Demand Volumes				Delay (s/veh)						LOS By Approach		LOS By Intersection		Queing Information (feet)								
																	Through			Left Turn			Right Turn		
			L	T	R	Total	L	LOS	T	LOS	R	LOS	Delay (S/Veh)	LOS	Delay (S/Veh)	LOS	Link Length	Avg.	Max	Storage	Avg.	Max	Storage	Avg.	Max
AM Peak Hour	US 169 at Landscape/Mobile Access	NB	0	1638	11	1,649	0.0	A	1.0	A	0.4	A	1.0	A	1.8	A	0	0	0	0	0	0	250		
		SB	0	1129	5	1,134	0.0	A	2.6	A	2.4	A	2.6	A			0	0	0	0	0	0	250		
		EB	0	0	6	6	0.0	A	0.0	A	13.9	B	13.9	B			0	0	0	0	0	0	500	8	67
		WB	0	0	19	19	0.0	A	0.0	A	15.8	C	15.8	C			0	0	0	0	0	0	500	10	40
	US 169 at Weckman Access	NB	22	1649	0	1,671	28.2	D	2.5	A	0.0	A	2.9	A	2.2	A	0	0	0	300	32	127	0	0	0
		SB	0	1135	0	1,135	0.0	A	1.0	A	0.0	A	1.0	A			716	0	6	0	0	0	250		
		EB	0	0	17	17	0.0	A	0.0	A	10.4	B	10.4	B			0	0	0	0	1	22	50	18	75
	US 169 at Holiday Gas Access	NB	0	1671	0	1,671	0.0	A	6.4	A	0.0	A	6.4	A	4.6	A	833	0	3	0	0	0	0	0	0
		SB	0	1091	61	1,152	0.0	A	2.0	A	1.2	A	2.0	A			0	0	0	0	0	0	300		
		EB	0	0	18	18	0.0	A	0.0	A	7.0	A	7.0	A			0	0	0	0	0	0	500	11	57
	US 169 at TH 41 (Signal)	NB	187	1039	66	1,292	92.2	F	38.6	D	6.3	A	44.6	D	47.9	D	892	317	583	275	152	374	350	29	404
		SB	11	567	531	1,109	97.1	F	43.0	D	8.7	A	27.4	C			833	241	422	315	16	78	600	58	358
		EB	583	147	121	851	94.0	F	48.5	D	8.2	A	73.7	E			1284	101	304	800	321	496	400	2	45
		WB	29	208	49	286	84.8	F	71.2	E	22.1	C	64.2	E			354	208	354	250	36	133	354	34	106
	US 169 at Value Inn	NB	0	1290	0	1,290	0.0	A	1.3	A	0.0	A	1.3	A	4.0	A	0	0	0	0		0	0	0	0
		SB	0	715	2	717	0.0	A	8.6	A	11.6	B	8.6	A			0	0	0	0	0	0	250		
		EB	2	0	1	3	27.6	D	0.0	A	0.0	A	27.6	D			0	0	0	500	2	22	50		14
	US 169 at 130th St	NB	15	1280	0	1,295	11.8	B	1.7	A	0.0	A	1.8	A	1.9	A	0	0	0	250	8	55	0	0	0
		SB	0	687	29	716	0.0	A	1.4	A	1.0	A	1.4	A			0	0	0	0	0	0	250		
		EB	10	0	4	14	39.4	E	0.0	A	10.3	B	31.6	D			0	0	0	500	18	88	50	8	66
	US 169 at 133rd St	NB	0	1273	6	1,279	0.0	A	2.0	A	1.0	A	2.0	A	2.1	A	0	0	0	0	0	0	250		
		SB	19	672	0	691	17.2	C	1.6	A	0.0	A	2.0	A			0	0	0	250	12	63	0	0	0
		WB	1	0	22	23	23.7	C	0.0	A	7.0	A	7.8	A			0	0	0	500	1	14	100	14	56
	US 169 at Bryan Rock Access	NB	2	1253	0	1,255	7.6	A	1.7	A	0.0	A	1.7	A	2.1	A	0	0	0	250	1	23	0	0	0
		SB	0	656	17	673	0.0	A	1.5	A	1.3	A	1.5	A			1381	0	2	0	0	0	0		
		EB	26	0	11	37	33.7	D	0.0	A	11.1	B	25.6	D			0	0	0	500	40	141	50	19	89
	US 169 at Drews Concrete Access	NB	0	1253	9	1,262	0.0	A	4.1	A	3.1	A	4.1	A	3.1	A	0	0	0	0	0	0	250		
		SB	0	667	0	667	0.0	A	1.3	A	0.0	A	1.3	A			0	0	0	0	0	0	0	0	0
		WB	0	0	2	2	0.0	A	0.0	A	5.0	A	5.0	A			0	0	0	0	0	0	500	2	24
	US 169 at 145th St	NB	0	1262	4	1,266	0.0	A	2.5	A	2.4	A	2.5	A	3.1	A	0	0	0	250			250		
		SB	1	666	0	667	6.4	A	3.8	A	0.0	A	3.8	A			0	0	0	250		6	250		
		EB	0	0	1	1	0.0	A	0.0	A	3.0	A	3.0	A			500			0	0	0	50		10
		WB	4	0	0	4	56.4	F	0.0	A	0.0	A	56.4	F			1068	5	34	0	0	0	0		
	US 169 at CSAH 14	NB	9	1224	32	1,265	11.7	B	2.7	A	1.9	A	2.7	A	4.9	A	3519	0	4	250	6	64	250		7
		SB	17	645	9	671	22.4	C	3.0	A	2.0	A	3.3	A			2557	0	1	300	8	55	250		
		EB	12	0	4	16	58.5	F	0.0	A	7.1	A	44.8	E			343	20	98	0	0	0	50	6	56
		WB	36	2	30	68	100.1	F	97.1	F	10.8	B	54.7	F			3863	43	141	0	0	0	50	24	104
	TH 41 at Rail Frontage	NB	1	0	3	4	40.7	E	0.0	A	9.1	A	15.4	C	5.8	A	1388	6	61	0	0	0	0	0	0
		SB	9	0	24	33	84.3	F	0.0	A	60.7	F	67.3	F			1000	70	280	0	0	0	0	0	0
		EB	6	775	4	785	22.6	C	4.5	A	4.9	A	4.6	A			1914	37	349	0	0	0	0	0	0
		WB	4	932	16	952	10.2	B	4.5	A	1.8	A	4.5	A			478	10	124	0	0	0	0	0	0
	TH 41 at Dem Con Dr (Signal)	NB	35	2	50	87	23.2	C	32.3	C	12.8	B	17.2	B	21.4	C	744	3	71	100	32	109	100	39	122
		SB	39	5	31	75	26.6	C	23.8	C	6.1	A	17.7	B			668	3	28	130	37	116	0	16	59
		EB	8	762	17	787	31.8	C	21.8	C	3.7	A	21.4	C			581	218	579	275	7	102	275	9	143
		WB	24	886	16	926	42.8	D	21.8	C	11.8	B	22.1	C			1284	107	325	275	22	83	275	2	32
	TH 41 at Ventura Ct	NB	70	4	19	93	11.1	B	11.3	B	3.4	A	9.5	A	4.2	A	615	47	117	0		0	100	16	62
		SB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A			0			0		0	0		
		EB	0	151	73	224	0.0	A	5.2	A	3.4	A	4.6	A			354		2	0		0	100		2
		WB	30	216	0	246	1.8	A	1.9	A	0.0	A	1.9	A			359	3	42	200	5	45	0		
	TH 41 at JustTens	NB	7	0	0	7	6.5	A	0.0	A	0.0	A	6.5	A	0.8	A	0	0	0	500	7	36	0		
		EB	0	161	9	170	0.0	A	1.1	A	0.2	A	1.1	A			0			0	0	0	0	0	0
		WB	5	239	0	244	1.3	A	0.4	A	0.0	A	0.4	A			243	1	16	0	0	0	0	0	0
	TH 41 at Emery Way	SB	0	0	0	0	0.0	A	0.0	A	2.2	A	2.2	A	0.8	A	0	0	0	500			100	1	22
		EB	7	154	0	161	1.4	A	0.5	A	0.0	A	0.5	A			243	1	23	0	0	0	0	0	0
		WB	0	244	2	246	0.0	A	0.9	A	0.0	A	0.9	A			0			0	0	0	0	0	0

Table 8

US 169 TH 41 Interchange Project

2015 Existing

PM Peak Hour

SimTraffic Ver 9 Results

	Intersection	Approach	Demand Volumes				Delay (s/veh)						LOS By Approach		LOS By Intersection		Queing Information (feet)								
																	Through			Left Turn			Right Turn		
			L	T	R	Total	L	LOS	T	LOS	R	LOS	Delay (S/Veh)	LOS	Delay (S/Veh)	LOS	Link Length	Avg.	Max	Storage	Avg.	Max	Storage	Avg.	Max
PM Peak Hour	US 169 at Landscape/Mobile Access	NB	0	1126	23	1,149	0.0	A	0.8	A	0.2	A	0.8	A	2.9	A	0	0	0	0	0	0	250		
		SB	0	1677	5	1,682	0.0	A	4.2	A	4.9	A	4.2	A			0	0	0	0	0	0	250		
		EB	0	0	10	10	0.0	A	0.0	A	15.9	C	15.9	C			0	0	0	0	0	0	500	7	45
		WB	0	0	26	26	0.0	A	0.0	A	7.1	A	7.1	A			0	0	0	0	0	0	500	13	42
	US 169 at Weckman Access	NB	1	1149	0	1,150	9.3	A	1.5	A	0.0	A	1.5	A	1.2	A	0	0	0	300		10	0	0	0
		SB	0	1687	0	1,687	0.0	A	1.0	A	0.0	A	1.0	A			0	0	0	0	0	0	250		
		EB	0	0	1	1	0.0	A	0.0	A	13.1	B	13.1	B			0	0	0	0	0	0	50	1	16
	US 169 at Holiday Gas Access	NB	0	1150	0	1,150	0.0	A	3.9	A	0.0	A	3.9	A	3.3	A	0	0	0	0	0	0	0	0	0
		SB	0	1641	47	1,688	0.0	A	2.6	A	1.3	A	2.6	A			0	0	0	0	0	0	300		
		EB	0	0	14	14	0.0	A	0.0	A	36.9	E	36.9	E			0	0	0	0	0	0	500	11	66
	US 169 at TH 41 (Signal)	NB	147	625	43	815	82.8	F	24.0	C	2.9	A	33.5	C	37.6	D	891	145	290	275	82	184	350		
		SB	14	1059	582	1,655	89.2	F	37.7	D	7.7	A	27.9	C			833	311	510	315	25	178	600	15	235
		EB	479	233	219	931	71.9	E	57.8	E	11.1	B	54.2	D			1284	174	367	800	227	384	400	30	232
		WB	31	109	46	186	81.9	F	72.4	E	11.0	B	58.1	E			348	100	204	250	34	101	348	26	65
	US 169 at Value Inn	NB	1	813	0	814	52.3	F	0.7	A	0.0	A	0.8	A	7.1	A	0	0	0	250	1	16	0	0	0
		SB	0	1303	6	1,309	0.0	A	10.8	B	7.7	A	10.8	B			0	0	0	0	0	0	250		
		EB	2	0	3	5	48.1	E	0.0	A	12.0	B	24.0	C			0	0	0	500	2	25	50	4	30
	US 169 at 130th St	NB	13	795	0	808	30.4	D	1.3	A	0.0	A	1.8	A	2.2	A	0	0	0	250	10	54	0	0	0
		SB	0	1294	12	1,306	0.0	A	1.3	A	0.5	A	1.3	A			0	0	0	0	0	0	250		
		EB	19	0	21	40	54.4	F	0.0	A	23.4	C	39.3	E			0	0	0	500	19	76	50	15	76
	US 169 at 133rd St	NB	0	776	8	784	0.0	A	1.5	A	0.3	A	1.5	A	2.2	A	0	0	0	0	0	0	250		
		SB	37	1278	0	1,315	8.0	A	2.0	A	0.0	A	2.2	A			0	0	0	250	16	50	0	0	0
		WB	13	0	32	45	38.1	E	0.0	A	4.4	A	14.4	B			0	0	0	500	12	64	100	20	57
	US 169 at Bryan Rock Access	NB	2	776	0	778	35.3	E	1.1	A	0.0	A	1.2	A	1.8	A	0	0	0	250	3	42	0	0	0
		SB	0	1288	3	1,291	0.0	A	1.8	A	1.7	A	1.8	A			1381	0	2	0	0	0	0		
		EB	8	0	4	12	42.1	E	0.0	A	17.8	C	35.5	E			0	0	0	500	6	42	50	5	48
	US 169 at Drews Concrete Access	NB	0	775	2	777	0.0	A	2.9	A	3.0	A	2.9	A	2.1	A	0	0	0	0	0	0	250		
		SB	0	1292	0	1,292	0.0	A	1.6	A	0.0	A	1.6	A			0	0	0	0	0	0	0	0	0
		WB	0	0	3	3	0.0	A	0.0	A	4.0	A	4.0	A			0	0	0	0	0	0	500	3	28
	US 169 at 145th St	NB	0	771	1	772	0.0	A	1.6	A	1.0	A	1.6	A	3.9	A	0	0	0	250			250		
		SB	5	1286	1	1,292	10.4	B	5.1	A	4.6	A	5.1	A			0	0	0	250	1	18	250		
		EB	3	0	2	5	52.4	F	0.0	A	15.6	C	40.1	E			500	3	29	0	0	0	50	1	19
		WB	3	1	3	7	42.8	E	0.0	A	3.1	A	19.0	C			1068	3	32	0	0	0	50	2	23
	US 169 at CSAH 14	NB	0	756	32	788	0.0	A	1.7	A	1.3	A	1.7	A	3.9	A	0	0	0	0		0	250		
		SB	29	1262	0	1,291	8.7	A	3.9	A	0.0	A	4.0	A			0	0	0	300	11	52	250		
		EB	0	2	3	5	0.0	A	42.1	E	9.4	A	22.5	C			343	1	23	0	0	0	50	1	18
		WB	37	0	16	53	46.2	E	0.0	A	3.8	A	33.7	D			3863	28	103	0	0	0	50	8	25
	TH 41 at Rail Frontage	NB	1	1	6	8	50.9	F	35.7	E	10.7	B	17.9	C	3.8	A	1388	8	44	0	0	0	0	0	0
		SB	8	1	11	20	67.2	F	42.1	E	24.5	C	39.7	E			1000	30	131	0	0	0	0	0	0
		EB	8	867	1	876	13.6	B	4.0	A	4.9	A	4.1	A			1914	32	304	0	0	0	0	0	0
		WB	3	872	4	879	4.0	A	2.7	A	1.1	A	2.7	A			478	2	50	0	0	0	0	0	0
	TH 41 at Dem Con Dr (Signal)	NB	25	3	34	62	23.6	C	23.5	C	12.7	B	17.6	B	17.3	B	744	2	36	100	19	60	100	16	64
		SB	37	10	46	93	26.9	C	26.4	C	5.8	A	16.0	B			668	8	44	130	26	82	0	22	63
		EB	11	860	10	881	31.7	C	14.9	B	4.8	A	15.0	B			581	174	600	275	11	142	275	6	156
		WB	10	808	20	838	44.1	D	19.9	B	10.8	B	19.9	B			1284	85	306	275	7	42	275	5	44
	TH 41 at Ventura Ct	NB	59	0	18	77	9.0	A	0.0	A	4.9	A	8.0	A	4.6	A	615	31	81	0		0	100	15	56
		SB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A			0			0		0	0		
		EB	0	239	51	290	0.0	A	5.8	A	3.6	A	5.4	A			0			0		0	0		
		WB	11	127	0	138	2.7	A	0.7	A	0.0	A	0.9	A			0			200	2	24	0		
	TH 41 at JustTens	NB	2	0	0	2	4.7	A	0.0	A	0.0	A	4.7	A	0.7	A	0	0	0	500	2	25	0		
		EB	0	256	1	257	0.0	A	0.9	A	0.0	A	0.9	A			0			0	0	0	0	0	0
		WB	1	136	0	137	0.0	A	0.2	A	0.0	A	0.2	A			0			0	0	0	0	0	0
	TH 41 at Emery Way	SB	2	0	11	13	4.8	A	0.0	A	2.6	A	2.9	A	0.5	A	0	0	0	500	1	21	100	9	30
		EB	0	256	0	256	0.0	A	0.3	A	0.0	A	0.3	A			0			0	0	0	0	0	0
		WB	0	126	0	126	0.0	A	0.8	A	0.0	A	0.8	A			0			0	0	0	0	0	0

Table 9

US 169 TH 41 Interchange Project
2040 No Build Conditions
AM Peak Hour

SimTraffic Ver 9 Results

	Intersection	Approach	Demand Volumes				Delay (s/veh)						LOS By Approach		LOS By Intersection		Queing Information (feet)								
																	Through			Left Turn			Right Turn		
			L	T	R	Total	L	LOS	T	LOS	R	LOS	Delay (S/Veh)	LOS	Delay (S/Veh)	LOS	Link Length	Avg.	Max	Storage	Avg.	Max	Storage	Avg.	Max
AM Peak Hour	US 169 at Landscape/Mobile Access	NB	0	2205	15	2,220	0.0	A	1.3	A	0.5	A	1.3	A	2.6	A	0	0	0	0	0	0	250		
		SB	0	1480	10	1,490	0.0	A	3.9	A	4.3	A	3.9	A			0	0	0	0	0	0	250		
		EB	0	0	10	10	0.0	A	0.0	A	19.0	C	19.0	C			0	0	0	0	0	0	500	14	86
		WB	0	0	20	20	0.0	A	0.0	A	41.4	E	41.4	E			0	0	0	0	0	0	500	11	47
	US 169 at Weckman Access	NB	25	2220	0	2,245	58.9	F	4.0	A	0.0	A	4.6	A	3.4	A	1340	2	55	300	38	166	0	0	0
		SB	0	1490	0	1,490	0.0	A	1.4	A	0.0	A	1.4	A			716	0	9	0	0	0	250		
		EB	0	0	20	20	0.0	A	0.0	A	19.7	C	19.7	C			0	0	0	0	3	76	50	23	90
	US 169 at Holiday Gas Access	NB	0	2245	0	2,245	0.0	A	8.7	A	0.0	A	8.7	A	6.4	A	0	0	0	0	0	0	0	0	0
		SB	0	1445	65	1,510	0.0	A	3.0	A	1.9	A	2.9	A			0	0	0	0	0	0	300		
		EB	0	0	20	20	0.0	A	0.0	A	15.1	C	15.1	C			0	0	0	0	0	0	500	13	65
	US 169 at TH 41 (Signal)	NB	200	1480	150	1,830	173.8	F	97.9	F	47.9	D	100.5	F	103.2	F	892	824	926	275	235	375	350	225	450
		SB	40	845	580	1,465	116.5	F	54.6	D	15.6	B	41.1	D			833	375	655	315	101	392	600	174	578
		EB	625	195	130	950	314.2	F	76.1	E	25.5	C	216.9	F			1284	831	1299	800	799	900	0		
		WB	65	270	140	475	133.3	F	88.8	F	71.1	E	89.7	F			354	339	378	250	168	349	354	192	363
	US 169 at Value Inn	NB	0	1825	0	1,825	0.0	A	25.4	D	0.0	A	25.4	D	19.8	C	630	249	601	0		0	0	0	0
		SB	0	1035	5	1,040	0.0	A	9.9	A	14.5	B	9.9	A			0	0	0	0	0	0	250		
		EB	5	0	5	10	130.0	F	0.0	A	15.6	C	67.6	F			0	0	0	500	8	45	50	5	34
	US 169 at 130th St	NB	20	1815	0	1,835	19.3	C	8.3	A	0.0	A	8.4	A	6.4	A	1292	54	260	250	14	126	0	0	0
		SB	0	1010	30	1,040	0.0	A	1.9	A	1.1	A	1.9	A			0	0	0	0	0	0	250		4
		EB	10	0	5	15	121.3	F	0.0	A	15.3	C	75.9	F			0	0	0	500	22	106	50	12	95
	US 169 at 133rd St	NB	0	1810	10	1,820	0.0	A	2.5	A	1.0	A	2.5	A	3.2	A	0	0	0	0	0	0	250		
		SB	20	995	0	1,015	58.5	F	2.3	A	0.0	A	3.3	A			1292	0	9	250	19	86	0	0	0
		WB	5	0	25	30	127.7	F	0.0	A	24.1	C	38.4	E			0	0	0	500	5	38	100	20	82
	US 169 at Bryan Rock Access	NB	5	1790	0	1,795	14.9	B	2.0	A	0.0	A	2.0	A	2.8	A	0	0	0	250	6	66	0	0	0
		SB	0	980	20	1,000	0.0	A	1.8	A	1.6	A	1.8	A			0	0	0	0	0	0	0		
		EB	30	0	15	45	77.9	F	0.0	A	17.7	C	58.3	F			0	0	0	500	57	162	50	20	119
	US 169 at Drews Concrete Access	NB	0	1790	10	1,800	0.0	A	5.2	A	6.1	A	5.2	A	3.9	A	0	0	0	0	0	0	250		
		SB	0	995	0	995	0.0	A	1.5	A	0.0	A	1.5	A			0	0	0	0	0	0	0	0	0
		WB	0	0	5	5	0.0	A	0.0	A	13.1	B	13.1	B			0	0	0	0	0	0	500	3	25
	US 169 at 145th St	NB	0	1800	5	1,805	0.0	A	3.4	A	2.8	A	3.4	A	3.9	A	0	0	0	250			250		
		SB	5	990	0	995	28.3	D	4.3	A	0.0	A	4.4	A			0	0	0	250	2	21	250		
		EB	0	0	5	5	0.0	A	0.0	A	7.1	A	7.1	A			500			0	0	0	50	2	24
		WB	5	0	0	5	79.2	F	0.0	A	0.0	A	79.2	F			1068	5	40	0	0	0	0		
	US 169 at CSAH 14	NB	10	1735	175	1,920	25.0	D	4.6	A	4.6	A	4.7	A	28.6	D	3519	0	8	250	11	81	250	1	27
		SB	30	960	10	1,000	102.5	F	3.4	A	3.1	A	5.8	A			2557	2	54	300	32	134	250		
		EB	15	0	5	20	247.3	F	0.0	A	45.2	E	193.4	F			343	56	261	0	0	0	50	4	47
		WB	210	5	55	270	2660.5	F	2464.0	F	2450.5	F	2618.5	F			3863	3274	3905	0	0	0	50	21	150
	TH 41 at Rail Frontage	NB	5	0	5	10	236.7	F	0.0	A	100.2	F	149.8	F	37.2	E	1388	25	92	0	0	0	0	0	0
		SB	10	0	25	35	693.4	F	0.0	A	521.1	F	553.0	F			1000	290	564	0	0	0	0	0	0
		EB	10	875	5	890	37.0	E	57.8	F	64.7	F	57.6	F			1914	431	1190	0	0	0	0	0	0
		WB	5	1055	20	1,080	24.6	C	7.5	A	3.5	A	7.5	A			478	33	432	0	0	0	0	0	0
	TH 41 at Dem Con Dr (Signal)	NB	40	5	50	95	28.3	C	20.3	C	23.8	C	25.5	C	42.6	D	744	9	88	100	39	123	100	52	155
		SB	40	10	35	85	36.4	D	25.1	C	10.6	B	23.6	C			668	7	41	130	44	140	0	21	73
		EB	10	860	20	890	68.9	E	60.7	E	20.5	C	59.9	E			581	502	681	275	29	247	275	46	375
		WB	25	1005	20	1,050	57.4	E	31.6	C	15.8	B	31.8	C			1284	177	475	275	35	256	275	7	174
	TH 41 at Ventura Ct	NB	70	5	20	95	261.2	F	279.7	F	125.4	F	231.9	F	32.0	D	615	220	473	0		0	100	40	176
		SB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A			0			0		0	0		
		EB	0	310	75	385	0.0	A	5.9	A	4.4	A	5.7	A			0			0		0	100		5
		WB	30	405	0	435	9.9	A	26.3	D	0.0	A	25.4	D			359	206	373	200	21	245	0		
	TH 41 at JustTens	NB	10	0	0	10	34.6	D	0.0	A	0.0	A	34.6	D	5.1	A	0	0	0	500	10	47	0		
		EB	0	320	10	330	0.0	A	1.3	A	0.1	A	1.3	A			0			0	0	0	0	0	0
		WB	10	425	0	435	6.0	A	7.3	A	0.0	A	7.3	A			243	59	253	0	0	0	0	0	0
	TH 41 at Emery Way	SB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A	3.0	A	0	0	0	500			0		
		EB	10	310	0	320	4.1	A	0.8	A	0.0	A	0.9	A			243	7	75	0	0	0	0	0	0
		WB	0	435	5	440	0.0	A	4.4	A	3.4	A	4.4	A			476	32	226	0	0	0	0	0	0

Table 10

US 169 TH 41 Interchange Project
2040 No Build Conditions
PM Peak Hour

SimTraffic Ver 9 Results

	Intersection	Approach	Demand Volumes				Delay (s/veh)						LOS By Approach		LOS By Intersection		Queing Information (feet)								
																	Through			Left Turn			Right Turn		
			L	T	R	Total	L	LOS	T	LOS	R	LOS	Delay (S/Veh)	LOS	Delay (S/Veh)	LOS	Link Length	Avg.	Max	Storage	Avg.	Max	Storage	Avg.	Max
PM Peak Hour	US 169 at Landscape/Mobile Access	NB	0	1490	25	1,515	0.0	A	1.0	A	0.4	A	1.0	A	4.9	A	0	0	0	0	0	0	250		
		SB	0	2245	10	2,255	0.0	A	7.1	A	7.1	A	7.1	A			0	0	0	0	0	0	250		
		EB	0	0	10	10	0.0	A	0.0	A	44.0	E	44.0	E			0	0	0	0	0	0	500	11	60
		WB	0	0	30	30	0.0	A	0.0	A	12.2	B	12.2	B			0	0	0	0	0	0	500	16	54
	US 169 at Weckman Access	NB	5	1515	0	1,520	215.2	F	2.0	A	0.0	A	2.7	A	2.5	A	0	0	0	300	9	39	0	0	0
		SB	0	2255	0	2,255	0.0	A	2.3	A	0.0	A	2.3	A			0	0	0	0	0	0	250		
		EB	0	0	5	5	0.0	A	0.0	A	42.5	E	42.5	E			0	0	0	0	0	11	50	5	41
	US 169 at Holiday Gas Access	NB	0	1520	0	1,520	0.0	A	4.9	A	0.0	A	4.9	A	16.1	C	0	0	0	0	0	0	0	0	0
		SB	0	2210	50	2,260	0.0	A	20.5	C	12.5	B	20.3	C			1340	191	727	0	0	0	300	17	238
		EB	0	0	15	15	0.0	A	0.0	A	784.9	F	784.9	F			0	0	0	0	0	0	500	61	116
	US 169 at TH 41 (Signal)	NB	200	895	90	1,185	119.2	F	37.6	D	7.2	A	48.4	D	67.8	E	891	239	523	275	157	374	350	30	385
		SB	80	1545	600	2,225	213.2	F	68.8	E	17.4	B	61.8	E			833	630	863	315	250	414	600	345	700
		EB	490	315	260	1,065	129.1	F	108.0	F	31.9	C	99.2	F			1284	443	916	800	370	775	400	216	500
		WB	45	135	135	315	116.2	F	92.0	F	23.6	C	68.4	E			348	196	356	250	96	214	348	86	195
	US 169 at Value Inn	NB	5	1180	0	1,185	60.3	F	1.0	A	0.0	A	1.3	A	10.3	B	0	0	0	250	5	46	0	0	0
		SB	0	1840	10	1,850	0.0	A	15.4	C	12.6	B	15.4	C			0	0	0	0	0	0	250		
		EB	5	0	5	10	109.9	F	0.0	A	37.0	E	68.2	F			0	0	0	500	7	47	50	8	44
	US 169 at 130th St	NB	15	1165	0	1,180	71.9	F	1.6	A	0.0	A	2.5	A	3.7	A	0	0	0	250	17	82	0	0	0
		SB	0	1830	15	1,845	0.0	A	2.3	A	0.8	A	2.3	A			0	0	0	0	0	0	250		
		EB	20	0	25	45	175.1	F	0.0	A	44.3	E	96.0	F			0	0	0	500	31	110	50	25	103
	US 169 at 133rd St	NB	0	1145	10	1,155	0.0	A	1.8	A	0.9	A	1.8	A	3.0	A	0	0	0	0	0	0	250		
		SB	40	1815	0	1,855	13.7	B	2.8	A	0.0	A	3.0	A			0	0	0	250	21	65	0	0	0
		WB	15	0	35	50	78.7	F	0.0	A	9.3	A	30.9	D			0	0	0	500	15	59	100	21	73
	US 169 at Bryan Rock Access	NB	5	1145	0	1,150	53.7	F	1.4	A	0.0	A	1.6	A	2.8	A	0	0	0	250	9	50	0	0	0
		SB	0	1825	5	1,830	0.0	A	2.4	A	2.1	A	2.4	A			0	0	0	0	0	0	0		
		EB	10	0	5	15	161.8	F	0.0	A	42.0	E	119.5	F			0	0	0	500	16	85	50	7	45
	US 169 at Drews Concrete Access	NB	0	1145	5	1,150	0.0	A	3.6	A	3.4	A	3.6	A	2.7	A	0	0	0	0	0	0	250		
		SB	0	1830	0	1,830	0.0	A	2.2	A	0.0	A	2.2	A			0	0	0	0	0	0	0	0	0
		WB	0	0	5	5	0.0	A	0.0	A	5.4	A	5.4	A			0	0	0	0	0	0	500	3	25
	US 169 at 145th St	NB	0	1140	5	1,145	0.0	A	2.2	A	1.3	A	2.2	A	5.4	A	0	0	0	250			250		
		SB	10	1815	5	1,830	20.5	C	6.3	A	6.2	A	6.4	A			3910	0	11	250	5	34	250		
		EB	5	0	5	10	146.5	F	0.0	A	21.6	C	84.1	F			500	9	49	0	0	0	50	5	28
		WB	5	5	5	15	106.0	F	93.6	F	6.3	A	78.0	F			1068	12	59	0	0	0	50	2	25
	US 169 at CSAH 14	NB	0	1120	205	1,325	0.0	A	3.0	A	2.8	A	3.0	A	39.9	E	0	0	0	0		0	250	2	24
		SB	45	1780	0	1,825	24.1	C	4.5	A	0.0	A	5.0	A			2557	0	12	300	23	91	250		
		EB	0	5	5	10	0.0	A	253.8	F	37.4	E	102.3	F			343	5	27	0	0	0	50	4	31
		WB	195	0	25	220	2003.0	F	0.0	A	1794.6	F	1973.8	F			3863	2860	3878	0	0	0	50	26	150
	TH 41 at Rail Frontage	NB	5	5	10	20	173.4	F	168.9	F	39.7	E	95.9	F	11.2	B	1388	26	74	0	0	0	0	0	0
		SB	10	5	15	30	325.2	F	229.6	F	155.8	F	228.6	F			1000	99	264	0	0	0	0	0	0
		EB	10	995	5	1,010	26.2	D	10.2	B	8.4	A	10.3	B			1914	82	628	0	0	0	0	0	0
		WB	5	975	5	985	14.7	B	5.1	A	4.4	A	5.2	A			478	26	362	0	0	0	0	0	0
	TH 41 at Dem Con Dr (Signal)	NB	30	5	35	70	27.3	C	20.3	C	17.0	B	22.0	C	25.8	C	744	4	49	100	23	69	100	18	73
		SB	40	10	50	100	31.5	C	27.8	C	8.4	A	18.8	B			668	9	61	130	27	88	0	25	80
		EB	15	990	10	1,015	39.0	D	25.8	C	9.2	A	25.8	C			581	326	648	275	19	118	275	13	241
		WB	10	905	20	935	42.9	D	27.0	C	14.6	B	26.9	C			1284	129	450	275	12	119	275	4	41
	TH 41 at Ventura Ct	NB	60	0	20	80	33.2	D	0.0	A	10.5	B	26.8	D	7.2	A	615	41	119	0		0	100	16	62
		SB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A			0			0		0	0		
		EB	0	430	55	485	0.0	A	7.6	A	5.9	A	7.4	A			0			0		0	0		
		WB	15	255	0	270	9.6	A	2.6	A	0.0	A	2.8	A			359	8	116	200	4	33	0		
	TH 41 at JustTens	NB	5	0	0	5	17.2	C	0.0	A	0.0	A	17.2	C	1.4	A	0	0	0	500	7	45	0		
		EB	0	445	5	450	0.0	A	1.4	A	0.1	A	1.4	A			0			0	0	0	0	0	0
		WB	5	265	0	270	17.6	C	0.8	A	0.0	A	1.0	A			243	5	102	0	0	0	0	0	0
	TH 41 at Emery Way	SB	5	0	15	20	7.2	A	0.0	A	3.7	A	4.5	A	0.8	A	0	0	0	500	5	30	100	11	30
		EB	0	445	0	445	0.0	A	0.5	A	0.0	A	0.5	A			0			0	0	0	0	0	0
		WB	0	255	0	255	0.0	A	1.1	A	0.0	A	1.1	A			0			0	0	0	0	0	0

Attachment D – Build Alternatives Traffic Evaluation Memo

Building a Better World
for All of Us®

MEMORANDUM

TO: Jon Chiglo, PE

FROM: Graham Johnson, PE

DATE: November 4, 2016

RE: US 169 at TH 41 Intersection Study - Build Alternatives Evaluation
SEH No. WSBAS 134559 14.00

Note: this memorandum supersedes the traffic operations memorandum dated June 13, 2016.

PROJECT DESCRIPTION

This memorandum summarizes the results of the future build alternative traffic operations analysis performed along US Highway (US) 169 from County State Aid Highway (CSAH) 14 to north of the existing at-grade intersection with Trunk Highway (TH) 41/CSAH 78. Several intersections and access locations surrounding the main intersections at TH 41/CSAH 78 and CSAH 14 were included in the analysis; most of these access points will be reconnected to and from US 169 via frontage road connections.

The primary purpose of this project is to improve both traffic safety and traffic operations at the study intersections as well as the surrounding access locations. In this memorandum, US 169 will be referred to as the north-south roadway and TH 41/ CSAH 78 and CSAH 14 will be referred to as the east-west roadways.

EXISTING AND FUTURE NO BUILD CONDITIONS - REVIEW

The existing and future no build conditions throughout the project area were evaluated to assess the current intersection conditions and the impacts of increase traffic demands on the existing intersections. To provide a brief overview of the evaluation, this section will provide a very high level summary of the analysis and results.

More information about the existing and future no build conditions methodology can be found in the Technical Memorandum *US 169 at TH 41 Intersection Study – Existing Conditions and No Build Memorandum, November 4, 2016*.

Intersection traffic data was collected in the fall of 2015 at all of the 15 intersections included in the study; the main study intersection of US 169 and TH 41 included a 48-hour turning movement count. Along US 169, 10 access intersections between the Mobile Manor access and CSAH 14 were included; along TH 41/CSAH 78, 5 accesses/intersections were evaluated between the Rail Road Crossing and approximately ¼ mile east of US 169.

Heavy vehicle data was also collected during the turning movement counts and was utilized in the traffic operations analysis; this data was used in the operations modeling for the peak hour analysis. While the late fall season typically does not typically include the highest peak truck demands, the data collected is higher than the MnDOT average annual daily traffic (AADT) demands for heavy commercial vehicles.

A 5-year crash history was evaluated and determined that two intersections in the study area have crash rates above the calculated critical rates; the intersections of US 169 at TH 41 and the intersection of TH 41 at Dem Con Drive. The US 169/TH 41/CSAH 78 intersection has a severe crash problem that has it ranked in the Top 100 worst intersections based on MnDOT crash costs crash rate and is over two times the critical rate, another indication of a significant crash problem at the intersection.

Under existing traffic demands, the main study intersection of US 169/TH 41/CSAH 78 has an overall intersection LOS of D; however the minor approaches are close to failing and all left-turn movements are at a LOS F. Intersection Level of Service, as defined in the 2010 Highway Capacity Manual, is a qualitative performance measure that represents quality of service. Six LOS are defined, designated by letters A through F. LOS A represents the best operating conditions from the traveler's perspective and LOS F the worst; LOS D is generally considered acceptable by most agencies.

Many of the minor intersections along US 169 have long delays for vehicles trying to enter the highway due to limited gaps in mainline US 169 traffic. As traffic increases to the 2040 demand numbers, the operations will degrade quickly. Under 2040 demands, the US 169/TH 41/CSAH 78 will fail and operate at LOS F in the AM peak and a LOS E in the PM peak. All left-turn movements and the minor approach through movements will operate at a LOS F due to the reduction in available traffic gaps. Queuing from the intersection will block many of the adjacent access locations.

BUILD ALTERNATIVE ANALYSIS

To evaluate the needs for the project area, traffic forecasts and operations were developed for the design year 2040. The overall safety and operations of each alternative was evaluated to determine which alternative provides the best fit for the project; this evaluation will only determine traffic implications of each alternative and not consider other impacts.

Concept Alternatives

Based on input from the Project Partners and Project Management Team, a total of seven alternatives, including the No Build, are being considered to improve safety and mobility at the US 169/TH 41/CSAH 78 and US 169/CSAH 14 intersections. Access closures along US 169 and TH 41 were assumed to be the same for all build alternatives which includes closing all local access along US 169 from CSAH 69 through 145th Street, with the exception of the Anchor Block access, and along CSAH 78 east of US 169. Additionally, the US 169/CSAH 14 right-in/right-out (RI/RO) intersection, CSAH 14 overpass, and associated supporting roadway improvements are the same for all build alternatives.

The main traffic patterns of issue are the high demands along US 169 and the heavy eastbound TH 41 to northbound US 169 movement. All build alternatives were developed to address these and other related issues. The six alternatives include:

- No Build – Leave the existing at-grade signal in place
- Alternative A - Partial Interchange with a Displaced Left Turn movement
- Alternative B - Diamond Interchange with Loop Ramp
- Alternative C - Tight Diamond Interchange
- Alternative D - Single Point Interchange
- Alternative E - Diverging Diamond Interchange
- Alternative F – Single Point Interchange Offset

<u>No Build – Do Nothing Alternative</u>

This alternative has significant safety and mobility issues that exist today and will degrade into the future as traffic increase through the project area. The current signal must serve all movements at the single at-grade intersection; the long cycle length and 8-phase signal results in significant delays.

Descriptions of the existing conditions and future No Build conditions can be found in the Technical Memorandum *US 169 at TH 41 Intersection Study – Existing Conditions and No Build Memorandum, November 4, 2016.*

The No Build alternative currently has 32 total vehicle conflict points which is standard for a full access 4-leg intersection.

<u>Alternative A – Partial Interchange with a Displaced Left Turn (DLT)</u>
This alternative includes grade separating southbound US 169 to address disproportionally high southbound crashes. It also includes a displaced left turn lane (DLT) to address the heavy eastbound to northbound movement from TH 41 to US 169. The DLT pulls the left turn movement to the opposite side of the roadway in order to reduce conflict points and simplify traffic signal operations (see Figure 1).

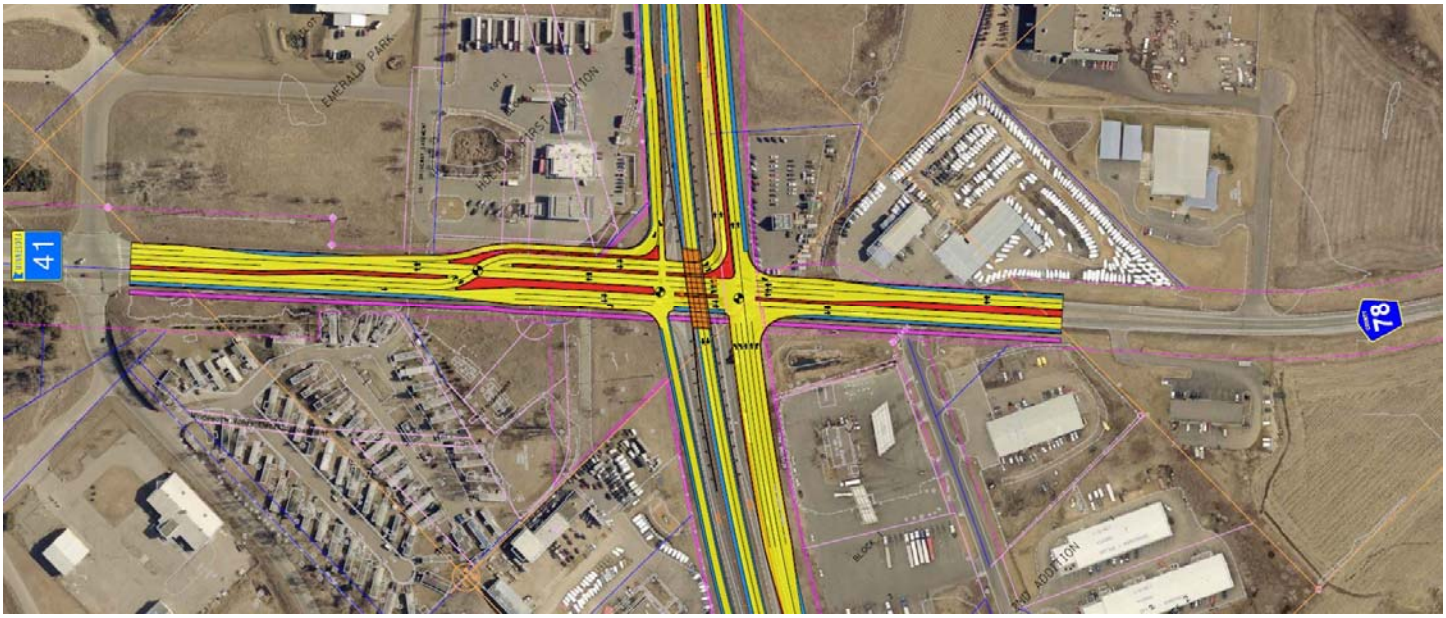
This alternative would include 3 traffic signals, though all three signals would function with simple and efficient 3-phase operations. However, the close spacing of the southbound off ramp and northbound US 169 signal does create timing and coordination difficulties to ensure traffic is not spilling through the intersections.

Southbound US 169 traffic is able to cross TH 41/CSAH 78 under free flow conditions without traffic control. The southbound to westbound movement would also operate as a free right turn and then merge into TH 41 under a yield condition. The eastbound left turn movement from TH 41 to northbound US 169 would travel through the DLT signal on and then through the southbound off ramp left turn signal before turning left and merging onto northbound US 169.

Northbound US 169 traffic would still traverse through an at-grade signalized intersection. The signal timings will be significantly shorter than the existing signal as this options provides a much more efficient phasing configuration.

The partial interchange with a displaced left turn has a total of 21 conflict points at all three intersections and an additional 3 conflict points for the highway ramp connections.

Figure 1 Alternative A



Alternative B – Diamond Interchange with Loop Ramp

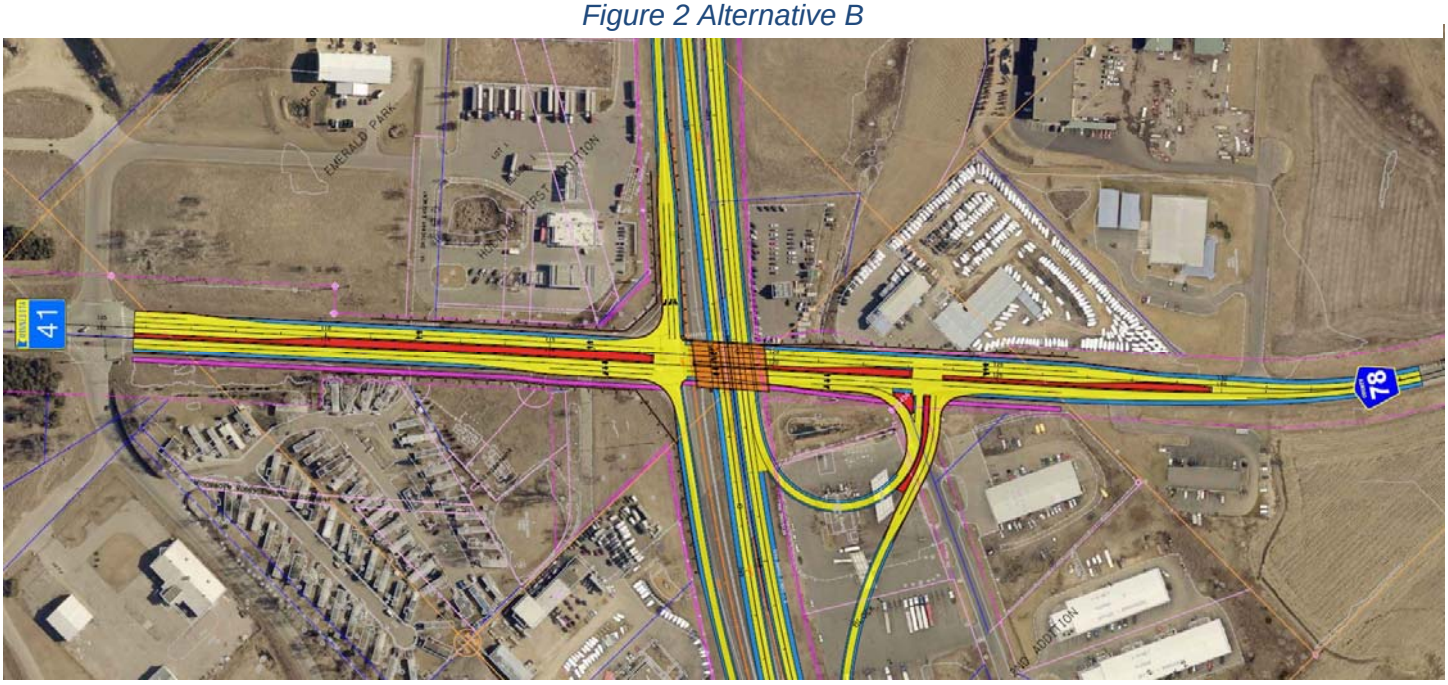
Alternative B provides for a fully grade-separated interchange with traditional “diamond” ramps in three of the quadrants and a “loop” ramp in the southeast quadrant to address the heavy TH 41 eastbound to northbound movement. The loop ramp removes the need for a separate left turn signal phase at the interchange by allowing the movement to make a right turn (see Figure 2).

This alternative would include 2 traffic signals at each ramp terminal intersection that operate efficiently with only 4-phases and a significantly reduced volume with US 169 through traffic removed.

All US 169 through traffic is able to cross TH 41/CSAH 78 under free flow conditions without traffic control; this removes a significant amount of traffic from the operations along TH 41/CSAH 78.

The diamond interchange with loop ramp alternative has a total of 22 conflict points at both ramp terminal intersections and an additional 4 conflict points for the highway ramp connections.

Figure 2 Alternative B



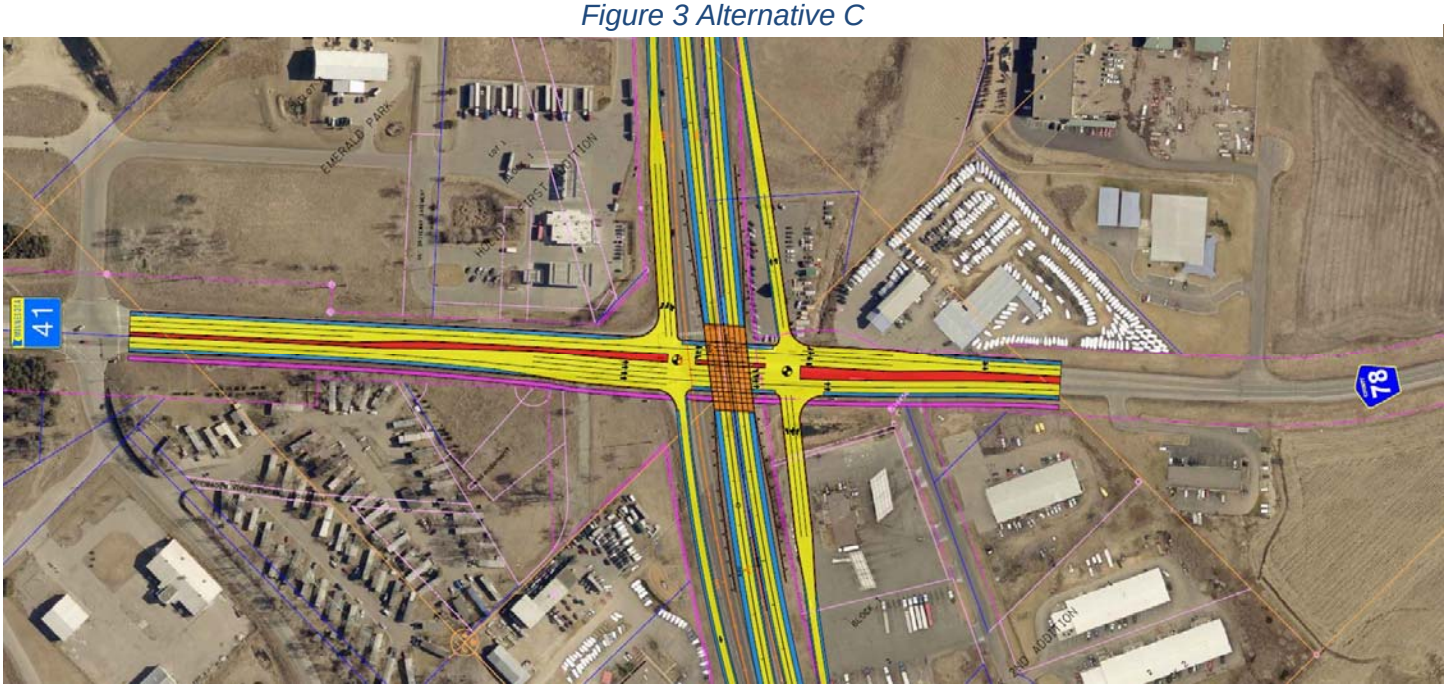
Alternative C – Tight Diamond Interchange (TDI)

This alternative is similar to a traditional diamond interchange configuration. However the TDI, the ramp intersections are spaced more closely which allows more efficient traffic progression through the ramp intersections. To address the heavy eastbound to northbound movement, additional storage lanes are provided approaching the interchange (see Figure 3).

This alternative would include 2 traffic signals at each ramp terminal intersection that operate efficiently with only 4-phases and a significantly reduced volume with US 169 through traffic removed. All US 169 through traffic is able to cross TH 41/CSAH 78 under free flow conditions without traffic control; this removes a significant amount of traffic from the operations along TH 41/CSAH 78.

The tight diamond interchange alternative has a total of 26 conflict points at both ramp terminal intersections and an additional 4 conflict points for the highway ramp connections.

Figure 3 Alternative C



Alternative D – Single Point Urban Interchange (SPUI)

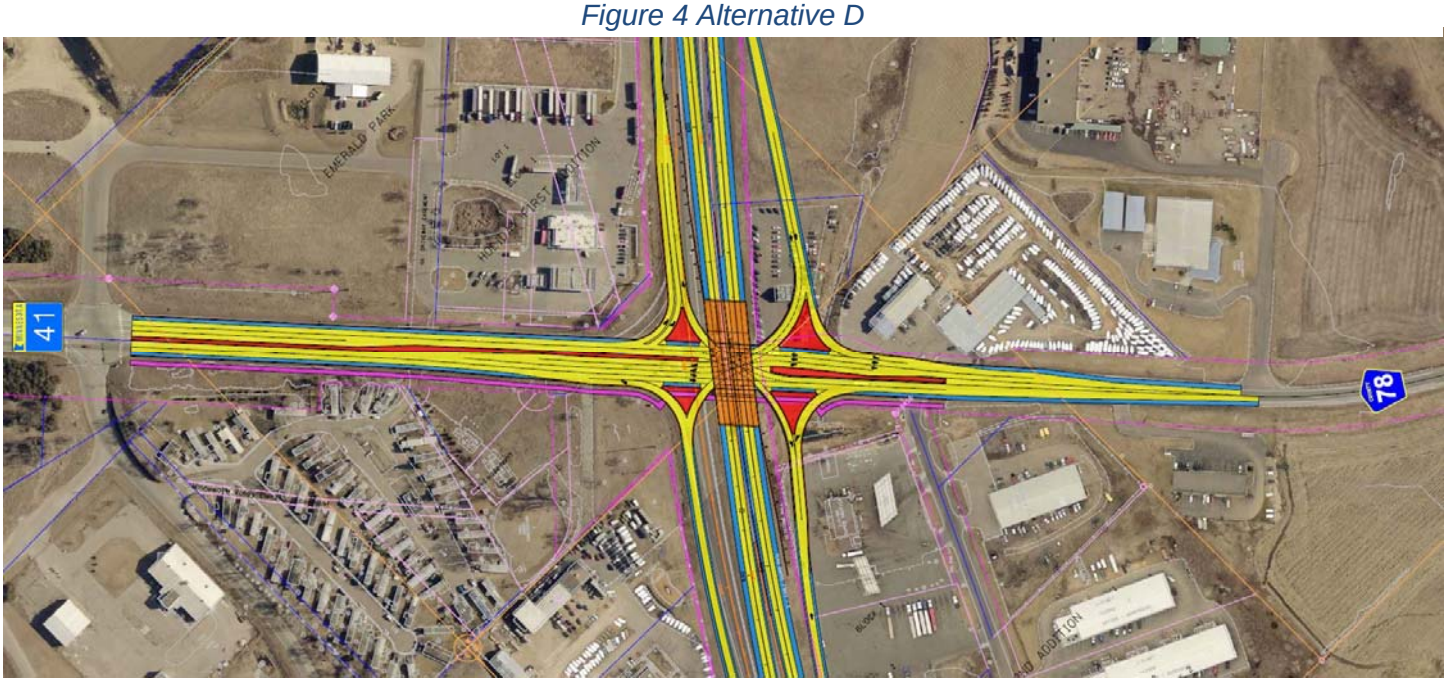
The SPUI interchange configuration is characterized by a single traffic signal at the ramp terminal intersection. This allows the heavy eastbound to northbound movement to travel through only 1 intersection to cross or gain access to US 169 (see Figure 4).

Due to all of the movements occurring at one intersection, the signal requires 6-phases to safely move traffic. The additional phases can increase the lost time at the signal as well as the larger intersection requires longer yellow and red timings.

All US 169 through traffic is able to cross TH 41/CSAH 78 under free flow conditions without traffic control; this removes a significant amount of traffic from the operations along TH 41/CSAH 78.

The single point urban interchange alternative has a total of 20 conflict points at the single ramp terminal intersection and an additional 4 conflict points for the highway ramp connections.

Figure 4 Alternative D



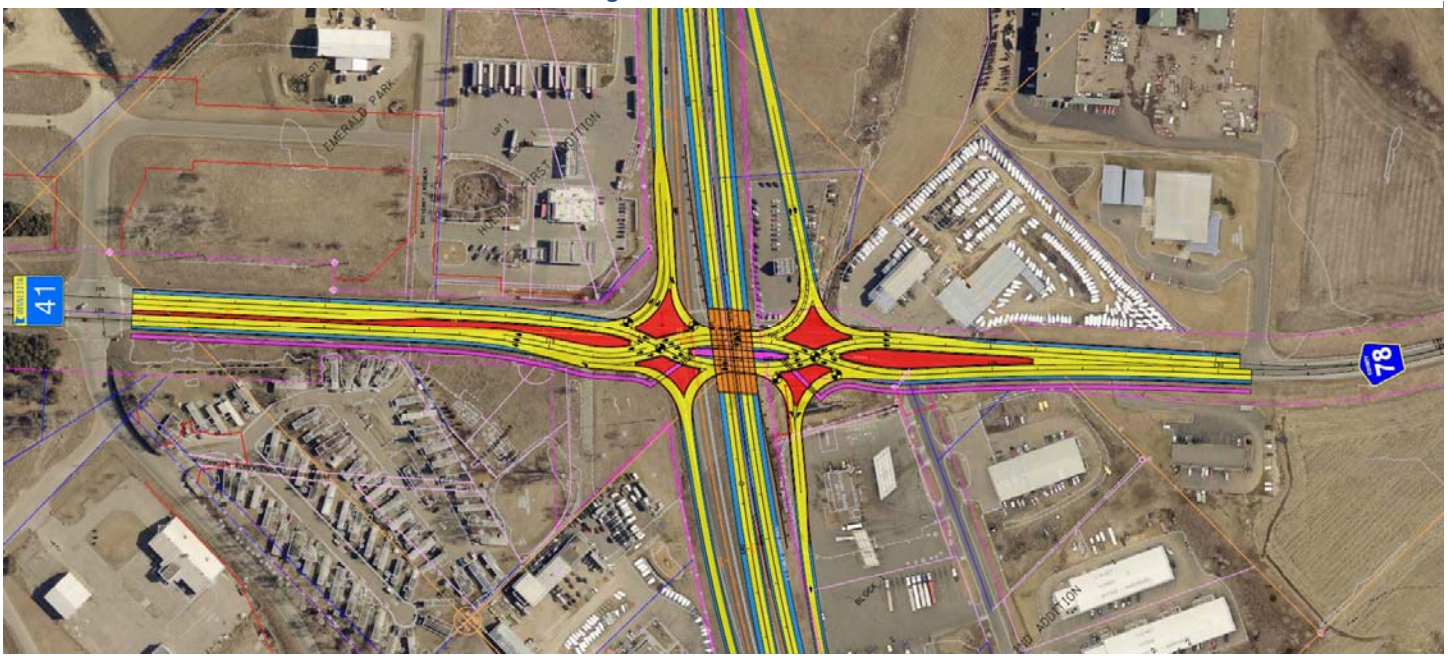
Alternative E – Diverging Diamond Interchange (DDI)

A diverging diamond interchange allows the two directions of traffic (TH 41/CSAH 78) to temporarily cross to opposite sides of the roadway. The design allows left turning traffic from the mainline to make a left turn movement similar to a free right turn at a standard intersection. It also allows both signalized intersections to operate under a 2-phase signal which typically allow a much shorter cycle length and move traffic through the signal more quickly. (see Figure 5).

All US 169 through traffic is able to cross TH 41/CSAH 78 under free flow conditions without traffic control; this removes a significant amount of traffic from the operations along TH 41.

The diverging diamond interchange alternative has a total of 14 conflict points at both ramp terminal intersections and an additional 4 conflict points for the highway ramp connections.

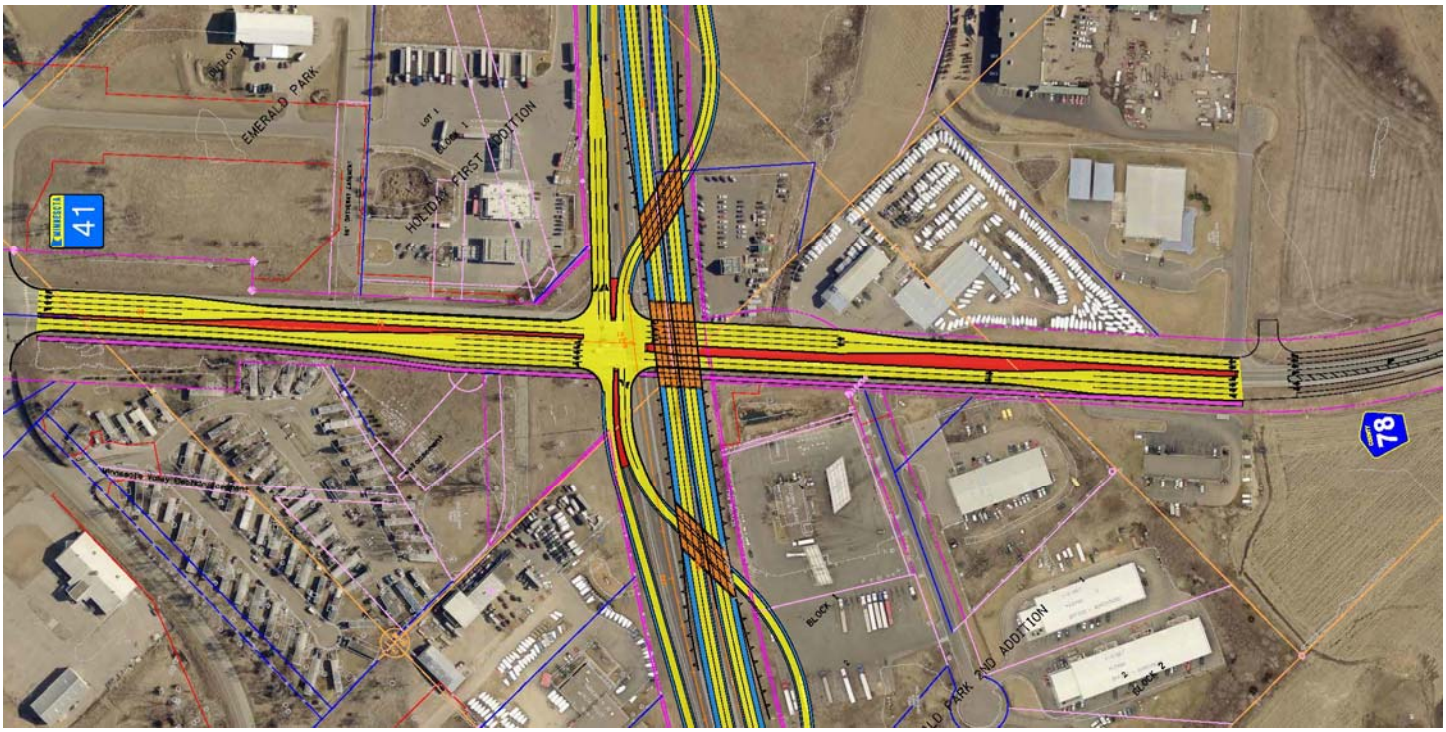
Figure 5 Alternative E



Alternative F – Single Point Urban Interchange (SPUI) Offset

While similar to Alternative D, this single point intersection is offset to the northwest, resulting in three grade separated structures on US 169 over TH 41/CSAH 78 and the northbound US 169 on and off ramps (see Figure 6). Traffic operations are very similar to Alternative D, however the right turn movements are brought into the intersection operations. With a standard 4-leg intersection design, the conflict points are increased from Alternative D up to 32 points with the ability of the ramp connections to go through the intersection.

Figure 6 Alternative F



TH 41 at Dem Con Drive Intersection

The only geometric change at the Dem Con Drive intersection (assumed for all build alternatives) was a lane configuration change from eastbound TH 41. The existing 250 foot right turn lane was converted to a shared through-right lane to provide more efficient operations for that approach. The existing and future right turn demands at that intersection are relatively low and the shared lane operation has no negative impact.

It should be noted that the shared through-right lane was not necessary to provide acceptable LOS at the intersection. It was added to reduce the queue and ensure all traffic passed through this intersection in order to fully evaluate the interchange designs. The improved efficiency also allows for better signal coordination with the proposed interchange ramp terminal intersections in all alternatives.

It is recognized that there are operational issues on Dem Con Drive west from the TH 41 intersection related to the roads design, diverse mix of land uses and heavy truck use. These issues are being considered as part of the frontage road development process.

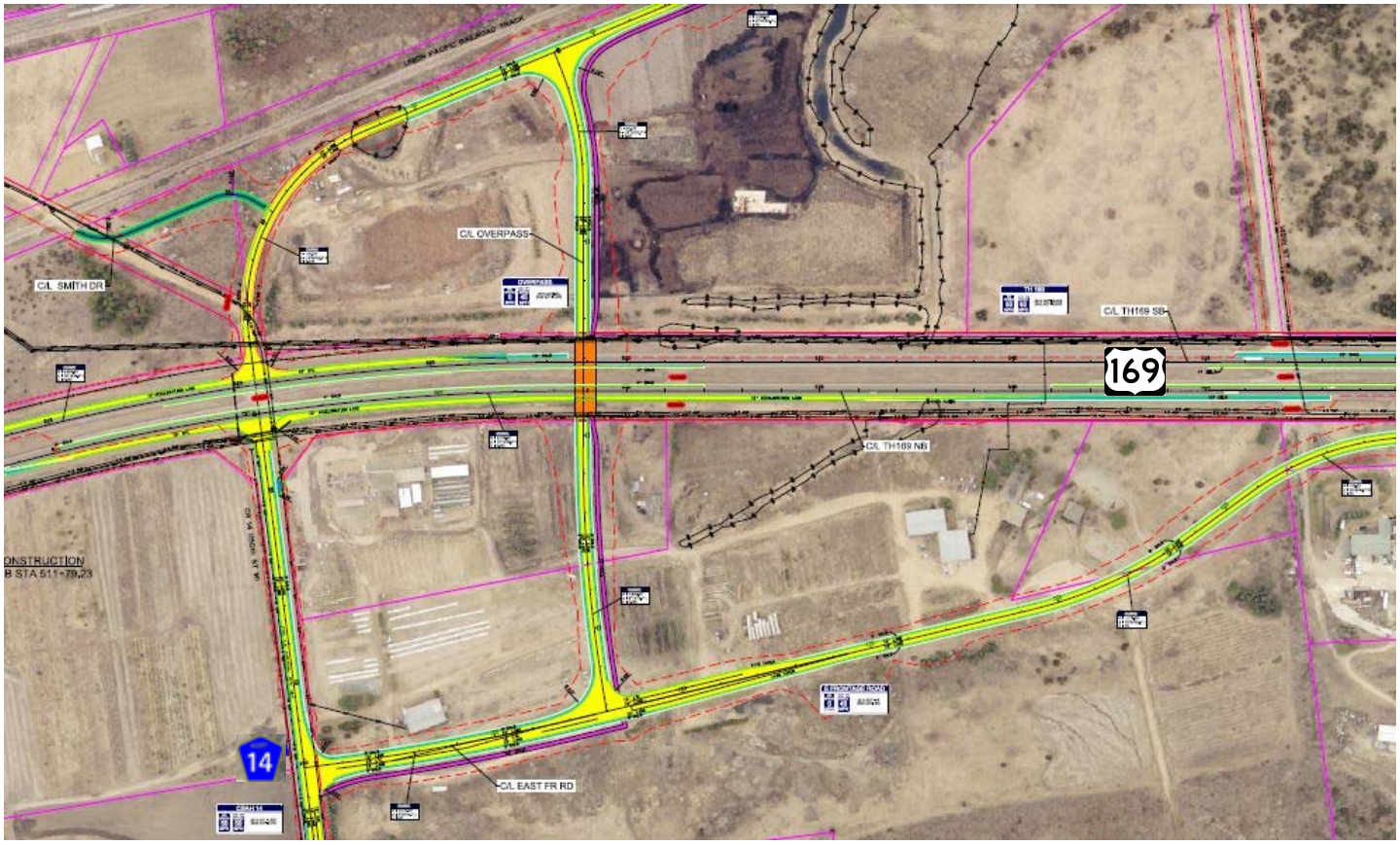
CSAH 14 at US 169 Overpass and Right-In/Right-Out Intersection

Access to US 169 via the three-legged intersection at 145th Street and the four-legged intersection at US CSAH 14 have been reconfigured to include a right-in/right-out (RI/RO) intersection at the existing CSAH 14 access, a grade-separated overpass north of the intersection, and supporting roadway connections both west and east of US 169 (see Figure 7). The existing three-legged intersection at 145th Street will be closed.

All resulting T-intersections are assumed to be side-street stop controlled, with the potential to include channelized right-turns with yield control, due to the most of the traffic turning destined to and from US 169.

This improvement is a part of all interchange alternatives at US 169 and TH 41/CSAH 78.

Figure 7 US 169 and CSAH 14 - Alternatives A-F



US 169 Access Closures

All remaining access along US 169 from the new RI/RO intersection at CSAH 14 to north of the new interchange at TH 41/CSAH 78 will be closed, but for the southbound US 169 RI/RO Anchor Block access, for all interchange alternatives at US 169 and TH 41/CSAH 78. Access to the east will be provided via a continuous frontage/supporting roadway east of US 169 from CSAH 14 to CSAH 78. 145th Street to the west accesses US 169 via the CSAH 14 overpass and right-in/right-out intersection, and the remaining western access is provided via a frontage road running north to TH 41.

Crash Estimation

Future vehicular crash estimates for each alternative were determined by applying varying crash rates to the daily entering traffic for each of the proposed intersections. The No Build estimates are based on the existing crash rates. Proposed intersections are based on the MnDOT Statewide average crash rates for varying similar types of intersection control.

All Build alternatives result in less crashes than No-Build (See Table 1). The diverging diamond interchange crash estimation was based on the Crash Modification Factor (CMF) for the reconstruction of a typical signalized diamond interchange to a diverging diamond interchange. The CMF includes a 56% reduction of all crash types at each signalized intersection.

The build alternative at US 169/CSAH 14, including all supporting roadway intersections, result in less crashes than No-Build (See Table 2). The US 169/CSAH 14 right-in/right-out crash estimation was based on the CMF for the restriction of access with a raised median and results in a 39% reduction from the Mn/DOT Statewide average of all crash types at the resulting right-in/right-out intersection.

Table 1 – US 169 at TH 41 Estimated Yearly Crashes 2040

Alternative	Intersection	Existing Crash Rate	MnDOT Avg Crash Rate	Total Entering ADT	Intersection Estimated Yearly Crashes	Overall Total Estimated Yearly Crashes
Existing	US 169 at TH 41	1.46		40,030	21.3	**21.3**
No Build	US 169 at TH 41	1.46		56,300	30.0	**30.0**
Build Option Alternatives						
Alt A – Partial/DLT	Displaced LT		0.43	9,600	1.5	**9.7**
	SB US 169 at TH 41		0.43	17,600	2.8	
	NB US 169 at TH 41		0.44	33,800	5.4	
Alt B – Diamond w/Loop	SB US 169 at TH 41		0.43	21,800	3.4	**6.4**
	NB US 169 at TH 41		0.43	18,800	3.0	
Alt C – TDI	SB US 169 at TH 41		0.43	21,800	3.4	**6.4**
	NB US 169 at TH 41		0.43	18,800	3.0	
Alt D,F – SPUI/Offset	NB/SB US 169 at TH 41		0.43	25,800	4.1	**4.1**
Alt E – DDI**	SB US 169 at TH 41		0.19	21,800	1.5	**2.8**
	NB US 169 at TH 41		0.19	18,800	1.3	

-Existing signalized intersection is a High Volume/High Speed Signalized intersection; Approach ADT's greater than 15,000.
-All new signalized intersections utilize MnDOT's 2014 Statewide Average Crash Rate for a Low Volume/High Speed Signalized intersection as no Approach exceeds 15,000 ADT.
(The only exception is the northbound approach of the at-grade US 169 signal for the partial interchange alternative.)
-Freeway Segment crashes assumed to be approximately equal for all alternatives and therefore not quantified for this analysis.
-Minor Street Access crashes assumed to be approximately equal for all alternatives and therefore not quantified for this analysis.
-** Diverging Diamond Interchange based on Crash Modification Factor (CMF) reduction of 56% from diamond interchange signals. (Ranges from 35% to 68% reductions)

Table 2 – US 169 at CSAH 14 Estimated Yearly Crashes 2040

Alternative	Intersection	Existing Crash Rate	MnDOT Avg Crash Rate	Total Entering ADT	Intersection Estimated Yearly Crashes	Overall Total Estimated Yearly Crashes
Existing	US 169 at 145th Street	0.04		28,250	0.4	**1.8**
	US 169 at CSAH 14	0.13		28,230	1.3	
No Build	US 169 at 145th Street	0.04		41,250	0.6	**5.1**
	US 169 at CSAH 14	0.13*	0.26	47,120	4.5	
Build Option Alternative						
CSAH 14 Overpass with RI/RO at US 169	CSAH 14 at US 169		0.16**	52,000	3.0	**4.2**
	CSAH 14 at E Frontage		0.26	5,030	0.5	
	Overpass at E Frontage		0.26	3,370	0.3	
	Overpass at W Frontage		0.26	4,320	0.4	

- Existing and future intersections are Rural Thru/Stop intersections; future RI/RO intersection is Other.
- *For No-Build 2040 the higher MnDOT Average Crash Rate has been used to determine future crashes due to increasing volumes on all approach legs, high speeds, decreased gaps, etc.
- **Mn/DOT Average Crash Rate reduced by CMF 0.61 from FHWA's cmfclearinghouse.org CMF ID: 3034

Traffic Forecasts

Daily and peak hour traffic forecasts for this project were developed largely based on the utilization of the 2040 Scott County Model (SC Model), which was based on the Twin Cities Collar County Travel Demand Model (TCCCTD model) and was updated in early 2015 to incorporate Thrive MSP 2040 that was adopted by the Council in May 2014. The 2040 SC model network also includes all the roadway improvements completed or in progress, improvements identified in Scott County's 2013 CIP (Capital Improvement Program) and a subset of the more likely fiscally constrained roadway improvements based on input from the County.

More information about the traffic forecast methodology can be found in the Technical Memorandum *US 169 at TH 41 Intersection Study – Traffic Forecast Memorandum, November 3, 2016.*

Attached Figures 8A and 8B represent the 2040 Build turning movement traffic demands. These figures represent a standard diamond interchange configuration, all scenarios included rerouting of the build demands based on the alternative being considered.

All local access traffic, including heavy vehicles, were rerouted from the proposed access closure locations to the appropriate turning movements at the study intersections. This includes routing heavy commercial vehicles to and from the Dem Con Drive intersection.

2040 Volume to Capacity Assessment

A simple volume to capacity (v/s) assessment was completed on all alternatives to assess how much capacity would be constructed with each alternative.

The Federal Highway Administration (FHWA) has developed a capacity evaluation tool that allows for a quick evaluation of many different alternative types. The tool is the Capacity Analysis and Planning of Junctions tool, or Cap-X. The following is a portion of the description from the FHWA website:

"Cap-X is a tool that can be used to evaluate selected types of innovative junction designs (eight intersections, five interchanges, three roundabouts and two mini-roundabouts) using given peak flow volumes. The intersections and interchanges are evaluated using the method of critical lane volume summation to provide planning capacity assessment at each crossing."

The following Tables 3 and 4 represent the resultant V/C ratios for each separate intersection of the alternatives analyzed for this project; the results are all from the FWHA Cap-X software.

From this assessment, it is clear the existing at-grade signalized intersection is above the capacity of the current design. Alternative A is improved over the No Build, however the northbound morning peak directional movement overburdens the proposed at-grade intersection and it operates very near capacity. Alternative C, the Diamond, and Alternative E, the DDI, operate with the overall lowest V/C ratio in the AM and PM peak hours, respectively.

All of the full interchange designs have lower V/C ratios allowing them to handle fluctuations in traffic demands as well as continuing to operate further into the future.

Table 3 2040 Volume/Capacity Assessment AM Peak

Alternative	Alt	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6	Highest V/C	Rank
No Build		--	--	--	--	1.13	--	1.13	6
Partial DLT	A	--	--	--	0.37	0.85	--	0.85	5
Diamond SE Loop	B	--	--	0.46	0.68	--	--	0.68	4
Diamond	C	--	--	0.45	0.37	--	--	0.45	1
SPUI/SPUI Offset	D	0.49	--	0.53	--	--	0.37	0.53	3
DDI	E	0.49	0.41	0.29	0.34	0.24	0.33	0.49	2

Table 4 2040 Volume/Capacity Assessment PM Peak

Alternative	Alt	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6	Highest V/C	Rank
No Build		--	--	--	--	1.06	--	1.06	6
Partial	A	--	--	--	0.28	0.59	--	0.59	4
Diamond SE Loop	B	--	--	0.40	0.68	--	--	0.68	5
Diamond	C	--	--	0.48	0.38	--	--	0.48	2
SPUI	D	0.42	--	0.49	--	--	0.41	0.49	3
DDI	E	0.42	0.35	0.35	0.26	0.23	0.35	0.42	1

2040 Traffic Operations

The traffic operations for all of the future alternatives were analyzed using Synchro/SimTraffic (ver 9) software package. Traffic operations analysis were conducted to determine the level of service (LOS), delay and queuing information at the alternative intersections in the project area. 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.

This section addresses the alternative US 169/TH 41/CSAH 78 intersection concepts presented above, as well as the TH 41 at Dem Con Drive intersection. All other intersections and access locations, including the US 169/CSAH 14 right-in/right-out and associated improvement intersections, would have similar operations between all alternatives.

Operational results for all intersections in each alternative can be found in the attached Appendix Tables A1 though A7. A summary of the operations is provided in Table 5 on the following page.

No Build Alternative

As discussed previously, this alternative has significant safety and mobility issues that exist today and will degrade into the future as traffic increases through the project area. The current at-grade signal is unable to serve future traffic demands, therefore substantial increases in delay and very poor operations result.

Alternative A – Partial Interchange with a Displaced Left Turn (DLT)

As discussed previously, this alternative does help to address two of the main safety or operational issues at the current intersection; the high southbound crash rate and the heavy eastbound to northbound movement. However, the inclusion of the at-grade signal and close spacing with the southbound off ramp terminal intersection create operational and safety issues.

The intersections must be treated similar to a tight diamond interchange in order to ensure traffic does not spill back between intersections and disrupt other intersections, including northbound US 169. A long cycle length, typical of a high speed corridor, would create potentially major safety problems if spillback occurred.

During the PM peak hour, when northbound US 169 demand is low, this build alternative operates well. However, when the northbound traffic demand are high such as the AM peak hour, the capacity of the design is tested. During the AM peak, the overall intersection delay is approaching failure at a LOS E, as the northbound US 169 through movement operates with over 100 seconds of delay, a failing LOS F, with average queues of approximately 1000 feet and maximum queues that are over 1250 feet.

Alternative B – Diamond Interchange with Loop Ramp

As discussed previously, this alternative addresses the high US 169 traffic demands in both directions as well as the TH 41 to US 169 movements. Both ramp terminal intersection operate at a LOS B during both the AM and PM peak hours.

The maximum queue at the interchange is less than 570 feet during the AM peak hour. This queue is a result of vehicles stacking in the right lane along TH 41 as they approach US 169. Prior to the southbound US 169 ramp terminal intersection, the two through lanes carry all traffic destined for northbound US 169 and eastbound CSAH78. This creates an uneven demand in the right most lane; however all traffic is served in one cycle and there are no delay issues.

Alternative C – Tight Diamond Interchange (TDI)
As discussed previously, this alternative addresses the high US 169 traffic demands in both directions as well as the TH 41 to US 169 movements. Both ramp terminal intersections operate at a LOS B during both the AM and PM peak hours and all maximum queues are less than 380 feet.

Alternative D – Single Point Urban Interchange (SPUI)
As discussed previously, this alternative addresses the high US 169 traffic demands in both directions as well as the TH 41 to US 169 movements. The ramp terminal intersection operates at a LOS B during both the AM and PM peak hours and all maximum queues are less than 370 feet.

Alternative E – Diverging Diamond Interchange (DDI)
As discussed previously, this alternative addresses the high US 169 traffic demands in both directions as well as the TH 41 to US 169 movements.

The southbound ramp terminal intersection operates at a LOS B and the northbound ramp terminal intersection operates at a LOS A during both the AM and PM peak hours and all maximum queues are less than 320 feet.

Alternative F – Single Point Urban Interchange (SPUI) Offset
Similar to Alternative D, the ramp terminal intersection operates at a LOS C in the AM peak hour and LOS B in the PM peak hour and all maximum queues are less than 350 feet.

Table 5 Traffic Operation Summary – Interchange Options

Alternative	Intersection	Total Entering ADT	Intersection Delay / LOS AM Peak	Intersection Delay / LOS PM Peak
Existing	US 169 at TH 41	40,030	**47.9 / D**	**37.6 / D**
No Build	US 169 at TH 41	56,300	**103.2 / F**	**67.8 / E**
Build Option Alternatives				
Alt A – Partial/DLT	Displaced LT	9,600	27.8 / C	14.8 / B
	SB US 169 at TH 41	17,600	10.8 / B	10.2 / B
	NB US 169 at TH 41	33,800	**73.7 / E**	21.8 / C
Alt B – Diamond with Loop	SB US 169 at TH 41	21,800	17.9 / B	14.1 / B
	NB US 169 at TH 41	18,800	17.8 / B	15.6 / B
Alt C – TDI	SB US 169 at TH 41	21,800	14.4 / B	12.8 / B
	NB US 169 at TH 41	18,800	16.3 / B	16.2 / B
Alt D – SPUI	NB/SB US 169 at TH 41	25,800	19.0 / B	15.4 / B
Alt E – DDI	SB US 169 at TH 41	21,800	15.4 / B	13.5 / B
	NB US 169 at TH 41	18,800	8.9 / A	8.8 / A
Alt F –SPUI Offset	SB US 169 at TH 41	25,800	21.8 / C	16.5 / B

TH 41 at Dem Con Drive Intersection

The intersection of TH 41 at Dem Con Drive has a significant amount of heavy commercial traffic which is included in the operations modeling. The intersection does have sufficient capacity to serve the future traffic demands with the inclusion of the eastbound shared through-right lane.

It should be noted that the shared through-right lane was not necessary to provide acceptable LOS at the intersection. It was added to reduce the queue and ensure all traffic passed through this intersection in order to fully evaluate the interchange designs. The improved efficiency also allows for better signal coordination with the proposed interchange ramp terminal intersections in all alternatives.

MnDOT has expressed the desire to not have a shared through-right lane, regardless of demands making the right turn movement. While not directly related to this project, MnDOT expects to do pavement maintenance work within the 10 to 20 year timeframe where this would be evaluated in more detail.

Under the No Build alternative, the at-grade signal of US 169 and TH 41 creates queue spillback that can impact the operations at Dem Con Drive; the AM peak has the worst overall delay but is still operating at a LOS D.

Under all of the build option alternatives, the existing signal would be coordinated with the interchange signals in order to provide better platooning and flow between the intersections. All of the build options operate at a LOS B with no major traffic operational issues.

Table 6 represents the TH 41 at Dem Con Drive intersection operations for all of the evaluated scenarios; this operational results in this table does include the addition of the eastbound shared through-right lane.

Table 6 Traffic Operations Summary – TH 41 at Dem Con Drive

Alternative	**Intersection**	**Intersection Delay / LOS AM Peak**	**Intersection Delay / LOS PM Peak**
Existing	TH 41 at Dem Con Dr	21.4 / C	17.3 / B
No Build	TH 41 at Dem Con Dr	**42.6 / D**	25.8 / C
Build Option Alternatives			
Alt A – Partial/DLT	TH 41 at Dem Con Dr	17.8 / B	12.9 / B
Alt B – Diamond with Loop	TH 41 at Dem Con Dr	17.1 / B	13.3 / B
Alt C – TDI	TH 41 at Dem Con Dr	15.4 / B	12.9 / B
Alt D – SPUI	TH 41 at Dem Con Dr	19.1 / B	14.3 / B
Alt E – DDI	TH 41 at Dem Con Dr	13.5 / B	11.3 / B
Alt F – SPUI Offset	TH 41 at Dem Con Dr	15.1 / B	11.8 / B

CSAH 14 at US 169 Overpass and Right-In/Right-Out Intersection

Under the No Build alternative, the US 169 at-grade side-street stop intersections at 145th Street and CSAH 14 operate at LOS A and LOS D for the AM peak hour, and LOS A and LOS E for the PM peak hour, respectively. In both existing 2015 and future No-Build scenarios, side street delays are at or near LOS F.

Under all six of the build alternatives, the intersections associated with the US 169/CSAH 14 right-in/right-out intersection, CSAH 14 overpass, and supporting roadway network all operate at LOS A with minimal queueing.

Table 7 represents the US 169 at CSAH 14 right-in/right-out intersection, CSAH 14 overpass, and associated supporting roadway network intersection operations for all of the evaluated scenarios.

Table 7 Traffic Operations Summary – US 169 at CSAH 14

Alternative	**Intersection**	**Intersection Delay / LOS AM Peak**	**Intersection Delay / LOS PM Peak**
Existing	US 169 at 145th Street	3.1 / A	3.9 / A
	US 169 at CSAH 14	4.9 / A	3.9 / A
No Build	US 169 at 145th Street	3.9 / A	5.4 / A
	US 169 at CSAH 14	**28.6 / D**	**39.9 / E**
Build Option Alternative			
CSAH 14 Overpass with RI/RO at US 169	CSAH 14 RI/RO at US 169	3.0 / A	2.7 / A
	CSAH 14 at East Frontage	3.8 / A	4.2 / A
	Overpass at E Frontage	2.9 / A	3.7 / A
	Overpass at W Frontage	3.5 / A	3.5 / A

Travel Time Analysis

As part of the evaluation, a travel time summary for each alternative was developed for four major movements that occur in the project area. The four major movements in the project area include the following:

- Southbound through trips on US 169 – CSAH 69 Overpass to CSAH 14
- Northbound through trips on US 169 - CSAH 14 to CSAH 69 Overpass
- Eastbound TH 41 to Northbound US 169 – S. River Bridge (TH 41) to CSAH 69 Overpass (US 169)
- Southbound US 169 to Westbound TH 41 – CSAH 69 Overpass (US 169) to S. River Bridge (TH 41)

The travel time analysis was completed for each alternative; the analysis was based on vehicle speed and distance traveled plus the “total delay” by movement from the operations modeling.

Speed limits along US 169 were increased from 55 mph to 65 mph for Alternatives B through E with the new freeway configuration. Alternative A, which keeps an at-grade signal for northbound US 169, was assumed to remain at the existing speed limit of 55 mph; southbound US 169 for Alternative A was not

increased based on driver expectancy for a roadway to have the same speed limit in both directions. Speed limits along TH 41 were assumed to remain at the current posted speed limit of 55 mph.

In both peak hours, the 2040 No Build alternative has the highest travel times for each of the four movements. Tables 4 and 5 present the travel time summary for the AM and PM peak hours respectively.

For southbound US 169, from the CSAH 69 overpass to CSAH 14, Alternatives A through E provide a benefit in both peak hours. Alternative A, with a northbound at-grade signal and thus lower speed limit, has a slightly higher travel time than the full grade separated alternatives. In the PM peak hour, when southbound US 169 demands are highest, the No Build travel time is approximately 6.2 minutes. Alternative A would reduce the travel time to approximately 4.0 minutes, a 35% reduction. Alternatives B through E would all have the same reduction of travel time down to approximately 3.4 minutes or a 45% reduction.

For northbound US 169, from CSAH 14 to the CSAH 69 overpass, Alternatives A through E provide a benefit in both peak hours. Alternative A, with a northbound at-grade signal and thus lower speed limit, has a higher travel time than the full grade separated alternatives. In the AM peak hour, when northbound US 169 demands are highest, the No Build travel time is approximately 6.6 minutes. Alternative A would only reduce the travel time to approximately 5.7 minutes, only a 14% reduction due to the at-grade signal. Alternatives B through E have the same reduction of travel time to approximately 3.4 minutes or a 48% reduction.

For the eastbound TH 41 movement to northbound US 169, the AM peak hour is the worst case for the No Build alternative as the eastbound left turn and northbound US 169 through movements are at their peak; the No Build travel time is approximately 9.6 minutes due to the long signal delays. All of the build alternatives provide a significant reduction of between 62% and 72%. Alternative B, with the longest travel distance, has the least reduction to 3.7 minutes, while Alternative E has the highest reduction with a travel time of 2.7 minutes.

For the southbound US 169 movement to westbound TH 41, the PM peak hour is the worst case for the No Build alternative; the No Build travel time is approximately 3.5 minutes. All of the build alternatives provide a similar reduction of approximately 30% with a travel time of around 2.5 minutes.

Table 8 Travel Time Summary – AM Peak

AM Peak Hour Comparison		2015	2040 Forecast Demands						
Description		**Existing**	**No Build**	**Alt A**	**Alt B**	**Alt C**	**Alt D**	**Alt E**	**Alt F**
Southbound US 169 - CSAH 69 Overpass to CSAH 14	Distance (mi)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
	Time (min)	5.1	5.4	4.0	3.4	3.4	3.4	3.4	3.4
Northbound US 169 - CSAH 14 to CSAH 69 Overpass	Distance (mi)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
	Time (min)	5.0	6.6	5.7	3.4	3.4	3.4	3.4	3.4
EB TH 41 to NB US 169 - S. River Bridge to CSAH 69 Overpass (169)	Distance (mi)	2.1	2.0	2.0	2.3	2.1	2.1	2.1	2.1
	Time (min)	4.4	9.6	3.7	3.7	3.0	3.0	2.7	2.9
SB US 169 to WB TH 41 - CSAH 69 Overpass to S. River Bridge (TH 41)	Distance (mi)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
	Time (min)	2.9	3.2	2.5	2.6	2.5	2.6	2.6	2.6

Table 9 Travel Time Summary – PM Peak

PM Peak Hour Comparison		2015	2040 Forecast Demands						
Description		**Existing**	**No Build**	**Alt A**	**Alt B**	**Alt C**	**Alt D**	**Alt E**	**Alt F**
Southbound US 169 - CSAH 69 Overpass to CSAH 14	Distance (mi)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
	Time (min)	5.1	6.2	4.0	3.4	3.4	3.4	3.4	3.4
Northbound US 169 - CSAH 14 to CSAH 69 Overpass	Distance (mi)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
	Time (min)	4.6	4.9	4.5	3.4	3.4	3.4	3.4	3.4
EB TH 41 to NB US 169 - S. River Bridge to CSAH 69 Overpass (169)	Distance (mi)	2.1	2.0	2.0	2.3	2.1	2.1	2.1	2.1
	Time (min)	3.8	5.1	3.1	3.3	3.1	2.8	2.6	2.8
SB US 169 to WB TH 41 - CSAH 69 Overpass to S. River Bridge (TH 41)	Distance (mi)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
	Time (min)	2.8	3.5	2.5	2.4	2.5	2.5	2.5	2.4

SENSITIVITY EVALUATIONS

Additional traffic evaluations were conducted to assess the impacts of the existing rail road crossing, as well as testing the available capacity of each interchange design.

Rail Road Crossing Assessment

Approximately ½ mile northwest of US 169 is a rail crossing of TH 41; the crossing is approximately 1,100 feet northwest of the intersection with Dem Con Drive.

Railroad data was obtained from MnDOT's Office of Commercial Vehicle Operations (CVO) and the Federal Railroad Administration (FRA) crossing database. The following is a summary of the information obtained:

Railroad: Union Pacific Railroad (UP)
RR Milepost: 31.53
Subdivision: Mankato - The line runs from South St Paul to Mankato to Sioux City, IA

DOT # 185342L
Warning devices: Signals with gates. New signals in February 2016; CWT circuitry (GCP 4000)

Trains per day: 5-7; random times during the day and night.
Train Speed: 25 to 49 mph
Train Length: Unit trains - 110-130 cars (up to 7,000 feet long) (2-5 per day)
Manifest trains - 75-125 cars (between 4,500 feet and 6,500 feet long) (1-2 per day)

Based on the information obtained, a "worst case" train crossing scenario would be approximately 4 to 5 minutes. For this analysis, a 5-minute gate closure was chosen which is based on a 7000 foot train at 25 mph, approximately 190 seconds, with 40 sec gate close/open and then an additional minute of unforeseen complications.

To evaluate the sensitivity of the rail crossing with traffic along TH 41, the evaluation was conducted using Alternative C as it is the more standard or typical alternative option. Based on the queue lengths from this analysis, an assessment of the operational characteristics developed.

Only the westbound TH 41 approach heading towards Chaska was assessed. The eastbound approach to the rail crossing along TH 41 from Chaska was not considered as it would be the same in all alternatives, including the No Build.

In the AM peak hour, the rail crossing added about 500' of queue at the westbound TH 41 approach to Dem Con Drive with a total maximum queue length of approximately 775 feet. In the PM peak hour, it added 700 of additional queue with a total maximum queue length of approximately 900 feet. See the attached Table B2a and Table B2b for the full results for this analysis.

In both peak hours the queues would not impact the proposed ramp terminal intersections for Alternative B through Alternative E as there is a few hundred feet of remaining storage to the southbound ramp intersection. The queue would not impact the at-grade signalized intersection of the No Build alternative.

This queuing however would extend through the displaced left turn intersection in Alternative A during both peak hours. As the displaced left turn intersection is signalized, traffic should not block the intersection to allow the eastbound approach to operate during a rail event with any Dem Con Drive traffic not impacted by the event. This additional gap in the westbound TH 41 queue would extend the queue closer to the southbound ramp terminal intersection in this alternative, but would not impact operations.

This evaluation shows that all alternatives at the US 169 and TH 41 intersection are not directly impacted by a typical rail event during the peak hours. The only exception to this is Alternative A would have queues that do extend through the displaced left turn intersection.

While this evaluation included a “buffer” time of an additional minute in the gate closures, there is always potential for a rail event that could keep the gates closed for a longer time period. If this was the case, it wouldn’t take much longer of a gate closure to potentially begin to impact the US 169 and TH 41 intersection area. If an event were to ever occur, it would impact all alternatives, including the No Build.

The worst situation for this type of event would be the No Build alternative if the queues did extend onto US 169. Queuing would occur most prominently in the southbound US 169 right turn lane which would be directly adjacent to the high speed through lanes along US 169. In Alternative A through Alternative E, the southbound exit ramp would provide an additional length of approximately 1400 feet of separated storage which would remove many of the safety concerns of such high speed differentials between the lanes. Alternative A could have additional implications as the westbound TH 41 traffic would begin to spill through the northbound US 169 at-grade intersection.

Increased Forecast Demand Assessment

As noted previously, traffic forecasts were prepared using the most recent 2040 Scott County Model, which is based on the Twin Cities Collar County Travel Demand Model. The forecasts were prepared based on current best practices in the industry. However, traffic forecasts have many uncertainties related to land use assumptions that could potentially fluctuate demands through the design year. On a daily basis, traffic demands can also fluctuate heavily for different days of the week and months of the year.

To assess the ability of each alternative to handle fluctuations in traffic demands a sensitivity analysis was conducted for all alternatives that assumed an additional 15 percent increase in all traffic demands throughout the project area. The analysis resulted in two of the alternatives (No-Build and Alternative A) failing and showing signs of significant design deficiencies. Alternatives B, C, D, E and F experience minor delay increases with no major operational issues. See the attached Tables C1 through C7.

The No Build and Alternative A result in failing traffic operations. The at-grade intersection on US 169 in both alternatives is unable to process the increased demands resulting in long queues that require multiple cycles for vehicles to pass.

Alternative B, the southeast loop design, does begin to show congestion problems related to vehicle stacking. With this alternative, eastbound TH 41 traffic destined to US 169 will need to be in the right lane to access both northbound and southbound US 169. This overburdens the lane and creates excessive stacking in the right most lane at the southbound US 169 ramp terminal intersection and reduces the number of gaps available for the westbound left turning traffic.

Alternatives C, D, E and F all operate acceptably with the increase in traffic demands. Alternative C incurs minor increases in delay times and remains at LOS B. Alternative D experiences small increases in the overall delays during the AM peak hour that bring the ramp intersections up to a LOS C; while the PM peak remains a LOS B. Alternative E only incurs very minor increases in delay times and remains at a LOS B or better for both the AM and PM peak hours. Alternative F experiences an increase in delay times for the AM peak hour that results in LOS D, while the PM peak hour remains at LOS B. All four of these alternatives have excess capacity that will keep traffic operations acceptable through the 2040 design year and be able to handle any seasonal traffic fluctuations.

CONCLUSIONS

The existing operations and safety analysis shows problems under today's traffic demands in the study area. Under the expected growth through the design year, 2040, both safety and operations are expected to continue to decline as demand increases.

The No Build scenario has significant delays and safety problems at the US 169/TH 41/CSAH 78 intersection that are unable to be easily mitigated by additional lanes or signal timing and phasing improvements.

The partial interchange, Alternative A, provides an improvement over the existing and no build conditions with the removal of the southbound US 169 through traffic and the displaced left turn configuration. However northbound US 169 will still be controlled by an at-grade signal which leaves approximately 14,500 existing and 24,000 future vehicles approaching TH 41 daily at high speeds. This alternative has the highest crash estimation of all the build alternatives and also has the least favorable traffic operations. This alternative resulted in failing traffic operations under the increased forecast demand operations analysis.

Alternatives B through F all have acceptable traffic operations and greatly improved safety over the no build conditions. Besides some minor fluctuations in intersection operations and crash estimates, these five alternatives are all acceptable alternatives from a traffic safety and operations perspective. All of the US 169 through traffic would essentially incur no delay as they would travel across TH 41 unimpeded. Alternatives B through F were able to handle the increased traffic demands and still operated under acceptable conditions.

The diverging diamond interchange, Alternative E, has the lowest estimated yearly crashes as well as one of the highest reserve capacity interchange types due to the reduced conflicts and free turn movements. The single point urban interchange, Alternatives D and F, have the second lowest estimated yearly crashes and sufficient reserve capacities as well.

At US 169 and CSAH 14, the No Build scenario has significant delays for the CSAH 14 approach to the intersection that are unable to be easily mitigated by additional lanes or traffic control improvements. The proposed reconfiguration to a RI/RO access, a US 169 overpass, and frontage connections will allow traffic to safely and efficiently connect to and from US 169.

The existing railroad crossing along TH 41 does not substantially impact the build alternatives evaluated, the only exception is queueing would extend through the displaced left turn signal for Alternative A.

gtj
Figure 8A and 8B 2040 Build Traffic Demands
Tables A1a through A1c No Build Operational MOE's
Tables A2a through A2c Alternative A Operational MOE's
Tables A3a through A3c Alternative B Operational MOE's
Tables A4a through A4c Alternative C Operational MOE's
Tables A5a through A5c Alternative D Operational MOE's
Tables A6a through A6c Alternative E Operational MOE's
Tables A7a through A7c Alternative F Operational MOE's
Table B1 and B2 Alternative C Railroad Crossing Operational MOE's
Tables C1 through C7 15% Demands Operational MOE's
Exhibits 1 through 8 – Travel Time Evaluation

c: Chris Hiniker, SEH
Jack Corkle, WSB
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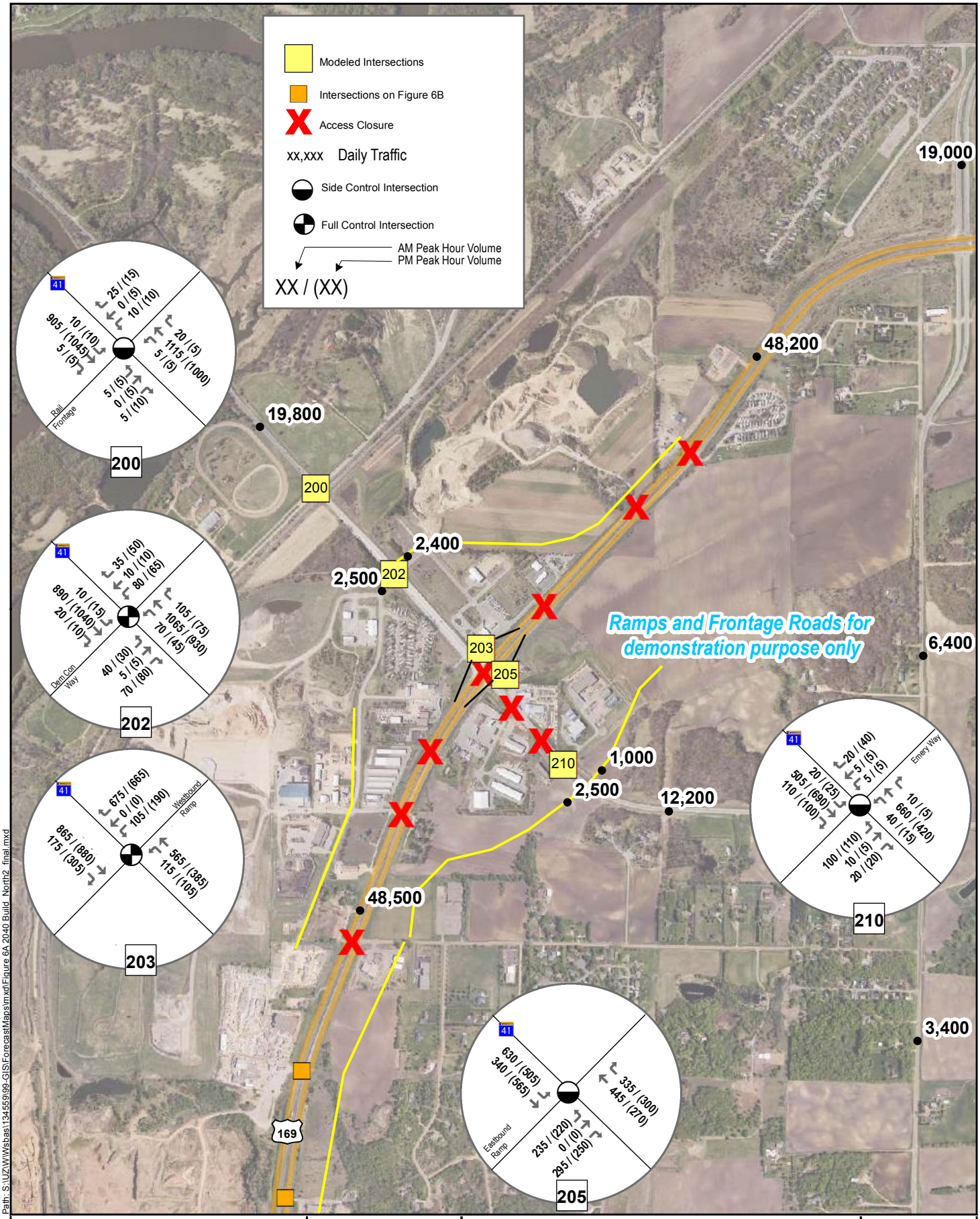

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SEH

0 0.125 0.25 Miles

Project: WSBAS 134559
Print Date: 10/28/2016

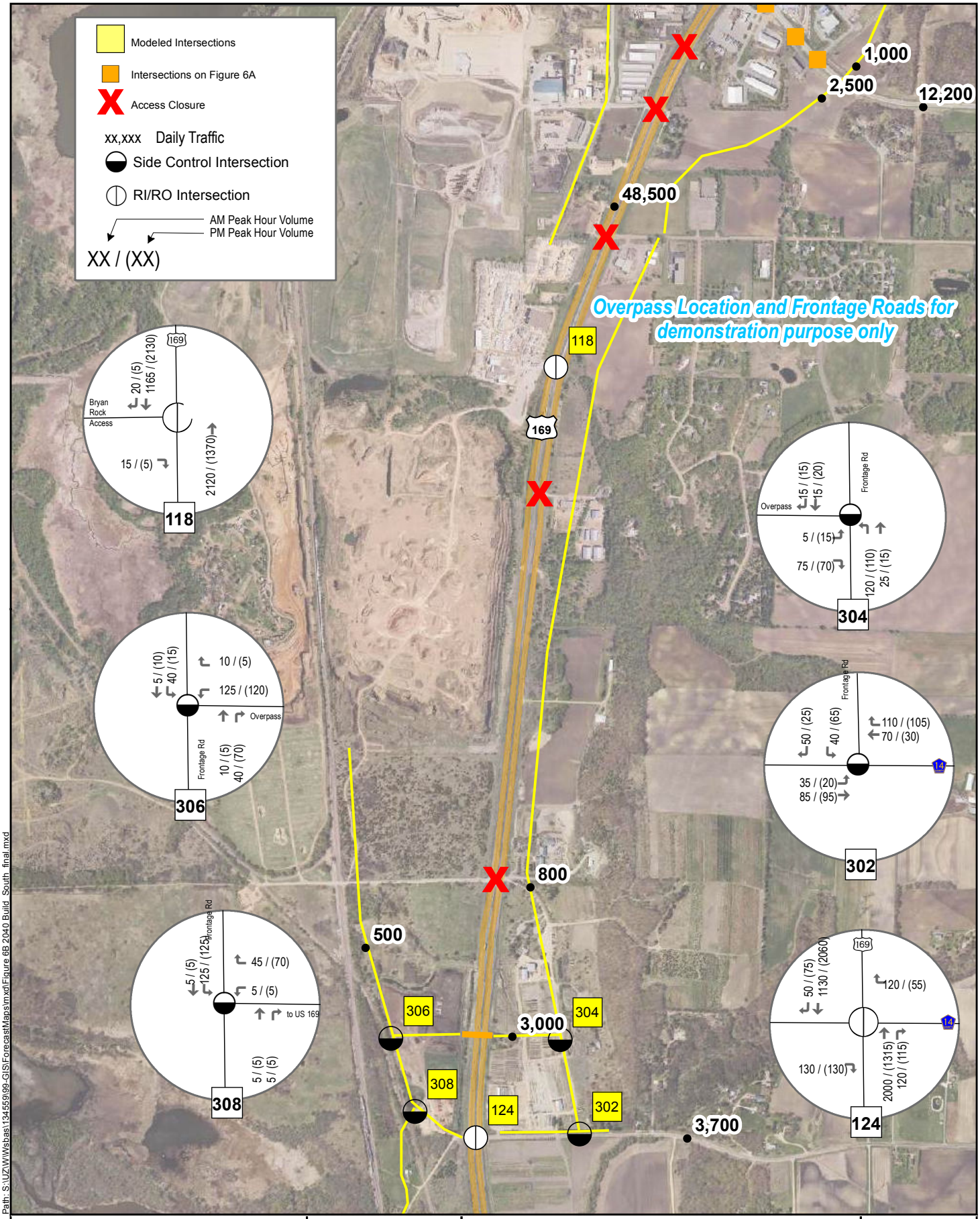
Map by: hxiao
Projection:Scott County Coordinates
Source: SEH, Bing, MnDOT

2040 Build Projections

US 169 & TH 41 Improvements
Scott County, Minnesota

Figure 8A

This map is neither a legally recorded map nor a survey map and is not intended to be used as one. This map is a compilation of records, information, and data gathered from various sources listed on this map and is to be used for reference purposes only. SEH does not warrant that the Geographic Information System (GIS) Data used to prepare this map are error free, and SEH does not represent that the GIS Data can be used for navigational, tracking, or any other purpose requiring exacting measurement of distance or direction or precision in the depiction of geographic features. The user of this map acknowledges that SEH shall not be liable for any damages which arise out of the user's access or use of data provided.



Path: S:\UZ\W\Wsbas\134559\99-GIS\ForecastMaps\mxd\Figure 6B 2040 Build South final.mxd

SEH

0 0.125 0.25 Miles

Project: WSBAS 134559
Print Date: 10/28/2016

Map by: hxiao
Projection:Scott County Coordinates
Source: SEH, Bing, MnDOT

2040 Build Projections

US 169 & TH 41 Improvements
Scott County, Minnesota

Figure 8B

This map is neither a legally recorded map nor a survey map and is not intended to be used as one. This map is a compilation of records, information, and data gathered from various sources listed on this map and is to be used for reference purposes only. SEH does not warrant that the Geographic Information System (GIS) Data used to prepare this map are error free, and SEH does not represent that the GIS Data can be used for navigational, tracking, or any other purpose requiring exacting measurement of distance or direction or precision in the depiction of geographic features. The user of this map acknowledges that SEH shall not be liable for any damages which arise out of the user's access or use of data provided.

Table A1a

2040 No Build Traffic Operations **2/17/2016**

SimTraffic Ver 9

Intersection	Approach	AM PEAK HOUR			PM PEAK HOUR		
		Approach Delay	Intersection Delay	Minor Stop - Worst Approach	Approach Delay	Intersection Delay	Minor Stop - Worst Approach
US 169 at Landscape/Mobile Access	NB	1.3 / A	2.6 / A	**41.4 / E**	1 / A	4.9 / A	**44 / E**
	SB	3.9 / A			7.1 / A		
	EB	19 / C			**44 / E**		
	WB	**41.4 / E**			12.2 / B		
US 169 at Weckman Access	NB	4.6 / A	3.4 / A	19.7 / C	2.7 / A	2.5 / A	**42.5 / E**
	SB	1.4 / A			2.3 / A		
	EB	19.7 / C			**42.5 / E**		
US 169 at Holiday Gas Access	NB	8.7 / A	6.4 / A	15.1 / C	4.9 / A	16.1 / C	**784.9 / F**
	SB	2.9 / A			20.3 / C		
	EB	15.1 / C			**784.9 / F**		
US 169 at TH 41 (Signal)	NB	**100.5 / F**	**103.2 / F**		**48.4 / D**	**67.8 / E**	
	SB	**41.1 / D**			**61.8 / E**		
	EB	**216.9 / F**			**99.2 / F**		
	WB	**89.7 / F**			**68.4 / E**		
US 169 at 130th St	NB	8.4 / A	6.4 / A	**75.9 / F**	2.5 / A	3.7 / A	**96 / F**
	SB	1.9 / A			2.3 / A		
	EB	**75.9 / F**			**96 / F**		
US 169 at 133rd St	NB	2.5 / A	3.2 / A	**38.4 / E**	1.8 / A	3 / A	**30.9 / D**
	SB	3.3 / A			3 / A		
	WB	**38.4 / E**			**30.9 / D**		
US 169 at 145th St	NB	3.4 / A	3.9 / A	**79.2 / F**	2.2 / A	5.4 / A	**84.1 / F**
	SB	4.4 / A			6.4 / A		
	EB	7.1 / A			**84.1 / F**		
	WB	**79.2 / F**			**78 / F**		
US 169 at CSAH 14	NB	4.7 / A	**28.6 / D**	**2618.5 / F**	3 / A	**39.9 / E**	**1973.8 / F**
	SB	5.8 / A			5 / A		
	EB	**193.4 / F**			**102.3 / F**		
	WB	**2618.5 / F**			**1973.8 / F**		
TH 41 at Rail Frontage	NB	**149.8 / F**	**37.2 / E**	**553 / F**	**95.9 / F**	11.2 / B	**228.6 / F**
	SB	**553 / F**			**228.6 / F**		
	EB	**57.6 / F**			10.3 / B		
	WB	7.5 / A			5.2 / A		
TH 41 at Dem Con Dr (Signal)	NB	25.5 / C	**42.6 / D**		22 / C	25.8 / C	
	SB	23.6 / C			18.8 / B		
	EB	**59.9 / E**			25.8 / C		
	WB	31.8 / C			26.9 / C		
TH 41 at Ventura Ct	NB	**231.9 / F**	**32 / D**	**231.9 / F**	**26.8 / D**	7.2 / A	**26.8 / D**
	SB	0 / A			0 / A		
	EB	5.7 / A			7.4 / A		
	WB	**25.4 / D**			2.8 / A		
TH 41 at JustTens	NB	**34.6 / D**	5.1 / A	**34.6 / D**	17.2 / C	1.4 / A	17.2 / C
	EB	1.3 / A			1.4 / A		
	WB	7.3 / A			1 / A		
TH 41 at Emery Way	SB	0 / A	3 / A	0 / A	4.5 / A	0.8 / A	4.5 / A
	EB	0.9 / A			0.5 / A		
	WB	4.4 / A			1.1 / A		

Table A1b

US 169 TH 41 Interchange Project

2040 No Build Conditions

AM Peak Hour

SimTraffic Ver 9 Results

	Intersection	Approach	Demand Volumes				Delay (s/veh)						LOS By Approach		LOS By Intersection		Queing Information (feet)								
																	Through			Left Turn			Right Turn		
			L	T	R	Total	L	LOS	T	LOS	R	LOS	Delay (S/Veh)	LOS	Delay (S/Veh)	LOS	Link Length	Avg.	Max	Storage	Avg.	Max	Storage	Avg.	Max
AM Peak Hour	US 169 at Landscape/Mobile Access	NB	0	2205	15	2,220	0.0	A	1.3	A	0.5	A	1.3	A	2.6	A	0	0	0	0	0	0	250		
		SB	0	1480	10	1,490	0.0	A	3.9	A	4.3	A	3.9	A			0	0	0	0	0	0	250		
		EB	0	0	10	10	0.0	A	0.0	A	19.0	C	19.0	C			0	0	0	0	0	0	500	14	86
		WB	0	0	20	20	0.0	A	0.0	A	41.4	E	41.4	E			0	0	0	0	0	0	500	11	47
	US 169 at Weckman Access	NB	25	2220	0	2,245	58.9	F	4.0	A	0.0	A	4.6	A	3.4	A	1340	2	55	300	38	166	0	0	0
		SB	0	1490	0	1,490	0.0	A	1.4	A	0.0	A	1.4	A			716	0	9	0	0	0	250		
		EB	0	0	20	20	0.0	A	0.0	A	19.7	C	19.7	C			0	0	0	0	3	76	50	23	90
	US 169 at Holiday Gas Access	NB	0	2245	0	2,245	0.0	A	8.7	A	0.0	A	8.7	A	6.4	A	0	0	0	0	0	0	0	0	0
		SB	0	1445	65	1,510	0.0	A	3.0	A	1.9	A	2.9	A			0	0	0	0	0	0	300		
		EB	0	0	20	20	0.0	A	0.0	A	15.1	C	15.1	C			0	0	0	0	0	0	500	13	65
	US 169 at TH 41 (Signal)	NB	200	1480	150	1,830	173.8	F	97.9	F	47.9	D	100.5	F	103.2	F	892	824	926	275	235	375	350	225	450
		SB	40	845	580	1,465	116.5	F	54.6	D	15.6	B	41.1	D			833	375	655	315	101	392	600	174	578
		EB	625	195	130	950	314.2	F	76.1	E	25.5	C	216.9	F			1284	831	1299	800	799	900	0		
		WB	65	270	140	475	133.3	F	88.8	F	71.1	E	89.7	F			354	339	378	250	168	349	354	192	363
	US 169 at Value Inn	NB	0	1825	0	1,825	0.0	A	25.4	D	0.0	A	25.4	D	19.8	C	630	249	601	0		0	0	0	0
		SB	0	1035	5	1,040	0.0	A	9.9	A	14.5	B	9.9	A			0	0	0	0	0	0	250		
		EB	5	0	5	10	130.0	F	0.0	A	15.6	C	67.6	F			0	0	0	500	8	45	50	5	34
	US 169 at 130th St	NB	20	1815	0	1,835	19.3	C	8.3	A	0.0	A	8.4	A	6.4	A	1292	54	260	250	14	126	0	0	0
		SB	0	1010	30	1,040	0.0	A	1.9	A	1.1	A	1.9	A			0	0	0	0	0	0	250		4
		EB	10	0	5	15	121.3	F	0.0	A	15.3	C	75.9	F			0	0	0	500	22	106	50	12	95
	US 169 at 133rd St	NB	0	1810	10	1,820	0.0	A	2.5	A	1.0	A	2.5	A	3.2	A	0	0	0	0	0	0	250		
		SB	20	995	0	1,015	58.5	F	2.3	A	0.0	A	3.3	A			1292	0	9	250	19	86	0	0	0
		WB	5	0	25	30	127.7	F	0.0	A	24.1	C	38.4	E			0	0	0	500	5	38	100	20	82
	US 169 at Bryan Rock Access	NB	5	1790	0	1,795	14.9	B	2.0	A	0.0	A	2.0	A	2.8	A	0	0	0	250	6	66	0	0	0
		SB	0	980	20	1,000	0.0	A	1.8	A	1.6	A	1.8	A			0	0	0	0	0	0	0		
		EB	30	0	15	45	77.9	F	0.0	A	17.7	C	58.3	F			0	0	0	500	57	162	50	20	119
	US 169 at Drews Concrete Access	NB	0	1790	10	1,800	0.0	A	5.2	A	6.1	A	5.2	A	3.9	A	0	0	0	0	0	0	250		
		SB	0	995	0	995	0.0	A	1.5	A	0.0	A	1.5	A			0	0	0	0	0	0	0	0	0
		WB	0	0	5	5	0.0	A	0.0	A	13.1	B	13.1	B			0	0	0	0	0	0	500	3	25
	US 169 at 145th St	NB	0	1800	5	1,805	0.0	A	3.4	A	2.8	A	3.4	A	3.9	A	0	0	0	250			250		
		SB	5	990	0	995	28.3	D	4.3	A	0.0	A	4.4	A			0	0	0	250	2	21	250		
		EB	0	0	5	5	0.0	A	0.0	A	7.1	A	7.1	A			500			0	0	0	50	2	24
		WB	5	0	0	5	79.2	F	0.0	A	0.0	A	79.2	F			1068	5	40	0	0	0	0		
	US 169 at CSAH 14	NB	10	1735	175	1,920	25.0	D	4.6	A	4.6	A	4.7	A	28.6	D	3519	0	8	250	11	81	250	1	27
		SB	30	960	10	1,000	102.5	F	3.4	A	3.1	A	5.8	A			2557	2	54	300	32	134	250		
		EB	15	0	5	20	247.3	F	0.0	A	45.2	E	193.4	F			343	56	261	0	0	0	50	4	47
		WB	210	5	55	270	2660.5	F	2464.0	F	2450.5	F	2618.5	F			3863	3274	3905	0	0	0	50	21	150
	TH 41 at Rail Frontage	NB	5	0	5	10	236.7	F	0.0	A	100.2	F	149.8	F	37.2	E	1388	25	92	0	0	0	0	0	0
		SB	10	0	25	35	693.4	F	0.0	A	521.1	F	553.0	F			1000	290	564	0	0	0	0	0	0
		EB	10	875	5	890	37.0	E	57.8	F	64.7	F	57.6	F			1914	431	1190	0	0	0	0	0	0
		WB	5	1055	20	1,080	24.6	C	7.5	A	3.5	A	7.5	A			478	33	432	0	0	0	0	0	0
	TH 41 at Dem Con Dr (Signal)	NB	40	5	50	95	28.3	C	20.3	C	23.8	C	25.5	C	42.6	D	744	9	88	100	39	123	100	52	155
		SB	40	10	35	85	36.4	D	25.1	C	10.6	B	23.6	C			668	7	41	130	44	140	0	21	73
		EB	10	860	20	890	68.9	E	60.7	E	20.5	C	59.9	E			581	502	681	275	29	247	275	46	375
		WB	25	1005	20	1,050	57.4	E	31.6	C	15.8	B	31.8	C			1284	177	475	275	35	256	275	7	174
	TH 41 at Ventura Ct	NB	70	5	20	95	261.2	F	279.7	F	125.4	F	231.9	F	32.0	D	615	220	473	0		0	100	40	176
		SB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A			0			0		0	0		
		EB	0	310	75	385	0.0	A	5.9	A	4.4	A	5.7	A			0			0		0	100		5
		WB	30	405	0	435	9.9	A	26.3	D	0.0	A	25.4	D			359	206	373	200	21	245	0		
	TH 41 at JustTens	NB	10	0	0	10	34.6	D	0.0	A	0.0	A	34.6	D	5.1	A	0	0	0	500	10	47	0		
		EB	0	320	10	330	0.0	A	1.3	A	0.1	A	1.3	A			0			0	0	0	0	0	0
		WB	10	425	0	435	6.0	A	7.3	A	0.0	A	7.3	A			243	59	253	0	0	0	0	0	0
	TH 41 at Emery Way	SB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A	3.0	A	0	0	0	500			0		
		EB	10	310	0	320	4.1	A	0.8	A	0.0	A	0.9	A			243	7	75	0	0	0	0	0	0
		WB	0	435	5	440	0.0	A	4.4	A	3.4	A	4.4	A			476	32	226	0	0	0	0	0	0

Table A1c

US 169 TH 41 Interchange Project

2040 No Build Conditions

PM Peak Hour

SimTraffic Ver 9 Results

	Intersection	Approach	Demand Volumes				Delay (s/veh)						LOS By Approach		LOS By Intersection		Queing Information (feet)								
																	Through			Left Turn			Right Turn		
			L	T	R	Total	L	LOS	T	LOS	R	LOS	Delay (S/Veh)	LOS	Delay (S/Veh)	LOS	Link Length	Avg.	Max	Storage	Avg.	Max	Storage	Avg.	Max
PM Peak Hour	US 169 at Landscape/Mobile Access	NB	0	1490	25	1,515	0.0	A	1.0	A	0.4	A	1.0	A	4.9	A	0	0	0	0	0	0	250		
		SB	0	2245	10	2,255	0.0	A	7.1	A	7.1	A	7.1	A			0	0	0	0	0	0	250		
		EB	0	0	10	10	0.0	A	0.0	A	44.0	E	44.0	E			0	0	0	0	0	0	500	11	60
		WB	0	0	30	30	0.0	A	0.0	A	12.2	B	12.2	B			0	0	0	0	0	0	500	16	54
	US 169 at Weckman Access	NB	5	1515	0	1,520	215.2	F	2.0	A	0.0	A	2.7	A	2.5	A	0	0	0	300	9	39	0	0	0
		SB	0	2255	0	2,255	0.0	A	2.3	A	0.0	A	2.3	A			0	0	0	0	0	0	250		
		EB	0	0	5	5	0.0	A	0.0	A	42.5	E	42.5	E			0	0	0	0	0	11	50	5	41
	US 169 at Holiday Gas Access	NB	0	1520	0	1,520	0.0	A	4.9	A	0.0	A	4.9	A	16.1	C	0	0	0	0	0	0	0	0	0
		SB	0	2210	50	2,260	0.0	A	20.5	C	12.5	B	20.3	C			1340	191	727	0	0	0	300	17	238
		EB	0	0	15	15	0.0	A	0.0	A	784.9	F	784.9	F			0	0	0	0	0	0	500	61	116
	US 169 at TH 41 (Signal)	NB	200	895	90	1,185	119.2	F	37.6	D	7.2	A	48.4	D	67.8	E	891	239	523	275	157	374	350	30	385
		SB	80	1545	600	2,225	213.2	F	68.8	E	17.4	B	61.8	E			833	630	863	315	250	414	600	345	700
		EB	490	315	260	1,065	129.1	F	108.0	F	31.9	C	99.2	F			1284	443	916	800	370	775	400	216	500
		WB	45	135	135	315	116.2	F	92.0	F	23.6	C	68.4	E			348	196	356	250	96	214	348	86	195
	US 169 at Value Inn	NB	5	1180	0	1,185	60.3	F	1.0	A	0.0	A	1.3	A	10.3	B	0	0	0	250	5	46	0	0	0
		SB	0	1840	10	1,850	0.0	A	15.4	C	12.6	B	15.4	C			0	0	0	0	0	0	250		
		EB	5	0	5	10	109.9	F	0.0	A	37.0	E	68.2	F			0	0	0	500	7	47	50	8	44
	US 169 at 130th St	NB	15	1165	0	1,180	71.9	F	1.6	A	0.0	A	2.5	A	3.7	A	0	0	0	250	17	82	0	0	0
		SB	0	1830	15	1,845	0.0	A	2.3	A	0.8	A	2.3	A			0	0	0	0	0	0	250		
		EB	20	0	25	45	175.1	F	0.0	A	44.3	E	96.0	F			0	0	0	500	31	110	50	25	103
	US 169 at 133rd St	NB	0	1145	10	1,155	0.0	A	1.8	A	0.9	A	1.8	A	3.0	A	0	0	0	0	0	0	250		
		SB	40	1815	0	1,855	13.7	B	2.8	A	0.0	A	3.0	A			0	0	0	250	21	65	0	0	0
		WB	15	0	35	50	78.7	F	0.0	A	9.3	A	30.9	D			0	0	0	500	15	59	100	21	73
	US 169 at Bryan Rock Access	NB	5	1145	0	1,150	53.7	F	1.4	A	0.0	A	1.6	A	2.8	A	0	0	0	250	9	50	0	0	0
		SB	0	1825	5	1,830	0.0	A	2.4	A	2.1	A	2.4	A			0	0	0	0	0	0	0		
		EB	10	0	5	15	161.8	F	0.0	A	42.0	E	119.5	F			0	0	0	500	16	85	50	7	45
	US 169 at Drews Concrete Access	NB	0	1145	5	1,150	0.0	A	3.6	A	3.4	A	3.6	A	2.7	A	0	0	0	0	0	0	250		
		SB	0	1830	0	1,830	0.0	A	2.2	A	0.0	A	2.2	A			0	0	0	0	0	0	0	0	0
		WB	0	0	5	5	0.0	A	0.0	A	5.4	A	5.4	A			0	0	0	0	0	0	500	3	25
	US 169 at 145th St	NB	0	1140	5	1,145	0.0	A	2.2	A	1.3	A	2.2	A	5.4	A	0	0	0	250			250		
		SB	10	1815	5	1,830	20.5	C	6.3	A	6.2	A	6.4	A			3910	0	11	250	5	34	250		
		EB	5	0	5	10	146.5	F	0.0	A	21.6	C	84.1	F			500	9	49	0	0	0	50	5	28
		WB	5	5	5	15	106.0	F	93.6	F	6.3	A	78.0	F			1068	12	59	0	0	0	50	2	25
	US 169 at CSAH 14	NB	0	1120	205	1,325	0.0	A	3.0	A	2.8	A	3.0	A	39.9	E	0	0	0	0		0	250	2	24
		SB	45	1780	0	1,825	24.1	C	4.5	A	0.0	A	5.0	A			2557	0	12	300	23	91	250		
		EB	0	5	5	10	0.0	A	253.8	F	37.4	E	102.3	F			343	5	27	0	0	0	50	4	31
		WB	195	0	25	220	2003.0	F	0.0	A	1794.6	F	1973.8	F			3863	2860	3878	0	0	0	50	26	150
	TH 41 at Rail Frontage	NB	5	5	10	20	173.4	F	168.9	F	39.7	E	95.9	F	11.2	B	1388	26	74	0	0	0	0	0	0
		SB	10	5	15	30	325.2	F	229.6	F	155.8	F	228.6	F			1000	99	264	0	0	0	0	0	0
		EB	10	995	5	1,010	26.2	D	10.2	B	8.4	A	10.3	B			1914	82	628	0	0	0	0	0	0
		WB	5	975	5	985	14.7	B	5.1	A	4.4	A	5.2	A			478	26	362	0	0	0	0	0	0
	TH 41 at Dem Con Dr (Signal)	NB	30	5	35	70	27.3	C	20.3	C	17.0	B	22.0	C	25.8	C	744	4	49	100	23	69	100	18	73
		SB	40	10	50	100	31.5	C	27.8	C	8.4	A	18.8	B			668	9	61	130	27	88	0	25	80
		EB	15	990	10	1,015	39.0	D	25.8	C	9.2	A	25.8	C			581	326	648	275	19	118	275	13	241
		WB	10	905	20	935	42.9	D	27.0	C	14.6	B	26.9	C			1284	129	450	275	12	119	275	4	41
	TH 41 at Ventura Ct	NB	60	0	20	80	33.2	D	0.0	A	10.5	B	26.8	D	7.2	A	615	41	119	0		0	100	16	62
		SB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A			0			0		0	0		
		EB	0	430	55	485	0.0	A	7.6	A	5.9	A	7.4	A			0			0		0	0		
		WB	15	255	0	270	9.6	A	2.6	A	0.0	A	2.8	A			359	8	116	200	4	33	0		
	TH 41 at JustTens	NB	5	0	0	5	17.2	C	0.0	A	0.0	A	17.2	C	1.4	A	0	0	0	500	7	45	0		
		EB	0	445	5	450	0.0	A	1.4	A	0.1	A	1.4	A			0			0	0	0	0	0	0
		WB	5	265	0	270	17.6	C	0.8	A	0.0	A	1.0	A			243	5	102	0	0	0	0	0	0
	TH 41 at Emery Way	SB	5	0	15	20	7.2	A	0.0	A	3.7	A	4.5	A	0.8	A	0	0	0	500	5	30	100	11	30
		EB	0	445	0	445	0.0	A	0.5	A	0.0	A	0.5	A			0			0	0	0	0	0	0
		WB	0	255	0	255	0.0	A	1.1	A	0.0	A	1.1	A			0			0	0	0	0	0	0

Table A2a

2040 Forecast Conditions DLT/Partial Alternative

10/31/2016

SimTraffic Ver 9

Intersection	Approach	AM PEAK HOUR			PM PEAK HOUR		
		Approach Delay	Intersection Delay	Minor Stop - Worst Approach	Approach Delay	Intersection Delay	Minor Stop - Worst Approach
TH 41 at US 169 Displaced Left (Signal)	SB	5.4 / A	27.8 / C		2.9 / A	14.8 / B	
	EB	43.2 / D			20.5 / C		
	WB	25.4 / C			17 / B		
US 169 SB Ramp at TH 41 (Signal)	SB	10 / B	10.8 / B		12.2 / B	10.2 / B	
(Includes DLT Crossing)	EB	7.1 / A			7.4 / A		
	WB	18.1 / B			13.7 / B		
US 169 NB at TH 41 at grade (Signal)	NB	102.2 / F	**73.7 / E**		29.1 / C	21.8 / C	
	EB	24.7 / C			18 / B		
	WB	19.9 / B			8 / A		
TH 41 at Rail Frontage	NB	**37.2 / E**	5.7 / A	**98 / F**	**52.9 / F**	5.5 / A	**85.7 / F**
	SB	**98 / F**			**85.7 / F**		
	EB	3 / A			3.2 / A		
	WB	4.9 / A			5 / A		
TH 41 at Dem Con Dr (Signal)	NB	25 / C	17.8 / B		20.4 / C	12.9 / B	
	SB	37 / D			24.3 / C		
	EB	20.6 / C			12.5 / B		
	WB	13.1 / B			11.1 / B		
US 169 RI/RO at CSAH 14	NB	3.3 / A	3 / A	3.9 / A	1.7 / A	2.7 / A	4.1 / A
	SB	2.6 / A			3.3 / A		
	EB	2.1 / A			2 / A		
	WB	3.9 / A			4.1 / A		
CSAH 14 at East Frontage	NB	0 / A	3.8 / A	7.8 / A	0 / A	4.2 / A	8.2 / A
	SB	7.8 / A			8.2 / A		
	EB	5.5 / A			5.2 / A		
	WB	0.6 / A			0.5 / A		
CSAH 14 Overpass at East Frontage	NB	2.1 / A	2.9 / A	5.5 / A	2 / A	3.7 / A	8 / A
	SB	0.2 / A			0.2 / A		
	EB	5.5 / A			8 / A		
	WB	0 / A			0 / A		
CSAH 14 Overpass at West Frontage	NB	2 / A	3.5 / A	4.6 / A	2.4 / A	3.5 / A	4.5 / A
	SB	1.8 / A			1 / A		
	EB	0 / A			0 / A		
	WB	4.6 / A			4.5 / A		

Table A2b

US 169 TH 41 Interchange Project
2040 Forecast Conditions DLT/Partial Alternative
AM Peak Hour

SimTraffic Ver 9 Results

	Intersection	Approach	Demand Volumes				Delay (s/veh)						LOS By Approach		LOS By Intersection		Queing Information (feet)								
																	Through			Left Turn			Right Turn		
			L	T	R	Total	L	LOS	T	LOS	R	LOS	Delay (S/Veh)	LOS	Delay (S/Veh)	LOS	Link Length	Avg.	Max	Storage	Avg.	Max	Storage	Avg.	Max
AM Peak Hour	TH 41 at US 169 Displaced Left (Signal)	SB	0	0	675	675	0.0	A	0.0	A	5.4	A	5.4	A			0	0	0	0	0	0	500	90	143
		EB	630	410	0	1,040	65.3	E	9.7	A	0.0	A	43.2	D	27.8	C	263	79	256	0	257	363	0	0	0
		WB	0	565	0	565	0.0	A	25.4	C	0.0	A	25.4	C			424	203	313	0	0	0	0	0	0
	US 169 SB Ramp at TH 41 (Signal)	SB	106		675	781	31.9	D			6.3	A	10.0	B						1200	51	163	300	3	50
	(Includes DLT Crossing)	EB	630	235	175	1,040	4.8	A	14.1	B	5.5	A	7.1	A	10.8	B	400			800	46	130	300	48	122
		WB	116	565		681	10.8	B	19.6	B			18.1	B			130	114	155	130	28	99			
	US 169 NB at TH 41 at grade (Signal)	NB	235	1590	295	2,120	104.5	F	105.9	F	79.4	E	102.2	F			1249	996	1250	300	228	325	300	251	325
		EB	0	341	0	341	0.0	A	24.7	C	0.0	A	24.7	C	73.7	E	130	70	141	0		0	0	0	0
		WB	0	446	335	781	0.0	A	18.8	B	21.4	C	19.9	B			1006	73	196	0	0	0	300	124	297
	TH 41 at Rail Frontage	NB	5	0	5	10	60.8	F	0.0	A	21.5	C	37.2	E			1382	13	67	250			250		
		SB	10	0	25	35	166.0	F	0.0	A	76.2	F	98.0	F	5.7	A	994	78	312	250			250		
		EB	10	905	5	920	18.0	C	2.8	A	1.3	A	3.0	A			500		31	100	14	90	0		
		WB	5	1115	20	1,140	11.1	B	4.9	A	2.1	A	4.9	A			479	15	174	0		0	0		
	TH 41 at Dem Con Dr (Signal)	NB	40	5	70	115	45.6	D	50.6	D	9.7	A	25.0	C			749	15	143	250	53	117	250	56	119
		SB	80	10	35	125	50.7	D	36.4	D	6.6	A	37.0	D	17.8	B	674	25	164	300	80	153	250	16	57
		EB	10	890	20	920	64.3	E	20.5	C	11.3	B	20.6	C			581	180	491	275	7	40	0		
		WB	70	1065	105	1,240	45.3	D	11.8	B	3.1	A	13.1	B			429	157	287	400	68	187	275	25	104
	US 169 RI/RO at CSAH 14	NB	0	2000	120	2,120	0.0	A	3.2	A	4.4	A	3.3	A			0			0		0	0		
		SB	0	1135	50	1,185	0.0	A	2.5	A	3.9	A	2.6	A	3.0	A	0			0		0	0		
		EB	0	0	130	130	0.0	A	0.0	A	2.1	A	2.1	A			0			0		0	0		
		WB	0	0	120	120	0.0	A	1.7	A	4.1	A	3.9	A			0			0		0	0		
	CSAH 14 at East Frontage	NB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A			0			0		0	0		
		SB	40	0	50	90	9.9	A	3.1	A	6.4	A	7.8	A	3.8	A	0	26	74	0		0	0		
		EB	35	85	0	120	7.2	A	4.9	A	0.0	A	5.5	A			911	6	62	0		0	0		
		WB	0	70	110	180	0.0	A	0.9	A	0.5	A	0.6	A			347		14	0		0	0		
	CSAH 14 Overpass at East Frontage	NB	120	25	0	145	2.4	A	0.8	A	0.0	A	2.1	A			945	7	47	250			250		
		SB	0	15	15	30	0.0	A	0.3	A	0.1	A	0.2	A	2.9	A	1413		4	300			250		
		EB	5	0	75	80	8.5	A	4.0	A	5.6	A	5.5	A			0	2	20	0		0	0		
		WB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A			0			0		0	0		
	CSAH 14 Overpass at West Frontage	NB	0	10	40	50	0.0	A	0.9	A	2.4	A	2.0	A			1142		7	0		0	0		
		SB	40	5	0	45	2.0	A	0.4	A	0.0	A	1.8	A	3.5	A	1441	1	10	0		0	0		
		EB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A			0			0		0	0		
		WB	125	0	10	135	5.3	A	0.4	A	2.0	A	4.6	A			0	38	78	0		0	0		

Table A2c

US 169 TH 41 Interchange Project
2040 Forecast Conditions DLT/Partial Alternative
PM Peak Hour

SimTraffic Ver 9 Results

	Intersection	Approach	Demand Volumes				Delay (s/veh)						LOS By Approach		LOS By Intersection		Queing Information (feet)								
																	Through			Left Turn			Right Turn		
			L	T	R	Total	L	LOS	T	LOS	R	LOS	Delay (S/Veh)	LOS	Delay (S/Veh)	LOS	Link Length	Avg.	Max	Storage	Avg.	Max	Storage	Avg.	Max
PM Peak Hour	TH 41 at US 169 Displaced Left (Signal)	SB	0	0	666	666	0.0	A	0.0	A	2.9	A	2.9	A	14.8	B	0	0	0	0	0	0	500	63	130
		EB	504	680	0	1,184	38.6	D	7.7	A	0.0	A	20.5	C			272	73	255	0	137	304	0	0	0
		WB	0	383	0	383	0.0	A	17.0	B	0.0	A	17.0	B			424	94	165	0	0	0	0	0	0
	US 169 SB Ramp at TH 41 (Signal)	SB	189		666	855	33.0	D	0.0	A	5.9	A	12.2	B						1200	82	191	300		
	(Includes DLT Crossing)	EB	504	375	305	1,184	3.4	A	14.8	B	4.8	A	7.4	A	10.2	B	400			800	48	114	300	45	99
		WB	105	383		488	9.9	A	14.6	B	0.0	A	13.7	B			130	86	136	130	25	82			
	US 169 NB at TH 41 at grade (Signal)	NB	219	900	251	1,370	28.9	C	33.7	C	12.9	B	29.1	C	21.8	C	1249	190	362	300	63	199	300	79	300
		EB	0	564	0	564	0.0	A	18.0	B	0.0	A	18.0	B			130	88	141	0		0	0	0	0
		WB	0	269	300	569	0.0	A	8.0	A	8.0	A	8.0	A			1006	17	90	0	0	0	300	50	184
	TH 41 at Rail Frontage	NB	5	5	10	20	101.3	F	101.1	F	28.7	D	52.9	F	5.5	A	1382	16	56	250			250		
		SB	10	5	15	30	147.3	F	50.3	F	44.8	E	85.7	F			994	57	179	250			250		
		EB	10	1045	5	1,060	19.9	C	3.1	A	1.7	A	3.2	A			500			100	10	72	0		
		WB	5	1000	5	1,010	19.7	C	4.9	A	2.0	A	5.0	A			479	25	343	0		0	0		
	TH 41 at Dem Con Dr (Signal)	NB	30	5	80	115	41.8	D	33.4	C	10.8	B	20.4	C	12.9	B	749	9	83	250	27	77	250	35	97
		SB	65	10	50	125	37.1	D	36.9	D	6.4	A	24.3	C			674	11	79	300	46	120	250	24	73
		EB	15	1040	10	1,065	43.2	D	12.2	B	8.8	A	12.5	B			581	109	374	275	10	51	0		
		WB	45	930	75	1,050	52.0	D	9.7	A	2.0	A	11.1	B			419	115	289	400	39	168	275	14	65
	US 169 RI/RO at CSAH 14	NB	0	1315	115	1,430	0.0	A	1.6	A	3.3	A	1.7	A	2.7	A	0			0		0	0		
		SB	0	2060	75	2,135	0.0	A	3.3	A	4.7	A	3.3	A			0			0		0	0		
		EB	0	0	130	130	0.0	A	0.0	A	2.0	A	2.0	A			0			0		0	0		
		WB	0	0	55	55	0.0	A	0.0	A	4.1	A	4.1	A			0			0		0	0		
	CSAH 14 at East Frontage	NB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A	4.2	A	0			0		0	0		
		SB	65	0	25	90	9.3	A	4.2	A	5.6	A	8.2	A			0	32	66	0		0	0		
		EB	20	95	0	115	6.7	A	4.8	A	0.0	A	5.2	A			911	3	36	0		0	0		
		WB	0	30	105	135	0.0	A	0.8	A	0.4	A	0.5	A			0			0		0	0		
	CSAH 14 Overpass at East Frontage	NB	110	15	0	125	2.2	A	0.7	A	0.0	A	2.0	A	3.7	A	945	5	36	250			250		
		SB	0	20	15	35	0.0	A	0.2	A	0.1	A	0.2	A			0			300			250		
		EB	15	0	70	85	10.4	B	7.0	A	7.5	A	8.0	A			0	8	24	0		0	0		
		WB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A			0			0		0	0		
	CSAH 14 Overpass at West Frontage	NB	0	5	70	75	0.0	A	0.2	A	2.5	A	2.4	A	3.5	A	0			0		0	0		
		SB	15	10	0	25	1.7	A	0.2	A	0.0	A	1.0	A			0			0		0	0		
		EB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A			0			0		0	0		
		WB	120	0	5	125	4.8	A	0.1	A	1.8	A	4.5	A			0	31	61	0		0	0		

Table A3a

2040 Forecast Conditions SE Loop Alternative

10/31/2016

SimTraffic Ver 9

Intersection	Approach	AM PEAK HOUR			PM PEAK HOUR		
		Approach Delay	Intersection Delay	Minor Stop - Worst Approach	Approach Delay	Intersection Delay	Minor Stop - Worst Approach
US 169 SB Ramp at TH 41 (Signal)	SB	14.5 / B	17.9 / B		14.6 / B	14.1 / B	
	EB	23.9 / C			15.1 / B		
	WB	12.4 / B			11 / B		
US 169 NB Ramp at TH 41 (Signal)	NB	16.7 / B	17.8 / B		18.6 / B	15.6 / B	
	EB	20.6 / C			14.3 / B		
	WB	15 / B			15.7 / B		
TH 41 at Rail Frontage	NB	**36.5 / E**	6 / A	**102.1 / F**	**82 / F**	7.6 / A	**224 / F**
	SB	**102.1 / F**			**224 / F**		
	EB	2.9 / A			3.3 / A		
	WB	5.6 / A			4.5 / A		
TH 41 at Dem Con Dr (Signal)	NB	21.9 / C	17.1 / B		21.7 / C	13.3 / B	
	SB	26.4 / C			24.5 / C		
	EB	19.6 / B			14.1 / B		
	WB	13.9 / B			10.3 / B		
US 169 RI/RO at CSAH 14	NB	3.4 / A	3.1 / A	3.8 / A	1.7 / A	3.2 / A	4.2 / A
	SB	2.7 / A			4.2 / A		
	EB	2.1 / A			2 / A		
	WB	3.8 / A			3.8 / A		
CSAH 14 at East Frontage	NB	0 / A	3.8 / A	7.9 / A	0 / A	4.3 / A	8.5 / A
	SB	7.9 / A			8.5 / A		
	EB	5.5 / A			5.2 / A		
	WB	0.5 / A			0.4 / A		
CSAH 14 Overpass at East Frontage	NB	2 / A	2.9 / A	5.3 / A	2.1 / A	4 / A	8.3 / A
	SB	0.1 / A			0.2 / A		
	EB	5.3 / A			8.3 / A		
	WB	0 / A			0 / A		
CSAH 14 Overpass at West Frontage	NB	2 / A	3.6 / A	4.7 / A	2.5 / A	3.4 / A	4.4 / A
	SB	1.8 / A			1 / A		
	EB	0 / A			0 / A		
	WB	4.7 / A			4.4 / A		

Table A3b

US 169 TH 41 Interchange Project
2040 Forecast Conditions SE Loop Alternative
AM Peak Hour

SimTraffic Ver 9 Results

	Intersection	Approach	Demand Volumes				Delay (s/veh)						LOS By Approach		LOS By Intersection		Queing Information (feet)								
																	Through			Left Turn			Right Turn		
			L	T	R	Total	L	LOS	T	LOS	R	LOS	Delay (S/Veh)	LOS	Delay (S/Veh)	LOS	Link Length	Avg.	Max	Storage	Avg.	Max	Storage	Avg.	Max
AM Peak Hour	US 169 SB Ramp at TH 41 (Signal)	SB	106	0	675	781	34.2	C	1.2	A	11.6	B	14.5	B	17.9	B	1088	82	157	300	66	183	300	92	169
		EB	0	865	175	1,040	0.0	A	26.1	C	12.6	B	23.9	C			1193	203	568	0	0	0	300	49	338
		WB	116	565	0	681	39.0	D	7.2	A	0.0	A	12.4	B			567	35	122	300	86	216	0	0	0
	US 169 NB Ramp at TH 41 (Signal)	NB	235	0	295	530	30.8	C	1.2	A	5.8	A	16.7	B	17.8	B	0	0	0	350	142	276	1200	60	166
		EB	630	341	0	971	0.0	A	10.9	B	25.8	C	20.6	C			567	147	527	0	0	0	250	279	350
		WB	0	446	335	781	22.2	C	9.8	A	0.0	A	15.0	B			652	80	202	300	140	301	0	0	0
	TH 41 at Rail Frontage	NB	5	0	5	10	56.1	F	0.0	A	23.5	C	36.5	E	6.0	A	1382	15	77	250			250		
		SB	10	0	25	35	232.8	F	0.0	A	64.0	F	102.1	F			994	75	231	250			250		
		EB	10	905	5	920	25.7	D	2.7	A	2.0	A	2.9	A			500	2	56	100	12	92	0		
		WB	5	1115	20	1,140	12.9	B	5.6	A	2.8	A	5.6	A			479	21	338	0		0	200		
	TH 41 at Dem Con Dr (Signal)	NB	40	5	70	115	35.0	D	29.8	C	14.3	B	21.9	C	17.1	B	750	20	170	250	42	120	250	60	124
		SB	80	10	35	125	35.0	D	26.8	C	7.8	A	26.4	C			674	8	113	130	67	144	250	19	64
		EB	10	890	20	920	46.9	D	19.5	B	13.7	B	19.6	B			581	181	459	275	10	106	0		
		WB	70	1065	105	1,240	42.3	D	13.0	B	5.4	A	13.9	B			1193	128	238	550	63	196	275	19	84
	US 169 RI/RO at CSAH 14	NB	0	2000	120	2,120	0.0	A	3.3	A	4.4	A	3.4	A	3.1	A	0			0		0	0		
		SB	0	1135	50	1,185	0.0	A	2.7	A	3.4	A	2.7	A			0			0		0	0		
		EB	0	0	130	130	0.0	A	0.0	A	2.1	A	2.1	A			0			0		0	0		
		WB	0	0	120	120	0.0	A	1.8	A	4.0	A	3.8	A			0			0		0	0		
	CSAH 14 at East Frontage	NB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A	3.8	A	0			0		0	0		
		SB	40	0	50	90	9.9	A	2.6	A	6.7	A	7.9	A			0	31	58	0		0	0		
		EB	35	85	0	120	7.1	A	4.9	A	0.0	A	5.5	A			911	6	48	0		0	0		
		WB	0	70	110	180	0.0	A	0.8	A	0.4	A	0.5	A			347		9	0		0	0		
	CSAH 14 Overpass at East Frontage	NB	120	25	0	145	2.3	A	1.0	A	0.0	A	2.0	A	2.9	A	945	5	61	250			250		
		SB	0	15	15	30	0.0	A	0.2	A	0.1	A	0.1	A			1413		4	0		0	250		
		EB	5	0	75	80	8.2	A	4.4	A	5.3	A	5.3	A			0	2	20	0		0	0		
		WB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A			0			0		0	0		
	CSAH 14 Overpass at West Frontage	NB	0	10	40	50	0.0	A	0.5	A	2.4	A	2.0	A	3.6	A	1142		6	0		0	0		
		SB	40	5	0	45	2.0	A	0.4	A	0.0	A	1.8	A			1441		6	0		0	0		
		EB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A			0			0		0	0		
		WB	125	0	10	135	5.3	A	0.2	A	2.0	A	4.7	A			0	36	82	0		0	0		

Table A3c

US 169 TH 41 Interchange Project
2040 Forecast Conditions SE Loop Alternative
PM Peak Hour

SimTraffic Ver 9 Results

	Intersection	Approach	Demand Volumes				Delay (s/veh)						LOS By Approach		LOS By Intersection		Queing Information (feet)								
																	Through			Left Turn			Right Turn		
			L	T	R	Total	L	LOS	T	LOS	R	LOS	Delay (S/Veh)	LOS	Delay (S/Veh)	LOS	Link Length	Avg.	Max	Storage	Avg.	Max	Storage	Avg.	Max
PM Peak Hour	US 169 SB Ramp at TH 41 (Signal)	SB	189	0	666	855	35.8	D	1.2	A	8.4	A	14.6	B	14.1	B	1088	59	101	300	113	212	300	74	138
		EB	0	879	305	1,184	0.0	A	16.8	B	9.9	A	15.1	B			1193	115	345	0	0	0	300	33	157
		WB	105	383	0	488	33.2	C	5.3	A	0.0	A	11.0	B			567	17	63	300	65	154	0	0	0
	US 169 NB Ramp at TH 41 (Signal)	NB	219	0	251	470	32.6	C	1.4	A	7.3	A	18.6	B	15.6	B	0	0	0	350	123	270	1200	65	165
		EB	504	564	0	1,068	0.0	A	12.4	B	16.4	B	14.3	B			567	83	323	0	0	0	250	183	347
		WB	0	269	300	569	23.3	C	7.4	A	0.0	A	15.7	B			652	42	103	300	133	265	0	0	0
	TH 41 at Rail Frontage	NB	5	5	10	20	121.5	F	136.5	F	46.5	E	82.0	F	7.6	A	1382	24	74	250			250		
		SB	10	5	15	30	315.5	F	244.2	F	152.9	F	224.0	F			994	110	304	250			250		
		EB	10	1045	5	1,060	19.1	C	3.2	A	0.9	A	3.3	A			500	1	36	100	11	82	0		
		WB	5	1000	5	1,010	18.7	C	4.4	A	2.5	A	4.5	A			479	32	414	0		0	200		
	TH 41 at Dem Con Dr (Signal)	NB	30	5	80	115	36.1	D	28.9	C	14.8	B	21.7	C	13.3	B	750	10	72	250	29	94	250	39	106
		SB	65	10	50	125	38.8	D	33.1	C	6.8	A	24.5	C			674	9	80	130	49	125	250	26	72
		EB	15	1040	10	1,065	42.1	D	13.7	B	16.3	B	14.1	B			581	143	478	275	13	65	0		
		WB	45	930	75	1,050	46.4	D	9.1	A	3.4	A	10.3	B			1193	85	196	550	34	137	275	11	51
	US 169 RI/RO at CSAH 14	NB	0	1315	115	1,430	0.0	A	1.6	A	3.3	A	1.7	A	3.2	A	0			0		0	0		
		SB	0	2060	75	2,135	0.0	A	4.2	A	5.2	A	4.2	A			0			0		0	0		
		EB	0	0	130	130	0.0	A	0.0	A	2.0	A	2.0	A			0			0		0	0		
		WB	0	0	55	55	0.0	A	0.0	A	3.8	A	3.8	A			0			0		0	0		
	CSAH 14 at East Frontage	NB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A	4.3	A	0			0		0	0		
		SB	65	0	25	90	9.6	A	3.7	A	5.8	A	8.5	A			0	32	68	0		0	0		
		EB	20	95	0	115	6.9	A	4.8	A	0.0	A	5.2	A			911	3	40	0		0	0		
		WB	0	30	105	135	0.0	A	0.6	A	0.3	A	0.4	A			0			0		0	0		
	CSAH 14 Overpass at East Frontage	NB	110	15	0	125	2.2	A	1.0	A	0.0	A	2.1	A	4.0	A	945	4	40	250			250		
		SB	0	20	15	35	0.0	A	0.2	A	0.1	A	0.2	A			0			0		0	250		
		EB	15	0	70	85	11.4	B	5.5	A	7.7	A	8.3	A			0	9	30	0		0	0		
		WB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A			0			0		0	0		
	CSAH 14 Overpass at West Frontage	NB	0	5	70	75	0.0	A	3.3	A	2.5	A	2.5	A	3.4	A	0			0		0	0		
		SB	15	10	0	25	1.9	A	0.1	A	0.0	A	1.0	A			0			0		0	0		
		EB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A			0			0		0	0		
		WB	120	0	5	125	4.8	A	0.4	A	1.7	A	4.4	A			0	29	60	0		0	0		

Table A4a

2040 Forecast Conditions TDI Alternative

10/31/2016

SimTraffic Ver 9

Intersection	Approach	AM PEAK HOUR			PM PEAK HOUR		
		Approach Delay	Intersection Delay	Minor Stop - Worst Approach	Approach Delay	Intersection Delay	Minor Stop - Worst Approach
TH 41 at SB US 169 Ramp (Signal)	SB	13.3 / B	14.4 / B		13.6 / B	12.8 / B	
	EB	14.5 / B			12.5 / B		
	WB	15.4 / B			12 / B		
TH 41 at NB US 169 Ramp (Signal)	NB	18.3 / B	16.3 / B		22 / C	16.2 / B	
	EB	14.8 / B			15.7 / B		
	WB	16.7 / B			12 / B		
TH 41 at Rail Frontage	NB	**28 / D**	5.5 / A	**89.1 / F**	**48.9 / E**	5.8 / A	**134.1 / F**
	SB	**89.1 / F**			**134.1 / F**		
	EB	2.7 / A			3.3 / A		
	WB	5.3 / A			4.6 / A		
TH 41 at Dem Con Dr (Signal)	NB	20.2 / C	15.4 / B		18 / B	12.9 / B	
	SB	29.3 / C			24.6 / C		
	EB	15.5 / B			13 / B		
	WB	13.5 / B			10.9 / B		
US 169 RI/RO at CSAH 14	NB	3.5 / A	3.2 / A	4.1 / A	1.8 / A	3.2 / A	4.2 / A
	SB	2.7 / A			4.2 / A		
	EB	2.1 / A			2 / A		
	WB	4.1 / A			4.1 / A		
CSAH 14 at East Frontage	NB	0 / A	3.9 / A	8.1 / A	0 / A	4.2 / A	8.1 / A
	SB	8.1 / A			8.1 / A		
	EB	5.4 / A			5.2 / A		
	WB	0.8 / A			0.4 / A		
CSAH 14 Overpass at East Frontage	NB	2 / A	3 / A	5.8 / A	2 / A	3.9 / A	8 / A
	SB	0.3 / A			0.2 / A		
	EB	5.8 / A			8 / A		
	WB	0 / A			0 / A		
CSAH 14 Overpass at West Frontage	NB	2.5 / A	3.8 / A	4.9 / A	2.4 / A	3.5 / A	4.6 / A
	SB	1.8 / A			1.1 / A		
	EB	0 / A			0 / A		
	WB	4.9 / A			4.6 / A		

Table A4b

US 169 TH 41 Interchange Project
2040 Forecast Conditions TDI Alternative
AM Peak Hour

SimTraffic Ver 9 Results

	Intersection	Approach	Demand Volumes				Delay (s/veh)						LOS By Approach		LOS By Intersection		Queing Information (feet)								
																	Through			Left Turn			Right Turn		
			L	T	R	Total	L	LOS	T	LOS	R	LOS	Delay (S/Veh)	LOS	Delay (S/Veh)	LOS	Link Length	Avg.	Max	Storage	Avg.	Max	Storage	Avg.	Max
AM Peak Hour	US 169 SB Ramp at TH 41 (Signal)	SB	106	0	675	781	33.7	C	0.9	A	10.4	B	13.3	B			1093	76	144	300	56	177	300	88	150
		EB	0	865	175	1,040	0.0	A	16.3	B	5.3	A	14.5	B	14.4	B	1400	48	367	0	0	0	250	19	67
		WB	116	565	0	681	44.9	D	9.9	A	0.0	A	15.4	B			219	99	**222**	219	75	**181**	0	0	0
	US 169 NB Ramp at TH 41 (Signal)	NB	235	0	295	530	32.8	C	0.4	A	8.1	A	18.3	B			1191	93	182	300	59	141	300	69	158
		EB	630	341	0	971	20.1	C	5.2	A	0.0	A	14.8	B	16.3	B	219	34	112	219	127	**234**	0	0	0
		WB	0	446	335	781	0.0	A	20.6	C	11.8	B	16.7	B			781	75	151	0	0	0	250	86	**216**
	US 169 at Bryan Rock Access	NB	0	2120	0	2,120	0.0	A	3.5	A	0.0	A	3.5	A			0			0		0	0	0	0
		SB	0	1185	0	1,185	0.0	A	1.8	A	0.0	A	1.8	A	2.9	A	0			0	0	0	0		
		EB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A			0			650			0		
	US 169 at Drews Concrete Access	NB	0	2120	0	2,120	0.0	A	4.8	A	0.0	A	4.8	A			0	0	0	0	0	0	0		
		SB	0	1185	0	1,185	0.0	A	1.3	A	0.0	A	1.3	A	3.6	A	0	0	0	0	0	0	0	0	0
		WB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A			0	0	0	0	0	0	500		
	TH 41 at Rail Frontage	NB	5	0	5	10	50.9	**F**	0.0	A	12.7	B	28.0	D			1382	13	70	250			250		
		SB	10	0	25	35	140.5	**F**	0.0	A	62.2	**F**	89.1	**F**	5.5	A	994	70	210	250			250		
		EB	10	905	5	920	17.5	C	2.6	A	1.2	A	2.7	A			500			100	11	**79**	0		
		WB	5	1115	20	1,140	15.9	C	5.3	A	3.2	A	5.3	A			479	18	248	0		0	0		
	TH 41 at Dem Con Dr (Signal)	NB	40	5	70	115	37.0	D	33.5	C	9.7	A	20.2	C			743	14	154	250	46	118	250	58	118
		SB	80	10	35	125	37.9	D	36.8	D	7.9	A	29.3	C	15.4	B	668	17	162	300	75	149	250	20	70
		EB	10	890	20	920	49.5	D	15.3	B	7.2	A	15.5	B			581	139	293	275	10	69	0		
		WB	70	1065	105	1,240	40.9	D	12.5	B	7.1	A	13.5	B			1400	104	239	550	64	188	275	18	89
	US 169 RI/RO at CSAH 14	NB	0	2000	120	2,120	0.0	A	3.5	A	4.4	A	3.5	A			0			0		0	0		
		SB	0	1135	50	1,185	0.0	A	2.7	A	3.6	A	2.7	A	3.2	A	0			0		0	0		
		EB	0	0	130	130	0.0	A	0.0	A	2.1	A	2.1	A			0			0		0	0		
		WB	0	0	120	120	0.0	A	1.9	A	4.3	A	4.1	A			0			0		0	0		
	CSAH 14 at East Frontage	NB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A			0			0		0	0		
		SB	40	0	50	90	10.0	B	3.7	A	6.6	A	8.1	A	3.9	A	0	**31**	**72**	0		0	0		
		EB	35	85	0	120	6.9	A	4.8	A	0.0	A	5.4	A			911	6	43	0		0	0		
		WB	0	70	110	180	0.0	A	1.2	A	0.5	A	0.8	A			347		4	0		0	0		
	CSAH 14 Overpass at East Frontage	NB	120	25	0	145	2.3	A	0.9	A	0.0	A	2.0	A			945	5	43	250			250		
		SB	0	15	15	30	0.0	A	0.6	A	0.1	A	0.3	A	3.0	A	0			250			250		
		EB	5	0	75	80	7.6	A	3.8	A	5.9	A	5.8	A			500	3	20	0		0	0		
		WB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A			0			0		0	0		
	CSAH 14 Overpass at West Frontage	NB	0	10	40	50	0.0	A	1.8	A	2.6	A	2.5	A			1142	1	14	250			250		
		SB	40	5	0	45	2.0	A	0.3	A	0.0	A	1.8	A	3.8	A	1441	1	12	300			250		
		EB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A			0			0		0	0		
		WB	125	0	10	135	5.4	A	0.2	A	1.9	A	4.9	A			0	**41**	**89**	0		0	0		

Table A4c

US 169 TH 41 Interchange Project
2040 Forecast Conditions TDI Alternative
PM Peak Hour

SimTraffic Ver 9 Results

	Intersection	Approach	Demand Volumes				Delay (s/veh)						LOS By Approach		LOS By Intersection		Queing Information (feet)								
																	Through			Left Turn			Right Turn		
			L	T	R	Total	L	LOS	T	LOS	R	LOS	Delay (S/Veh)	LOS	Delay (S/Veh)	LOS	Link Length	Avg.	Max	Storage	Avg.	Max	Storage	Avg.	Max
PM Peak Hour	US 169 SB Ramp at TH 41 (Signal)	SB	189	0	666	855	32.3	C	1.1	A	8.2	A	13.6	B	12.8	B	1093	58	114	300	98	206	300	72	118
		EB	0	879	305	1,184	0.0	A	14.3	B	7.2	A	12.5	B			1400	35	375	0	0	0	250	20	69
		WB	105	383	0	488	25.6	C	8.6	A	0.0	A	12.0	B			219	50	123	219	67	159	0	0	0
	US 169 NB Ramp at TH 41 (Signal)	NB	219	0	251	470	35.5	D	0.1	A	10.4	B	22.0	C	16.2	B	1191	86	164	300	56	138	300	68	166
		EB	504	564	0	1,068	29.4	C	4.2	A	0.0	A	15.7	B			219	30	107	219	118	230	0	0	0
		WB	0	269	300	569	0.0	A	17.0	B	7.4	A	12.0	B			781	32	106	0	0	0	250	52	153
	US 169 at Bryan Rock Access	NB	0	1370	0	1,370	0.0	A	2.0	A	0.0	A	2.0	A	2.4	A	0			0		0	0	0	0
		SB	0	2135	0	2,135	0.0	A	2.6	A	0.0	A	2.6	A			0			0	0	0	0		
		EB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A			0			650			0		
	US 169 at Drews Concrete Access	NB	0	1370	0	1,370	0.0	A	3.0	A	0.0	A	3.0	A	2.2	A	0	0	0	0	0	0	0		
		SB	0	2135	0	2,135	0.0	A	1.7	A	0.0	A	1.7	A			0	0	0	0	0	0	0	0	0
		WB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A			0	0	0	0	0	0	500		
	TH 41 at Rail Frontage	NB	5	5	10	20	97.2	F	96.5	F	15.3	C	48.9	E	5.8	A	1382	18	64	250			250		
		SB	10	5	15	30	185.1	F	72.8	F	107.0	F	134.1	F			994	66	204	250			250		
		EB	10	1045	5	1,060	14.3	B	3.2	A	3.0	A	3.3	A			500		6	100	12	72	0		
		WB	5	1000	5	1,010	16.8	C	4.6	A	1.6	A	4.6	A			479	33	310	0		0	0		
	TH 41 at Dem Con Dr (Signal)	NB	30	5	80	115	40.1	D	23.4	C	9.3	A	18.0	B	12.9	B	743	6	62	250	26	86	250	34	87
		SB	65	10	50	125	37.4	D	35.7	D	6.0	A	24.6	C			668	9	48	300	51	136	250	21	58
		EB	15	1040	10	1,065	47.8	D	12.4	B	10.0	B	13.0	B			581	117	454	275	15	71	0		
		WB	45	930	75	1,050	43.3	D	9.9	A	4.1	A	10.9	B			1400	88	190	550	34	112	275	13	62
	US 169 RI/RO at CSAH 14	NB	0	1315	115	1,430	0.0	A	1.6	A	3.5	A	1.8	A	3.2	A	0			0		0	0		
		SB	0	2060	75	2,135	0.0	A	4.2	A	5.1	A	4.2	A			0			0		0	0		
		EB	0	0	130	130	0.0	A	0.0	A	2.0	A	2.0	A			0			0		0	0		
		WB	0	0	55	55	0.0	A	0.0	A	4.1	A	4.1	A			0			0		0	0		
	CSAH 14 at East Frontage	NB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A	4.2	A	0			0		0	0		
		SB	65	0	25	90	8.9	A	3.2	A	6.6	A	8.1	A			0	31	59	0		0	0		
		EB	20	95	0	115	6.9	A	4.9	A	0.0	A	5.2	A			911	4	39	0		0	0		
		WB	0	30	105	135	0.0	A	0.5	A	0.4	A	0.4	A			347		4	0		0	0		
	CSAH 14 Overpass at East Frontage	NB	110	15	0	125	2.2	A	0.7	A	0.0	A	2.0	A	3.9	A	945	4	43	250			250		
		SB	0	20	15	35	0.0	A	0.2	A	0.1	A	0.2	A			0			300			250		
		EB	15	0	70	85	9.9	A	5.4	A	7.8	A	8.0	A			0	8	20	0		0	0		
		WB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A			0			0		0	0		
	CSAH 14 Overpass at West Frontage	NB	0	5	70	75	0.0	A	2.3	A	2.4	A	2.4	A	3.5	A	0			0		0	0		
		SB	15	10	0	25	1.7	A	0.0	A	0.0	A	1.1	A			0			0		0	0		
		EB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A			0			0		0	0		
		WB	120	0	5	125	4.9	A	0.2	A	2.7	A	4.6	A			0	32	69	0		0	0		

Table A5a

2040 Forecast Conditions SPUI Alternative

10/31/2016

SimTraffic Ver 9

Intersection	Approach	AM PEAK HOUR			PM PEAK HOUR		
		Approach Delay	Intersection Delay	Minor Stop - Worst Approach	Approach Delay	Intersection Delay	Minor Stop - Worst Approach
US 169 Ramps at TH 41 (Signal)	NB	19.4 / B	19 / B		19.5 / B	15.4 / B	
	SB	12.8 / B			13 / B		
	EB	23.5 / C			15.4 / B		
	WB	18.9 / B			15.7 / B		
TH 41 at Rail Frontage	NB	**39 / E**	7 / A	**189.9 / F**	**36.6 / E**	4.5 / A	**61 / F**
	SB	**189.9 / F**			**61 / F**		
	EB	2.6 / A			3.1 / A		
	WB	5 / A			3.6 / A		
TH 41 at Dem Con Dr (Signal)	NB	18.8 / B	19.1 / B		17.9 / B	14.3 / B	
	SB	27.2 / C			24.5 / C		
	EB	15.7 / B			10.9 / B		
	WB	20.8 / C			16.1 / B		
US 169 RI/RO at CSAH 14	NB	3.5 / A	3.2 / A	4 / A	1.7 / A	3.3 / A	4.4 / A
	SB	2.6 / A			4.4 / A		
	EB	2.1 / A			2.1 / A		
	WB	4 / A			4.2 / A		
CSAH 14 at East Frontage	NB	0 / A	4 / A	8.2 / A	0 / A	4.1 / A	8.2 / A
	SB	8.2 / A			8.2 / A		
	EB	5.8 / A			5.2 / A		
	WB	0.6 / A			0.5 / A		
CSAH 14 Overpass at East Frontage	NB	2.1 / A	3.1 / A	5.7 / A	2.1 / A	3.8 / A	7.9 / A
	SB	0.2 / A			0.1 / A		
	EB	5.7 / A			7.9 / A		
	WB	0 / A			0 / A		
CSAH 14 Overpass at West Frontage	NB	2.2 / A	3.6 / A	4.7 / A	2.4 / A	3.6 / A	4.7 / A
	SB	1.7 / A			1.1 / A		
	EB	0 / A			0 / A		
	WB	4.7 / A			4.7 / A		

Table A5b

US 169 TH 41 Interchange Project
2040 Forecast Conditions SPUI Alternative
AM Peak Hour

SimTraffic Ver 9 Results

	Intersection	Approach	Demand Volumes				Delay (s/veh)						LOS By Approach		LOS By Intersection		Queing Information (feet)								
																	Through			Left Turn			Right Turn		
			L	T	R	Total	L	LOS	T	LOS	R	LOS	Delay (S/Veh)	LOS	Delay (S/Veh)	LOS	Link Length	Avg.	Max	Storage	Avg.	Max	Storage	Avg.	Max
AM Peak Hour	US 169 Ramps at TH 41 (Signal)	NB	235	1590	295	2,120	41.1	D	0.6	A	3.7	A	19.4	B	19.0	B	0	0	0	1200	169	337	300		
		SB	105	895	675	1,675	35.3	D	0.9	A	9.4	A	12.8	B			0	0	0	1200	71	219	600		
		EB	630	235	175	1,040	34.3	C	8.8	A	4.8	A	23.5	C			1248	29	160	450	169	367	250		
		WB	115	330	335	780	42.0	D	25.1	C	4.5	A	18.9	B			1154	99	196	300	88	217	300		
	TH 41 at Rail Frontage	NB	5	0	5	10	72.2	F	0.0	A	16.8	C	39.0	E	7.0	A	1382	13	67	250			250		
		SB	10	0	25	35	250.0	F	0.0	A	170.7	F	189.9	F			994	118	320	250			250		
		EB	10	905	5	920	28.2	D	2.4	A	0.9	A	2.6	A			500			100	12	69	0		
		WB	5	1115	20	1,140	8.8	A	5.0	A	1.9	A	5.0	A			479	5	109	0		0	0		
	TH 41 at Dem Con Dr (Signal)	NB	40	5	70	115	34.3	C	31.4	C	8.8	A	18.8	B	19.1	B	743	11	146	100	44	116	250	50	120
		SB	80	10	35	125	36.3	D	22.8	C	8.4	A	27.2	C			668	10	139	130	67	150	250	17	65
		EB	10	890	20	920	47.3	D	15.5	B	4.8	A	15.7	B			581	144	286	275	10	62	0		
		WB	70	1065	105	1,240	48.5	D	19.8	B	11.4	B	20.8	C			1248	124	252	550	70	170	275	13	60
	US 169 RI/RO at CSAH 14	NB	0	2000	120	2,120	0.0	A	3.4	A	4.4	A	3.5	A	3.2	A	0			0		0	0		
		SB	0	1135	50	1,185	0.0	A	2.6	A	3.5	A	2.6	A			0			0		0	0		
		EB	0	0	130	130	0.0	A	0.0	A	2.1	A	2.1	A			0			0		0	0		
		WB	0	0	120	120	0.0	A	1.6	A	4.2	A	4.0	A			0			0		0	0		
	CSAH 14 at East Frontage	NB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A	4.0	A	0			0		0	0		
		SB	40	0	50	90	10.2	B	4.1	A	6.9	A	8.2	A			0	25	69	0		0	0		
		EB	35	85	0	120	7.5	A	5.1	A	0.0	A	5.8	A			911	9	56	0		0	0		
		WB	0	70	110	180	0.0	A	0.9	A	0.4	A	0.6	A			0			0		0	0		
	CSAH 14 Overpass at East Frontage	NB	120	25	0	145	2.4	A	0.9	A	0.0	A	2.1	A	3.1	A	945	6	64	0		0	250		
		SB	0	15	15	30	0.0	A	0.4	A	0.0	A	0.2	A			0			0		0	250		
		EB	5	0	75	80	9.7	A	3.8	A	5.7	A	5.7	A			0	2	20	0		0	0		
		WB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A			0			0		0	0		
	CSAH 14 Overpass at West Frontage	NB	0	10	40	50	0.0	A	1.2	A	2.4	A	2.2	A	3.6	A	1142		14	0		0	0		
		SB	40	5	0	45	1.9	A	0.3	A	0.0	A	1.7	A			1441		6	0		0	0		
		EB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A			0			0		0	0		
		WB	125	0	10	135	5.4	A	0.5	A	2.0	A	4.7	A			0	39	89	0		0	0		

Table A5c

US 169 TH 41 Interchange Project
2040 Forecast Conditions SPUI Alternative
PM Peak Hour

SimTraffic Ver 9 Results

	Intersection	Approach	Demand Volumes				Delay (s/veh)						LOS By Approach		LOS By Intersection		Queing Information (feet)								
																	Through			Left Turn			Right Turn		
			L	T	R	Total	L	LOS	T	LOS	R	LOS	Delay (S/Veh)	LOS	Delay (S/Veh)	LOS	Link Length	Avg.	Max	Storage	Avg.	Max	Storage	Avg.	Max
PM Peak Hour	US 169 Ramps at TH 41 (Signal)	NB	220	900	250	1,370	38.9	D	0.4	A	3.4	A	19.5	B	15.4	B	0	0	0	1200	128	245	300		
		SB	190	1725	665	2,580	37.5	D	0.8	A	6.3	A	13.0	B			0	0	0	1200	112	217	600		
		EB	505	375	305	1,185	25.0	C	10.9	B	5.3	A	15.4	B			1248	50	109	450	124	195	250		
		WB	105	165	300	570	38.9	D	22.9	C	3.2	A	15.7	B			1154	50	115	300	73	166	300		
	TH 41 at Rail Frontage	NB	5	5	10	20	100.7	F	54.1	F	16.6	C	36.6	E	4.5	A	1382	20	56	250			250		
		SB	10	5	15	30	89.3	F	57.4	F	38.9	E	61.0	F			994	45	154	250			250		
		EB	10	1045	5	1,060	13.7	B	3.0	A	1.3	A	3.1	A			500			100	11	66	0		
		WB	5	1000	5	1,010	10.0	B	3.6	A	1.3	A	3.6	A			479	17	232	0		0	0		
	TH 41 at Dem Con Dr (Signal)	NB	30	5	80	115	35.0	D	33.5	C	10.4	B	17.9	B	14.3	B	743	4	47	100	25	70	250	32	102
		SB	65	10	50	125	35.6	D	28.5	C	8.0	A	24.5	C			668	10	70	130	48	136	250	24	73
		EB	15	1040	10	1,065	48.3	D	10.5	B	4.9	A	10.9	B			581	98	246	275	11	75	0		
		WB	45	930	75	1,050	52.5	D	14.8	B	10.2	B	16.1	B			1248	75	200	550	35	145	275	11	63
	US 169 RI/RO at CSAH 14	NB	0	1315	115	1,430	0.0	A	1.6	A	3.4	A	1.7	A	3.3	A	0			0		0	0		
		SB	0	2060	75	2,135	0.0	A	4.4	A	5.0	A	4.4	A			0			0		0	0		
		EB	0	0	130	130	0.0	A	0.0	A	2.1	A	2.1	A			0			0		0	0		
		WB	0	0	55	55	0.0	A	0.0	A	4.2	A	4.2	A			0			0		0	0		
	CSAH 14 at East Frontage	NB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A	4.1	A	0			0		0	0		
		SB	65	0	25	90	9.0	A	3.7	A	6.4	A	8.2	A			0	31	62	0		0	0		
		EB	20	95	0	115	6.9	A	4.9	A	0.0	A	5.2	A			911	6	48	0		0	0		
		WB	0	30	105	135	0.0	A	0.8	A	0.4	A	0.5	A			0			0		0	0		
	CSAH 14 Overpass at East Frontage	NB	110	15	0	125	2.3	A	0.7	A	0.0	A	2.1	A	3.8	A	945	7	44	0		0	250		
		SB	0	20	15	35	0.0	A	0.2	A	0.0	A	0.1	A			0			0		0	250		
		EB	15	0	70	85	10.9	B	5.7	A	7.4	A	7.9	A			0	7	20	0		0	0		
		WB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A			0			0		0	0		
	CSAH 14 Overpass at West Frontage	NB	0	5	70	75	0.0	A	1.9	A	2.4	A	2.4	A	3.6	A	1142		18	0		0	0		
		SB	15	10	0	25	1.7	A	0.4	A	0.0	A	1.1	A			1441		6	0		0	0		
		EB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A			0			0		0	0		
		WB	120	0	5	125	5.1	A	0.3	A	1.7	A	4.7	A			0	33	67	0		0	0		

Table A6a

2040 Forecast Conditions DDI Alternative

10/31/2016

SimTraffic Ver 9

Intersection	Approach	AM PEAK HOUR			PM PEAK HOUR		
		Approach Delay	Intersection Delay	Minor Stop - Worst Approach	Approach Delay	Intersection Delay	Minor Stop - Worst Approach
TH 41 at SB US 169 Ramp (Signal)	SB	15.2 / B	15.4 / B		14.8 / B	13.5 / B	
	EB	12 / B			10.4 / B		
	WB	21.2 / C			19 / B		
TH 41 at NB US 169 Ramp (Signal)	NB	13.4 / B	8.9 / A		13.1 / B	8.8 / A	
	EB	6.7 / A			7.4 / A		
	WB	8.6 / A			8 / A		
TH 41 at Rail Frontage	NB	**33 / D**	7 / A	**166.4 / F**	**57.6 / F**	5.6 / A	**98.1 / F**
	SB	**166.4 / F**			**98.1 / F**		
	EB	2.9 / A			3.3 / A		
	WB	5.3 / A			4.2 / A		
TH 41 at Dem Con Dr (Signal)	NB	16.9 / B	13.5 / B		14.5 / B	11.3 / B	
	SB	26.9 / C			20.8 / C		
	EB	14.8 / B			11.2 / B		
	WB	11 / B			9.9 / A		
US 169 RI/RO at CSAH 14	NB	3.5 / A	3.2 / A	3.5 / A	1.7 / A	3.3 / A	4.4 / A
	SB	2.7 / A			4.4 / A		
	EB	2.1 / A			2.1 / A		
	WB	4.2 / A			4.3 / A		
CSAH 14 at East Frontage	NB	0 / A	3.9 / A	7.8 / A	0 / A	4.4 / A	8.6 / A
	SB	7.8 / A			8.6 / A		
	EB	5.7 / A			5.2 / A		
	WB	0.6 / A			0.5 / A		
CSAH 14 Overpass at East Frontage	NB	2 / A	2.8 / A	5.2 / A	2 / A	3.8 / A	7.5 / A
	SB	0.2 / A			0.1 / A		
	EB	5.2 / A			7.5 / A		
	WB	0 / A			0 / A		
CSAH 14 Overpass at West Frontage	NB	2.1 / A	3.6 / A	4.7 / A	2.4 / A	3.4 / A	4.5 / A
	SB	1.6 / A			1.3 / A		
	EB	0 / A			0 / A		
	WB	4.7 / A			4.5 / A		

Table A6b

US 169 TH 41 Interchange Project
2040 Forecast Conditions DDI Alternative
AM Peak Hour

SimTraffic Ver 9 Results

	Intersection	Approach	Demand Volumes				Delay (s/veh)						LOS By Approach		LOS By Intersection		Queing Information (feet)								
																	Through			Left Turn			Right Turn		
			L	T	R	Total	L	LOS	T	LOS	R	LOS	Delay (S/Veh)	LOS	Delay (S/Veh)	LOS	Link Length	Avg.	Max	Storage	Avg.	Max	Storage	Avg.	Max
AM Peak Hour	US 169 SB Ramp at TH 41 (Signal)	SB	106	0	675	781	20.4	C			14.4	B	15.2	B			0	0	0	300	61	192	1000	138	301
	Diverging Diamond (No RTOR)	EB	0	865	175	1,040			13.9	B	2.9	A	12.0	B	15.4	B	1200	20	142	0	0	0	200		
		WB	116	565	0	681	3.8	A	24.7	C			21.2	C			400	145	316	200	23	173	0	0	0
	US 169 NB Ramp at TH 41 (Signal)	NB	235	0	295	530	13.9	B			13.0	B	13.4	B			0	0	0	300	88	211	300	103	278
	Diverging Diamond (No RTOR)	EB	630	341	0	971	2.3	A	14.4	B			6.7	A	8.9	A	400	72	144	400	1	19	0	0	0
		WB	0	446	335	781			13.3	B	2.6	A	8.6	A			1000	97	215	0	0	0	200	20	107
	TH 41 at Rail Frontage	NB	5	0	5	10	62.0	F	0.0	A	20.6	C	33.0	D			1382	15	76	250			250		
		SB	10	0	25	35	266.5	F	0.0	A	130.4	F	166.4	F	7.0	A	994	113	309	250			250		
		EB	10	905	5	920	35.6	E	2.6	A	1.0	A	2.9	A			500			100	13	82	0		
		WB	5	1115	20	1,140	10.5	B	5.3	A	2.3	A	5.3	A			479	23	256	0		0	0		
	TH 41 at Dem Con Dr (Signal)	NB	40	5	70	115	32.3	C	23.6	C	7.5	A	16.9	B			749	11	98	250	36	114	250	48	111
		SB	80	10	35	125	35.4	D	29.6	C	7.8	A	26.9	C	13.5	B	674	15	160	300	74	152	250	18	71
		EB	10	890	20	920	45.7	D	14.6	B	8.7	A	14.8	B			581	116	243	275	8	61	0		
		WB	70	1065	105	1,240	32.6	C	10.4	B	3.2	A	11.0	B			765	105	271	550	63	155	275	15	112
	US 169 RI/RO at CSAH 14	NB	0	2000	120	2,120	0.0	A	3.4	A	4.6	A	3.5	A			0			0		0	0		
		SB	0	1135	50	1,185	0.0	A	2.7	A	3.4	A	2.7	A	3.2	A	0			0		0	0		
		EB	0	0	130	130	0.0	A	0.4	A	2.1	A	2.1	A			0			0		0	0		
		WB	0	0	120	120	0.0	A	2.0	A	4.4	A	4.2	A			0			0		0	0		
	CSAH 14 at East Frontage	NB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A			0			0		0	0		
		SB	40	0	50	90	10.2	B	2.5	A	6.5	A	7.8	A	3.9	A	0	26	68	0		0	0		
		EB	35	85	0	120	7.3	A	5.0	A	0.0	A	5.7	A			911	10	66	0		0	0		
		WB	0	70	110	180	0.0	A	1.0	A	0.4	A	0.6	A			347		4	0		0	0		
	CSAH 14 Overpass at East Frontage	NB	120	25	0	145	2.3	A	1.0	A	0.0	A	2.0	A			945	7	44	0		0	0		
		SB	0	15	15	30	0.0	A	0.4	A	0.1	A	0.2	A	2.8	A	0			0		0	0		
		EB	5	0	75	80	9.9	A	2.3	A	5.2	A	5.2	A			0	3	20	0		0	0		
		WB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A			0			0		0	0		
	CSAH 14 Overpass at West Frontage	NB	0	10	40	50	0.0	A	0.5	A	2.4	A	2.1	A			0			0		0	0		
		SB	40	5	0	45	1.8	A	0.1	A	0.0	A	1.6	A	3.6	A	1441		6	0		0	0		
		EB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A			0			0		0	0		
		WB	125	0	10	135	5.2	A	0.2	A	2.0	A	4.7	A			0	37	82	0		0	0		

Table A6c

US 169 TH 41 Interchange Project
2040 Forecast Conditions DDI Alternative
PM Peak Hour

SimTraffic Ver 9 Results

	Intersection	Approach	Demand Volumes				Delay (s/veh)						LOS By Approach		LOS By Intersection		Queing Information (feet)								
																	Through			Left Turn			Right Turn		
			L	T	R	Total	L	LOS	T	LOS	R	LOS	Delay (S/Veh)	LOS	Delay (S/Veh)	LOS	Link Length	Avg.	Max	Storage	Avg.	Max	Storage	Avg.	Max
PM Peak Hour	US 169 SB Ramp at TH 41 (Signal)	SB	189	0	666	855	21.2	C			13.0	B	14.8	B	13.5	B	0	0	0	300	91	186	1000	125	254
	Diverging Diamond (No RTOR)	EB	0	879	305	1,184			12.9	B	3.2	A	10.4	B			1200	12	103	0	0	0	200		
		WB	105	383	0	488	1.1	A	23.9	C			19.0	B			400	84	156	200	1	24	0	0	0
	US 169 NB Ramp at TH 41 (Signal)	NB	219	0	251	470	11.2	B			14.7	B	13.1	B	8.8	A	0	0	0	300	68	154	300	88	200
	Diverging Diamond (No RTOR)	EB	504	564	0	1,068	1.7	A	12.5	B			7.4	A			400	86	180	400		4	0	0	0
		WB	0	269	300	569			14.8	B	2.2	A	8.0	A			1000	69	131	0	0	0	200	14	94
	TH 41 at Rail Frontage	NB	5	5	10	20	126.0	F	83.4	F	28.9	D	57.6	F	5.6	A	1382	24	70	250			250		
		SB	10	5	15	30	127.5	F	146.8	F	61.1	F	98.1	F			994	60	178	250			250		
		EB	10	1045	5	1,060	17.7	C	3.2	A	3.3	A	3.3	A			500			100	11	69	0		
		WB	5	1000	5	1,010	13.7	B	4.1	A	6.2	A	4.2	A			479	25	321	0		0	0		
	TH 41 at Dem Con Dr (Signal)	NB	30	5	80	115	32.1	C	25.5	C	7.7	A	14.5	B	11.3	B	749	5	54	250	26	82	250	32	78
		SB	65	10	50	125	31.9	C	30.2	C	6.5	A	20.8	C			674	9	52	300	47	116	250	24	86
		EB	15	1040	10	1,065	45.7	D	10.8	B	7.9	A	11.2	B			581	96	189	275	12	62	0		
		WB	45	930	75	1,050	47.8	D	8.7	A	2.9	A	9.9	A			765	83	199	550	35	139	275	13	70
	US 169 RI/RO at CSAH 14	NB	0	1315	115	1,430	0.0	A	1.6	A	3.3	A	1.7	A	3.3	A	0			0		0	0		
		SB	0	2060	75	2,135	0.0	A	4.4	A	4.9	A	4.4	A			0			0		0	0		
		EB	0	0	130	130	0.0	A	0.0	A	2.1	A	2.1	A			0			0		0	0		
		WB	0	0	55	55	0.0	A	0.0	A	4.3	A	4.3	A			0			0		0	0		
	CSAH 14 at East Frontage	NB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A	4.4	A	0			0		0	0		
		SB	65	0	25	90	9.4	A	5.5	A	6.6	A	8.6	A			0	33	58	0		0	0		
		EB	20	95	0	115	7.1	A	4.8	A	0.0	A	5.2	A			911	4	36	0		0	0		
		WB	0	30	105	135	0.0	A	0.7	A	0.4	A	0.5	A			0			0		0	0		
	CSAH 14 Overpass at East Frontage	NB	110	15	0	125	2.2	A	0.8	A	0.0	A	2.0	A	3.8	A	945	5	40	250			250		
		SB	0	20	15	35	0.0	A	0.1	A	0.1	A	0.1	A			0			250			250		
		EB	15	0	70	85	9.7	A	6.2	A	7.3	A	7.5	A			500	5	20	0		0	0		
		WB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A			0			0		0	0		
	CSAH 14 Overpass at West Frontage	NB	0	5	70	75	0.0	A	2.2	A	2.4	A	2.4	A	3.4	A	0			250			250		
		SB	15	10	0	25	1.8	A	0.5	A	0.0	A	1.3	A			1441		6	300			250		
		EB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A			0			0		0	0		
		WB	120	0	5	125	5.0	A	0.1	A	1.3	A	4.5	A			0	31	58	0		0	0		

Table A7a

2040 Forecast Conditions SPUI Offset Alternative

10/31/2016

SimTraffic Ver 9

Intersection	Approach	AM PEAK HOUR			PM PEAK HOUR		
		Approach Delay	Intersection Delay	Minor Stop - Worst Approach	Approach Delay	Intersection Delay	Minor Stop - Worst Approach
US 169 Ramps at TH 41 (Signal)	NB	26.3 / C	21.8 / C		22.3 / C	16.5 / B	
	SB	19.1 / B			14.8 / B		
	EB	21.3 / C			14.9 / B		
	WB	22.1 / C			17.9 / B		
TH 41 at Rail Frontage	NB	**31.3 / D**	6.8 / A	**187.1 / F**	**35.8 / E**	4.6 / A	**80.9 / F**
	SB	**187.1 / F**			**80.9 / F**		
	EB	2.7 / A			3 / A		
	WB	5.1 / A			3.5 / A		
TH 41 at Dem Con Dr (Signal)	NB	19.6 / B	15.1 / B		16.4 / B	11.8 / B	
	SB	27.5 / C			22.6 / C		
	EB	16.2 / B			11.6 / B		
	WB	12.8 / B			10.1 / B		
US 169 RI/RO at CSAH 14	NB	3.4 / A	3.1 / A	3.9 / A	1.7 / A	3.2 / A	4.4 / A
	SB	2.7 / A			4.2 / A		
	EB	2.1 / A			2.1 / A		
	WB	3.9 / A			4.4 / A		
CSAH 14 at East Frontage	NB	0 / A	4 / A	8.2 / A	0 / A	4.1 / A	8.2 / A
	SB	8.2 / A			8.2 / A		
	EB	5.6 / A			5.1 / A		
	WB	0.7 / A			0.5 / A		
CSAH 14 Overpass at East Frontage	NB	2.2 / A	3 / A	5.5 / A	2.1 / A	3.7 / A	7.6 / A
	SB	0.1 / A			0.2 / A		
	EB	5.5 / A			7.6 / A		
	WB	0 / A			0 / A		
CSAH 14 Overpass at West Frontage	NB	2.3 / A	3.8 / A	4.9 / A	2.3 / A	3.6 / A	4.7 / A
	SB	1.8 / A			1.2 / A		
	EB	0 / A			0 / A		
	WB	4.9 / A			4.7 / A		

Table A7b

US 169 TH 41 Interchange Project
2040 Forecast Conditions SPUI Offset Alternative
AM Peak Hour

SimTraffic Ver 9 Results

	Intersection	Approach	Demand Volumes				Delay (s/veh)						LOS By Approach		LOS By Intersection		Queing Information (feet)								
																	Through			Left Turn			Right Turn		
			L	T	R	Total	L	LOS	T	LOS	R	LOS	Delay (S/Veh)	LOS	Delay (S/Veh)	LOS	Link Length	Avg.	Max	Storage	Avg.	Max	Storage	Avg.	Max
AM Peak Hour	US 169 Ramps at TH 41 (Signal)	NB	235	1590	295	2,120	50.8	D	0.6	A	8.7	A	26.3	C	21.8	C	0	0	0	1200	184	349	300		
		SB	105	895	675	1,675	36.9	D	0.4	A	16.4	B	19.1	B			0	0	0	1200	72	247	600		
		EB	630	235	175	1,040	30.6	C	7.7	A	5.9	A	21.3	C			1096	30	242	450	170	**340**	250		
		WB	115	330	335	780	49.4	D	22.2	C	12.7	B	22.1	C			1280	76	152	300	80	**230**	300		
	TH 41 at Rail Frontage	NB	5	0	5	10	66.0	**F**	0.0	A	13.9	B	31.3	D	6.8	A	1382	12	70	250			250		
		SB	10	0	25	35	464.4	**F**	0.0	A	106.2	**F**	187.1	**F**			994	119	353	250			250		
		EB	10	905	5	920	20.9	C	2.5	A	1.5	A	2.7	A			500			100	12	**77**	0		
		WB	5	1115	20	1,140	9.3	A	5.1	A	1.9	A	5.1	A			479	13	168	0		0	0		
	TH 41 at Dem Con Dr (Signal)	NB	40	5	70	115	33.6	C	36.0	D	9.7	A	19.6	B	15.1	B	742	8	120	100	43	**112**	250	51	111
		SB	80	10	35	125	35.8	D	30.6	C	7.6	A	27.5	C			668	10	107	130	72	**146**	250	18	74
		EB	10	890	20	920	46.7	D	16.1	B	7.2	A	16.2	B			581	153	342	275	7	45	0		
		WB	70	1065	105	1,240	40.3	D	11.7	B	4.9	A	12.8	B			1096	110	253	550	72	184	275	18	76
	US 169 RI/RO at CSAH 14	NB	0	2000	120	2,120	0.0	A	3.4	A	4.3	A	3.4	A	3.1	A	0			0		0	0		
		SB	0	1135	50	1,185	0.0	A	2.7	A	3.7	A	2.7	A			0			0		0	0		
		EB	0	0	130	130	0.0	A	0.0	A	2.1	A	2.1	A			0			0		0	0		
		WB	0	0	120	120	0.0	A	2.8	A	4.0	A	3.9	A			0			0		0	0		
	CSAH 14 at East Frontage	NB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A	4.0	A	0			0		0	0		
		SB	40	0	50	90	10.0	B	3.4	A	6.8	A	8.2	A			0	**29**	**76**	0		0	0		
		EB	35	85	0	120	7.2	A	4.9	A	0.0	A	5.6	A			911	9	60	0		0	0		
		WB	0	70	110	180	0.0	A	0.9	A	0.5	A	0.7	A			0			0		0	0		
	CSAH 14 Overpass at East Frontage	NB	120	25	0	145	2.4	A	1.1	A	0.0	A	2.2	A	3.0	A	945	8	49	0		0	250		
		SB	0	15	15	30	0.0	A	0.2	A	0.1	A	0.1	A			0			0		0	250		
		EB	5	0	75	80	6.7	A	3.0	A	5.6	A	5.5	A			0	**2**	**19**	0		0	0		
		WB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A			0			0		0	0		
	CSAH 14 Overpass at West Frontage	NB	0	10	40	50	0.0	A	0.9	A	2.6	A	2.3	A	3.8	A	1142		7	0		0	0		
		SB	40	5	0	45	2.0	A	0.1	A	0.0	A	1.8	A			1441		12	0		0	0		
		EB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A			0			0		0	0		
		WB	125	0	10	135	5.4	A	0.5	A	2.4	A	4.9	A			0	**38**	**90**	0		0	0		

Table A7c

US 169 TH 41 Interchange Project
2040 Forecast Conditions SPUI Offset Alternative
PM Peak Hour

SimTraffic Ver 9 Results

	Intersection	Approach	Demand Volumes				Delay (s/veh)						LOS By Approach		LOS By Intersection		Queing Information (feet)								
																	Through			Left Turn			Right Turn		
			L	T	R	Total	L	LOS	T	LOS	R	LOS	Delay (S/Veh)	LOS	Delay (S/Veh)	LOS	Link Length	Avg.	Max	Storage	Avg.	Max	Storage	Avg.	Max
PM Peak Hour	US 169 Ramps at TH 41 (Signal)	NB	220	900	250	1,370	38.1	D	0.1	A	9.0	A	22.3	C	16.5	B	0	0	0	1200	131	253	300		
		SB	190	1725	665	2,580	38.1	D	0.7	A	7.9	A	14.8	B			0	0	0	1200	110	225	600		
		EB	505	375	305	1,185	24.5	C	9.4	A	6.3	A	14.9	B			1083	38	116	450	123	230	250		
		WB	105	165	300	570	38.7	D	21.5	C	8.7	A	17.9	B			1280	34	89	300	61	147	300		
	TH 41 at Rail Frontage	NB	5	5	10	20	61.6	F	56.9	F	19.2	C	35.8	E	4.6	A	1382	18	52	250			250		
		SB	10	5	15	30	115.6	F	95.9	F	43.2	E	80.9	F			994	54	169	250			250		
		EB	10	1045	5	1,060	20.0	C	2.9	A	1.9	A	3.0	A			500			100	12	78	0		
		WB	5	1000	5	1,010	9.0	A	3.5	A	1.3	A	3.5	A			479	16	240	0		0	0		
	TH 41 at Dem Con Dr (Signal)	NB	30	5	80	115	35.0	D	21.1	C	8.7	A	16.4	B	11.8	B	742	6	58	100	28	88	250	33	96
		SB	65	10	50	125	31.9	C	34.3	C	6.6	A	22.6	C			668	11	47	130	51	122	250	21	59
		EB	15	1040	10	1,065	51.5	D	11.2	B	8.2	A	11.6	B			581	108	236	275	12	59	0		
		WB	45	930	75	1,050	41.9	D	9.1	A	3.8	A	10.1	B			1083	79	205	550	31	123	275	11	65
	US 169 RI/RO at CSAH 14	NB	0	1315	115	1,430	0.0	A	1.6	A	3.3	A	1.7	A	3.2	A	0			0		0	0		
		SB	0	2060	75	2,135	0.0	A	4.2	A	4.9	A	4.2	A			0			0		0	0		
		EB	0	0	130	130	0.0	A	0.0	A	2.1	A	2.1	A			0			0		0	0		
		WB	0	0	55	55	0.0	A	0.0	A	4.4	A	4.4	A			0			0		0	0		
	CSAH 14 at East Frontage	NB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A	4.1	A	0			0		0	0		
		SB	65	0	25	90	9.1	A	3.2	A	6.5	A	8.2	A			0	33	66	0		0	0		
		EB	20	95	0	115	6.7	A	4.8	A	0.0	A	5.1	A			911	3	45	0		0	0		
		WB	0	30	105	135	0.0	A	0.8	A	0.4	A	0.5	A			0			0		0	0		
	CSAH 14 Overpass at East Frontage	NB	110	15	0	125	2.3	A	0.7	A	0.0	A	2.1	A	3.7	A	945	6	36	0		0	250		
		SB	0	20	15	35	0.0	A	0.3	A	0.1	A	0.2	A			1413		4	0		0	250		
		EB	15	0	70	85	10.4	B	5.7	A	7.2	A	7.6	A			0	8	20	0		0	0		
		WB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A			0			0		0	0		
	CSAH 14 Overpass at West Frontage	NB	0	5	70	75	0.0	A	1.9	A	2.3	A	2.3	A	3.6	A	1142		6	0		0	0		
		SB	15	10	0	25	1.8	A	0.1	A	0.0	A	1.2	A			0			0		0	0		
		EB	0	0	0	0	0.0	A	0.0	A	0.0	A	0.0	A			0			0		0	0		
		WB	120	0	5	125	5.0	A	0.5	A	1.2	A	4.7	A			0	31	59	0		0	0		

Table B1

US 169 TH 41 Interchange Project
2040 Forecast Conditions TDI Alternative C
AM Peak Hour

SimTraffic Ver 9 Results

	Intersection	Approach	Demand Volumes				Delay (s/veh)						LOS By Approach		LOS By Intersection		Queing Information (feet)								
																	Through			Left Turn			Right Turn		
			L	T	R	Total	L	LOS	T	LOS	R	LOS	Delay (S/Veh)	LOS	Delay (S/Veh)	LOS	Link Length	Avg.	Max	Storage	Avg.	Max	Storage	Avg.	Max
AM Peak Hour	US 169 SB Ramp at TH 41 (Signal)	SB	99	0	665	764	32.5	C	1.2	A	9.0	A	11.9	B			1093	77	143	300	62	212	300	75	130
		EB	0	864	175	1,039	0.0	A	24.9	C	5.8	A	21.1	C	17.0	B	1400	84	384	0	0	0	250	21	69
		WB	110	570	0	680	48.2	D	10.1	B	0.0	A	16.2	B			219	94	165	219	80	229	0	0	0
	US 169 NB Ramp at TH 41 (Signal)	NB	235	0	280	515	34.3	C	0.5	A	8.1	A	19.2	B			1191	82	174	300	53	125	300	67	170
		EB	624	339	0	963	23.4	C	4.9	A	0.0	A	17.0	B	17.0	B	219	30	92	219	141	244	0	0	0
		WB	0	445	310	755	0.0	A	20.4	C	9.5	A	15.5	B			781	66	244	0	0	0	250	67	256
	US 169 at Bryan Rock Access	NB	5	1895	0	1,900	0.0	A	2.3	A	0.0	A	2.3	A			0			0		0	0	0	0
		SB	0	1050	20	1,070	0.0	A	1.8	A	0.0	A	1.8	A	2.1	A	0			0	0	0	0		
		EB	30	0	15	45	0.0	A	0.0	A	0.0	A	0.0	A			0			650			0		
	US 169 at Drews Concrete Access	NB	0	1895	10	1,905	0.0	A	5.5	A	4.6	A	5.5	A			0	0	0	0	0	0	0		
		SB	0	1065	0	1,065	0.0	A	1.1	A	0.0	A	1.1	A	3.9	A	0	0	0	0	0	0	0	0	0
		WB	0	0	5	5	0.0	A	0.0	A	15.6	C	15.6	C			0	0	0	0	0	0	500	3	26
	US 169 at 145th St	NB	0	1905	5	1,910	0.0	A	3.5	A	0.0	A	3.5	A			0			250			250		
		SB	5	1060	0	1,065	21.5	C	4.2	A	0.0	A	4.3	A	4.0	A	0			250	2	16	250		
		EB	0	0	5	5	0.0	A	0.0	A	3.0	A	3.0	A			500			0		0	200	4	25
		WB	5	0	0	5	109.1	F	0.0	A	0.0	A	109.1	F			1068	8	50	0		0	0		
	US 169 at CSAH 14	NB	10	1840	125	1,975	21.4	C	5.1	A	4.6	A	5.1	A			0			250	16	71	250	1	21
		SB	30	1030	10	1,070	77.9	F	3.3	A	3.6	A	5.6	A	17.6	C	0			300	33	112	250		31
		EB	15	0	5	20	420.2	F	0.0	A	10.6	B	292.2	F			343	84	342	0		0	200	5	66
		WB	150	5	55	210	2583.0	F	2789.0	F	2368.4	F	2549.3	F			3863	3018	3897	0		0	200	25	225
	TH 41 at Rail Frontage	NB	5	0	5	10	0.0	A	10.5	B	0.0	A	10.5	B			1382	1	31	0		0	0		
		SB	10	0	25	35	0.0	A	0.0	A	0.0	A	0.0	A	27.0	D	0			0		0	0		
		EB	10	905	5	920	0.0	A	45.8	E	0.0	A	45.8	E			1914	281	1948	0		0	0		
		WB	5	1110	20	1,135	0.0	A	11.1	B	0.0	A	11.1	B			479	60	574	0		0	0		
	TH 41 at Dem Con Dr (Signal)	NB	40	5	70	115	47.1	D	40.8	D	10.1	B	20.5	C			743	41	282	100	46	120	100	75	124
		SB	80	10	35	125	35.1	D	26.1	C	11.4	B	28.3	C	27.4	C	668	5	44	130	69	152	0	15	44
		EB	10	890	20	920	49.9	D	28.2	C	12.3	B	28.2	C			581	240	687	275	12	68	0		
		WB	70	1060	105	1,235	70.1	E	25.6	C	7.2	A	27.7	C			1400	157	765	550	131	439	275	33	300

Table B2

US 169 TH 41 Interchange Project
2040 Forecast Conditions TDI Alternative C
PM Peak Hour

SimTraffic Ver 9 Results

	Intersection	Approach	Demand Volumes				Delay (s/veh)						LOS By Approach		LOS By Intersection		Queing Information (feet)								
																	Through			Left Turn			Right Turn		
			L	T	R	Total	L	LOS	T	LOS	R	LOS	Delay (S/Veh)	LOS	Delay (S/Veh)	LOS	Link Length	Avg.	Max	Storage	Avg.	Max	Storage	Avg.	Max
PM Peak Hour	US 169 SB Ramp at TH 41 (Signal)	SB	179	0	666	845	29.7	C	0.4	A	8.6	A	13.2	B	13.9	B	1093	58	112	300	90	193	300	69	132
		EB	0	879	300	1,179	0.0	A	16.8	B	9.4	A	14.8	B			1400	40	280	0	0	0	250	29	79
		WB	105	380	0	485	27.8	C	9.2	A	0.0	A	13.0	B			219	53	122	219	72	154	0	0	0
	US 169 NB Ramp at TH 41 (Signal)	NB	210	0	236	446	34.0	C	0.2	A	9.4	A	21.5	C	15.4	B	1191	90	157	300	53	124	300	62	118
		EB	504	554	0	1,058	25.0	C	4.6	A	0.0	A	14.4	B			219	35	95	219	119	228	0	0	0
		WB	0	275	280	555	0.0	A	17.7	B	7.0	A	12.4	B			781	40	101	0	0	0	250	41	115
	US 169 at Bryan Rock Access	NB	5	1225	0	1,230	0.0	A	1.6	A	0.0	A	1.6	A	2.4	A	0			0		0	0	0	0
		SB	0	1935	5	1,940	0.0	A	2.8	A	0.0	A	2.8	A			0			0	0	0	0		
		EB	10	0	5	15	0.0	A	0.0	A	0.0	A	0.0	A			0			650			0		
	US 169 at Drews Concrete Access	NB	0	1225	5	1,230	0.0	A	4.0	A	3.9	A	4.0	A	2.6	A	0	0	0	0	0	0	0		
		SB	0	1940	0	1,940	0.0	A	1.8	A	0.0	A	1.8	A			0	0	0	0	0	0	0	0	0
		WB	0	0	5	5	0.0	A	0.0	A	4.3	A	4.3	A			0	0	0	0	0	0	500	2	25
	US 169 at 145th St	NB	0	1220	5	1,225	0.0	A	2.5	A	2.5	A	2.5	A	9.3	A	0			250			250		
		SB	10	1925	5	1,940	20.3	C	6.0	A	5.1	A	6.1	A			0			250	9	42	250		
		EB	5	0	5	10	1264.2	F	0.0	A	23.7	C	821.2	F			500	69	177	0		0	200	4	25
		WB	5	5	5	15	371.5	F	289.1	F	8.8	A	209.7	F			1068	23	89	0		0	200	4	26
	US 169 at CSAH 14	NB	0	1200	145	1,345	0.0	A	2.8	A	2.4	A	2.8	A	23.2	C	0			250			250	2	22
		SB	50	1885	0	1,935	43.1	E	4.7	A	0.0	A	5.6	A			2557	2	69	300	33	110	250		
		EB	0	5	5	10	0.0	A	564.8	F	26.4	D	180.2	F			343	6	44	0		0	200	3	19
		WB	140	0	25	165	1531.4	F	0.0	A	918.4	F	1431.6	F			3863	1592	2960	0		0	200	35	225
	TH 41 at Rail Frontage	NB	5	5	10	20	0.0	A	1.3	A	0.0	A	1.3	A	22.4	C	1382	1	31	0		0	0		
		SB	10	5	15	30	0.0	A	0.0	A	0.0	A	0.0	A			0			0		0	0		
		EB	10	1040	5	1,055	0.0	A	32.5	D	0.0	A	32.5	D			1914	252	1929	0		0	0		
		WB	5	995	5	1,005	0.0	A	11.6	B	0.0	A	11.6	B			479	59	550	0		0	0		
	TH 41 at Dem Con Dr (Signal)	NB	30	5	80	115	36.5	D	29.6	C	14.2	B	19.6	B	26.4	C	743	10	90	100	20	73	100	45	112
		SB	65	10	50	125	37.5	D	37.2	D	9.2	A	26.1	C			668	4	24	130	47	132	0	23	62
		EB	15	1035	10	1,060	50.2	D	19.3	B	8.7	A	19.6	B			581	189	668	275	13	80	0		
		WB	45	925	75	1,045	56.8	E	34.4	C	18.0	B	34.5	C			1400	181	900	550	81	575	275	52	300

Table C1

2040 No Build Traffic Operations

15% Increase Demands

5/9/2016

SimTraffic Ver 9

Intersection	Approach	AM PEAK HOUR			PM PEAK HOUR		
		Approach Delay	Intersection Delay	Minor Stop - Worst Approach	Approach Delay	Intersection Delay	Minor Stop - Worst Approach
US 169 at Landscape/Mobile Access	NB	1.4 / A	3.3 / A	**42.1 / E**	1.1 / A	**100.5 / F**	**227.1 / F**
	SB	4.8 / A			**171 / F**		
	EB	**66.9 / F**			**227.1 / F**		
	WB	**42.1 / E**			16.9 / C		
US 169 at Weckman Access	NB	5.4 / A	4 / A	**37.4 / E**	2.3 / A	**31 / D**	**186.1 / F**
	SB	1.7 / A			**51.2 / F**		
	EB	**37.4 / E**			**186.1 / F**		
US 169 at Holiday Gas Access	NB	8.9 / A	6.9 / A	**26.2 / D**	5.5 / A	**67.7 / F**	**1934.7 / F**
	SB	4.1 / A			**107.1 / F**		
	EB	**26.2 / D**			**1934.7 / F**		
US 169 at TH 41 (Signal)	NB	**121.3 / F**	**115.9 / F**		**52.9 / D**	**89.3 / F**	
	SB	**48.2 / D**			**84.2 / F**		
	EB	**244 / F**			**145.8 / F**		
	WB	**98.8 / F**			**74.2 / E**		
US 169 at 130th St	NB	**139.7 / F**	**88.5 / F**	**1206.3 / F**	2.8 / A	4.9 / A	**155.9 / F**
	SB	2.2 / A			2.5 / A		
	EB	**1206.3 / F**			**155.9 / F**		
US 169 at 133rd St	NB	**102.9 / F**	**67.2 / F**	**321.2 / F**	2 / A	3.8 / A	**61.3 / F**
	SB	3.7 / A			3.4 / A		
	WB	**321.2 / F**			**61.3 / F**		
US 169 at 145th St	NB	4 / A	4.7 / A	**153.2 / F**	2.6 / A	6.4 / A	**112.3 / F**
	SB	5.1 / A			6.5 / A		
	EB	8.4 / A			**112.3 / F**		
	WB	**153.2 / F**			**224.6 / F**		
US 169 at CSAH 14	NB	6.4 / A	16.1 / C	**3104.6 / F**	3.6 / A	**27 / D**	**2608.1 / F**
	SB	9.5 / A			6 / A		
	EB	**901.4 / F**			**211.7 / F**		
	WB	**3104.6 / F**			**2608.1 / F**		
TH 41 at Rail Frontage	NB	**492.5 / F**	**100.3 / F**	**1940.1 / F**	**599.8 / F**	**59.3 / F**	**1859.2 / F**
	SB	**1940.1 / F**			**1859.2 / F**		
	EB	**210.8 / F**			**88 / F**		
	WB	8.5 / A			8.1 / A		
TH 41 at Dem Con Dr (Signal)	NB	30.4 / C	**57.4 / E**		26.4 / C	**38.8 / D**	
	SB	27.8 / C			20.1 / C		
	EB	**83.6 / F**			**48.3 / D**		
	WB	44 / D			31.2 / C		
TH 41 at Ventura Ct	NB	**936 / F**	**65 / F**	**936 / F**	**34.3 / D**	8.3 / A	**34.3 / D**
	SB	0 / A			0 / A		
	EB	5.1 / A			7.9 / A		
	WB	**51 / F**			3.5 / A		
TH 41 at JustTens	NB	**516.2 / F**	22.2 / C	**516.2 / F**	19.5 / C	1.4 / A	19.5 / C
	EB	1.2 / A			1.5 / A		
	WB	27.6 / D			1 / A		
TH 41 at Emery Way	SB	0 / A	**25.6 / D**	0 / A	5.8 / A	0.9 / A	5.8 / A
	EB	2.1 / A			0.5 / A		
	WB	**39.7 / E**			1.1 / A		

Table C2

2040 Forecast Conditions DLT/Partial Alternative +15%

10/31/2016

SimTraffic Ver 9

Intersection	Approach	AM PEAK HOUR			PM PEAK HOUR		
		Approach Delay	Intersection Delay	Minor Stop - Worst Approach	Approach Delay	Intersection Delay	Minor Stop - Worst Approach
TH 41 at US 169 Displaced Left (Signal)	SB	7.6 / A	30.8 / C		3.1 / A	16.4 / B	
	EB	**48.5 / D**			21.9 / C		
	WB	24.4 / C			18.1 / B		
US 169 SB Ramp at TH 41 (Signal)	SB	13 / B	10.8 / B		12.8 / B	11.1 / B	
(Includes DLT Crossing)	EB	7.7 / A			8.6 / A		
	WB	13.5 / B			14.6 / B		
US 169 NB at TH 41 at grade (Signal)	NB	**161.6 / F**	**101.4 / F**		**38.8 / D**	27.8 / C	
	EB	18.9 / B			18.8 / B		
	WB	16.3 / B			9.8 / A		
TH 41 at Rail Frontage	NB	**330.2 / F**	17.5 / C	**748.4 / F**	**163.6 / F**	10.1 / B	**262.2 / F**
	SB	**748.4 / F**			**262.2 / F**		
	EB	4.2 / A			4.6 / A		
	WB	8.5 / A			4.9 / A		
TH 41 at Dem Con Dr (Signal)	NB	23.1 / C	23.2 / C		20.6 / C	14.4 / B	
	SB	32.9 / C			25.6 / C		
	EB	31.4 / C			14.7 / B		
	WB	15.8 / B			11.9 / B		
US 169 RI/RO at CSAH 14	NB	6.4 / A	4.9 / A	6.4 / A	2 / A	2.8 / A	4 / A
	SB	2.7 / A			3.5 / A		
	EB	2.2 / A			2.2 / A		
	WB	4.4 / A			4 / A		
CSAH 14 at East Frontage	NB	0 / A	4.2 / A	8.3 / A	0 / A	4.1 / A	8.5 / A
	SB	8.3 / A			8.5 / A		
	EB	5.5 / A			5.1 / A		
	WB	0.7 / A			0.6 / A		
CSAH 14 Overpass at East Frontage	NB	2 / A	3 / A	5.4 / A	2.1 / A	3.8 / A	8.3 / A
	SB	0.3 / A			0.2 / A		
	EB	5.4 / A			8.3 / A		
	WB	0 / A			0 / A		
CSAH 14 Overpass at West Frontage	NB	2.2 / A	3.7 / A	4.9 / A	2.4 / A	3.8 / A	4.9 / A
	SB	1.8 / A			1.2 / A		
	EB	0 / A			0 / A		
	WB	4.9 / A			4.9 / A		

Table C3

2040 Forecast Conditions SE Loop Alternative +15%

10/31/2016

SimTraffic Ver 9

Intersection	Approach	AM PEAK HOUR			PM PEAK HOUR		
		Approach Delay	Intersection Delay	Minor Stop - Worst Approach	Approach Delay	Intersection Delay	Minor Stop - Worst Approach
US 169 SB Ramp at TH 41 (Signal)	SB	17.1 / B	30.5 / C		17.3 / B	16.5 / B	
	EB	**51.2 / D**			18.1 / B		
	WB	12.9 / B			11.2 / B		
US 169 NB Ramp at TH 41 (Signal)	NB	17.9 / B	20.6 / C		22.6 / C	18.6 / B	
	EB	23.3 / C			16 / B		
	WB	19.1 / B			20 / C		
TH 41 at Rail Frontage	NB	**300.8 / F**	23.6 / C	**807.1 / F**	**202 / F**	18.8 / C	**782.6 / F**
	SB	**807.1 / F**			**782.6 / F**		
	EB	14.2 / B			5 / A		
	WB	8.3 / A			11.1 / B		
TH 41 at Dem Con Dr (Signal)	NB	23.3 / C	26.5 / C		22.7 / C	18.9 / B	
	SB	28.9 / C			25.6 / C		
	EB	**38.2 / D**			18.9 / B		
	WB	17.6 / B			17.6 / B		
US 169 RI/RO at CSAH 14	NB	5.4 / A	4.4 / A	5.4 / A	2 / A	3.8 / A	5.1 / A
	SB	3 / A			5.1 / A		
	EB	2.1 / A			2.2 / A		
	WB	4.2 / A			4 / A		
CSAH 14 at East Frontage	NB	0 / A	4 / A	8.2 / A	0 / A	4.3 / A	8.6 / A
	SB	8.2 / A			8.6 / A		
	EB	5.6 / A			5.3 / A		
	WB	0.7 / A			0.5 / A		
CSAH 14 Overpass at East Frontage	NB	2.1 / A	3 / A	5.6 / A	2.1 / A	4 / A	7.8 / A
	SB	0.2 / A			0.3 / A		
	EB	5.6 / A			7.8 / A		
	WB	0 / A			0 / A		
CSAH 14 Overpass at West Frontage	NB	2.2 / A	3.7 / A	4.9 / A	2.5 / A	3.6 / A	4.7 / A
	SB	1.8 / A			1.4 / A		
	EB	0 / A			0 / A		
	WB	4.9 / A			4.7 / A		

Table C4

2040 Forecast Conditions TDI Alternative +15%

10/31/2016

SimTraffic Ver 9

Intersection	Approach	AM PEAK HOUR			PM PEAK HOUR		
		Approach Delay	Intersection Delay	Minor Stop - Worst Approach	Approach Delay	Intersection Delay	Minor Stop - Worst Approach
TH 41 at SB US 169 Ramp (Signal)	SB	15.4 / B	18.7 / B		16.3 / B	15.3 / B	
	EB	21.7 / C			14.9 / B		
	WB	17.8 / B			14.5 / B		
TH 41 at NB US 169 Ramp (Signal)	NB	19.7 / B	19.5 / B		23.2 / C	16.5 / B	
	EB	18.3 / B			14.8 / B		
	WB	21 / C			13.9 / B		
TH 41 at Rail Frontage	NB	**157.6 / F**	16.5 / C	**632.9 / F**	**219 / F**	14.3 / B	**518.1 / F**
	SB	**632.9 / F**			**518.1 / F**		
	EB	3.5 / A			4.9 / A		
	WB	8.7 / A			8.3 / A		
TH 41 at Dem Con Dr (Signal)	NB	19.9 / B	19.5 / B		20 / C	17.9 / B	
	SB	30.1 / C			26.3 / C		
	EB	19.8 / B			14.8 / B		
	WB	18.2 / B			19.8 / B		
US 169 RI/RO at CSAH 14	NB	5.1 / A	4.2 / A	5.1 / A	2.1 / A	3.7 / A	4.9 / A
	SB	3 / A			4.9 / A		
	EB	2.2 / A			2.1 / A		
	WB	4.2 / A			4.1 / A		
CSAH 14 at East Frontage	NB	0 / A	4.1 / A	8.5 / A	0 / A	4.2 / A	8.4 / A
	SB	8.5 / A			8.4 / A		
	EB	5.6 / A			5.2 / A		
	WB	0.9 / A			0.6 / A		
CSAH 14 Overpass at East Frontage	NB	2.1 / A	3 / A	5.6 / A	2.1 / A	4.1 / A	8.3 / A
	SB	0.2 / A			0.3 / A		
	EB	5.6 / A			8.3 / A		
	WB	0 / A			0 / A		
CSAH 14 Overpass at West Frontage	NB	2.1 / A	3.8 / A	4.9 / A	2.4 / A	3.6 / A	4.7 / A
	SB	2 / A			1.3 / A		
	EB	0 / A			0 / A		
	WB	4.9 / A			4.7 / A		

Table C5

2040 Forecast Conditions SPUI Alternative +15%

10/31/2016

SimTraffic Ver 9

Intersection	Approach	AM PEAK HOUR			PM PEAK HOUR		
		Approach Delay	Intersection Delay	Minor Stop - Worst Approach	Approach Delay	Intersection Delay	Minor Stop - Worst Approach
US 169 Ramps at TH 41 (Signal)	NB	20.7 / C	26.6 / C		22.4 / C	17.3 / B	
	SB	20.7 / C			14.7 / B		
	EB	**38.8 / D**			17.3 / B		
	WB	19.9 / B			16.9 / B		
TH 41 at Rail Frontage	NB	**248.6 / F**	21.3 / C	**853.4 / F**	**134.6 / F**	12 / B	**537.2 / F**
	SB	**853.4 / F**			**537.2 / F**		
	EB	3.9 / A			4.4 / A		
	WB	8.1 / A			6.8 / A		
TH 41 at Dem Con Dr (Signal)	NB	19.9 / B	24.6 / C		16.5 / B	17.3 / B	
	SB	26 / C			23.8 / C		
	EB	22.9 / C			14.8 / B		
	WB	26.2 / C			19.1 / B		
US 169 RI/RO at CSAH 14	NB	4.9 / A	4.1 / A	4.9 / A	2.1 / A	4 / A	5.4 / A
	SB	2.9 / A			5.4 / A		
	EB	2.2 / A			2.1 / A		
	WB	4.1 / A			4.2 / A		
CSAH 14 at East Frontage	NB	0 / A	3.9 / A	8.1 / A	0 / A	4.2 / A	8.1 / A
	SB	8.1 / A			8.1 / A		
	EB	5.7 / A			5.2 / A		
	WB	0.9 / A			0.5 / A		
CSAH 14 Overpass at East Frontage	NB	2.1 / A	3 / A	5.7 / A	2.1 / A	3.9 / A	7.9 / A
	SB	0.1 / A			0.2 / A		
	EB	5.7 / A			7.9 / A		
	WB	0 / A			0 / A		
CSAH 14 Overpass at West Frontage	NB	2.1 / A	3.8 / A	5 / A	2.4 / A	3.6 / A	4.8 / A
	SB	1.8 / A			1.2 / A		
	EB	0 / A			0 / A		
	WB	5 / A			4.8 / A		

Table C6

2040 Forecast Conditions DDI Alternative +15%

10/31/2016

SimTraffic Ver 9

Intersection	Approach	AM PEAK HOUR			PM PEAK HOUR		
		Approach Delay	Intersection Delay	Minor Stop - Worst Approach	Approach Delay	Intersection Delay	Minor Stop - Worst Approach
TH 41 at SB US 169 Ramp (Signal)	SB	19.1 / B	18.5 / B		15.6 / B	13.4 / B	
	EB	15 / B			9.4 / A		
	WB	23.3 / C			19.6 / B		
TH 41 at NB US 169 Ramp (Signal)	NB	14.3 / B	11.8 / B		14.3 / B	9.6 / A	
	EB	8.5 / A			8.2 / A		
	WB	14.4 / B			8.4 / A		
TH 41 at Rail Frontage	NB	**166.9 / F**	21.3 / C	**731.4 / F**	**118 / F**	13.1 / B	**487.3 / F**
	SB	**731.4 / F**			**487.3 / F**		
	EB	10.9 / B			5 / A		
	WB	10.6 / B			8.9 / A		
TH 41 at Dem Con Dr (Signal)	NB	17.5 / B	24.4 / C		17.9 / B	16.6 / B	
	SB	26.9 / C			24.1 / C		
	EB	20.1 / C			14.8 / B		
	WB	27.9 / C			17.4 / B		
US 169 RI/RO at CSAH 14	NB	5 / A	4.2 / A	5 / A	1.9 / A	4 / A	5.5 / A
	SB	2.9 / A			5.5 / A		
	EB	2.2 / A			2.2 / A		
	WB	4.1 / A			3.9 / A		
CSAH 14 at East Frontage	NB	0 / A	4 / A	8.5 / A	0 / A	4.2 / A	8.6 / A
	SB	8.5 / A			8.6 / A		
	EB	5.6 / A			5.2 / A		
	WB	0.7 / A			0.6 / A		
CSAH 14 Overpass at East Frontage	NB	2.1 / A	3.1 / A	5.8 / A	2.1 / A	3.9 / A	8.1 / A
	SB	0.3 / A			0.3 / A		
	EB	5.8 / A			8.1 / A		
	WB	0 / A			0 / A		
CSAH 14 Overpass at West Frontage	NB	2.4 / A	3.9 / A	5.1 / A	2.4 / A	3.7 / A	4.9 / A
	SB	1.8 / A			1.2 / A		
	EB	0 / A			0 / A		
	WB	5.1 / A			4.9 / A		

Table C7

2040 Forecast Conditions SPUI Offset Alternative +15%

10/31/2016

SimTraffic Ver 9

Intersection	Approach	AM PEAK HOUR			PM PEAK HOUR		
		Approach Delay	Intersection Delay	Minor Stop - Worst Approach	Approach Delay	Intersection Delay	Minor Stop - Worst Approach
US 169 Ramps at TH 41 (Signal)	NB	36.5 / D	35.1 / D		25.5 / C	18.4 / B	
	SB	38.3 / D			15.5 / B		
	EB	32 / C			16.8 / B		
	WB	35.2 / D			20.1 / C		
TH 41 at Rail Frontage	NB	**299.5 / F**	16.1 / C	**706.7 / F**	**149.9 / F**	12.8 / B	**408.9 / F**
	SB	**706.7 / F**			**408.9 / F**		
	EB	3.8 / A			4.6 / A		
	WB	7.9 / A			7.1 / A		
TH 41 at Dem Con Dr (Signal)	NB	20.3 / C	20.3 / C		18.8 / B	14.6 / B	
	SB	28 / C			24.6 / C		
	EB	22.4 / C			15.1 / B		
	WB	17.9 / B			12.3 / B		
US 169 RI/RO at CSAH 14	NB	5.7 / A	4.6 / A	5.7 / A	2 / A	3.8 / A	5 / A
	SB	3 / A			5 / A		
	EB	2.2 / A			2.2 / A		
	WB	4.3 / A			4.1 / A		
CSAH 14 at East Frontage	NB	0 / A	4.1 / A	8.6 / A	0 / A	4.1 / A	8.3 / A
	SB	8.6 / A			8.3 / A		
	EB	5.5 / A			5.1 / A		
	WB	0.7 / A			0.5 / A		
CSAH 14 Overpass at East Frontage	NB	2 / A	3.1 / A	5.6 / A	2.2 / A	3.7 / A	7.6 / A
	SB	0.4 / A			0.2 / A		
	EB	5.6 / A			7.6 / A		
	WB	0 / A			0 / A		
CSAH 14 Overpass at West Frontage	NB	2.1 / A	3.7 / A	4.9 / A	2.4 / A	3.7 / A	4.8 / A
	SB	1.9 / A			1.3 / A		
	EB	0 / A			0 / A		
	WB	4.9 / A			4.8 / A		

Travel Time Analysis
Existing Conditions Alternative
2015 Demand Year

Exhibit 1

	Distance (miles)	AM (min)	PM (min)
Southbound US 169	3.64	5.1	5.1
Northbound US 169	3.64	5.0	4.6
EB TH 41 to NB US 169	2.05	4.4	3.8
SB US 169 to WB TH 41	2.04	2.9	2.8

SOUTHBOUND US 169 - CSAH 69 Overpass to CSAH 14

Description		Speed Limit	Distance (ft)	Distance (mi)	Time (sec)	Time (min)		
CSAH 69 Overpass	55 MPH Transition	65	1,500	0.28	15.7	0.3		
55 MPH Transition	TH 41	55	5,200	0.98	64.5	1.1		
TH 41	133rd Street	55	3,120	0.59	38.7	0.6		
133rd Street	Bryan Rock	55	1,440	0.27	17.9	0.3		
Bryan Rock	145th	55	5,280	1.00	65.5	1.1		
145th	CSAH 14	55	2,700	0.51	33.5	0.6		
	TOTAL TRAVEL		19,240	3.64	235.7	3.9		
Intersection Delay					AM	AM	PM	PM
US 169 at TH 41 Signal	Through				43.0	0.7	37.7	0.6
Uncontrolled Delays	Through	Sum of All Minor Access Delay			26.8	0.4	34.3	0.6
	TOTAL DELAY				69.8	1.2	72.0	1.2
TOTAL TRAVEL/DELAY TIME					**305.5**	**5.1**	**307.7**	**5.1**

NORTHBOUND US 169 - CSAH 14 to CSAH 69 Overpass

Description		Speed Limit	Distance (ft)	Distance (mi)	Time (sec)	Time (min)		
CSAH 14	145th	55	2,700	0.51	33.5	0.6		
145th	Bryan Rock	55	5,280	1.00	65.5	1.1		
Bryan Rock	133rd Street	55	1,440	0.27	17.9	0.3		
133rd Street	TH 41	55	3,120	0.59	38.7	0.6		
TH 41	55 MPH Transition	55	5,200	0.98	64.5	1.1		
55 MPH Transition	CSAH 69 Overpass	65	1,500	0.28	15.7	0.3		
	TOTAL TRAVEL		19,240	3.64	235.7	3.9		
Intersection Delay					AM	AM	PM	PM
US 169 at TH 41 Signal	Through				38.6	0.6	24.0	0.4
Uncontrolled Delays	Through	Sum of All Minor Access Delay			23.2	0.4	15.3	0.3
	TOTAL DELAY				61.8	1.0	39.3	0.7
TOTAL TRAVEL/DELAY TIME					**297.5**	**5.0**	**275.0**	**4.6**

EB TH 41 to NB US 169 - S.River Bridge to CSAH 69 Overpass (NB 169)

Description		Speed Limit	Distance (ft)	Distance (mi)	Time (sec)	Time (min)		
S. River Bridge	Railroad	55	1,625	0.31	20.1	0.3		
Railroad	Dem Con Dr	55	1,060	0.20	13.1	0.2		
Dem Con Dr	NB US 169	55	1,385	0.26	17.2	0.3		
NB US 169	55 MPH Transition	55	5,275	1.00	65.4	1.1		
55 MPH Transition	CSAH 69 Overpass	65	1,500	0.28	15.7	0.3		
	TOTAL TRAVEL		10,845	2.05	131.6	2.2		
Intersection Delay					AM	AM	PM	PM
TH 41 at Dem Con Signal	Through				21.8	0.4	14.9	0.2
US 169 at TH 41 Signal	Left				94.0	1.6	71.9	1.2
Uncontrolled Delay US 169	Through	Sum of All Minor Access Delay			9.9	0.2	6.2	0.1
Uncontrolled Delay TH 41	Through	Sum of All Minor Access Delay			4.5	0.1	4.0	0.1
	TOTAL DELAY				130.2	2.2	97.0	1.6
TOTAL TRAVEL/DELAY TIME					**261.8**	**4.4**	**228.6**	**3.8**

SB US 169 to WB TH 41 - CSAH 69 Overpass to S. River Bridge (TH 41)

Description		Speed Limit	Distance (ft)	Distance (mi)	Time (sec)	Time (min)		
CSAH 69 Overpass	55 MPH Transition	65	1,500	0.28	15.7	0.3		
55 MPH Transition	TH 41	55	5,225	0.99	64.8	1.1		
TH 41	Dem Con Dr	55	1,255	0.24	15.6	0.3		
Dem Con Dr	Railroad	55	1,180	0.22	14.6	0.2		
Railroad	S. River Bridge	55	1,625	0.31	20.1	0.3		
	TOTAL TRAVEL		10,785	2.04	130.8	2.2		
Intersection Delay					AM	AM	PM	PM
US 169 at TH 41 Signal	Right				8.7	0.1	7.7	0.1
TH 41 at Dem Con Signal	Through				21.8	0.4	19.9	0.3
Uncontrolled Delay US 169	Through	Sum of All Minor Access Delay			5.6	0.1	7.8	0.1
Uncontrolled Delay TH 41	Through	Sum of All Minor Access Delay			4.5	0.1	2.7	0.0
	TOTAL DELAY				40.6	0.7	38.1	0.6
TOTAL TRAVEL/DELAY TIME					**171.4**	**2.9**	**168.9**	**2.8**

Notes:

All distances are approximate; Travel time assumes all vehicles travel at the posted speed limit.

Intersection Delays from Synchro/SimTraffic analysis results

Travel Time Analysis
No Build Alternative
2040 Forecast

Exhibit 2

	Distance (miles)	AM (min)	PM (min)
Southbound US 169	3.64	5.4	6.2
Northbound US 169	3.64	6.6	4.9
EB TH 41 to NB US 169	2.03	9.6	5.1
SB US 169 to WB TH 41	2.03	3.2	3.5

SOUTHBOUND US 169 - CSAH 69 Overpass to CSAH 14

Description		Speed Limit	Distance (ft)	Distance (mi)	Time (sec)	Time (min)		
CSAH 69 Overpass	55 MPH Transition	65	1,500	0.28	15.7	0.3		
55 MPH Transition	TH 41	55	5,200	0.98	64.5	1.1		
TH 41	133rd Street	55	3,120	0.59	38.7	0.6		
133rd Street	Bryan Rock	55	1,440	0.27	17.9	0.3		
Bryan Rock	145th	55	5,280	1.00	65.5	1.1		
145th	CSAH 14	55	2,700	0.51	33.5	0.6		
	TOTAL TRAVEL		19,240	3.64	235.7	3.9		
Intersection Delay					AM	AM	PM	PM
US 169 at TH 41 Signal	Through				54.6	0.9	68.8	1.1
Uncontrolled Delays	Through	Sum of All Minor Access Delay			33.4	0.6	65.8	1.1
	TOTAL DELAY				88.0	1.5	134.6	2.2
TOTAL TRAVEL/DELAY TIME					**323.7**	**5.4**	**370.3**	**6.2**

NORTHBOUND US 169 - CSAH 14 to CSAH 69 Overpass

Description		Speed Limit	Distance (ft)	Distance (mi)	Time (sec)	Time (min)		
CSAH 14	145th	55	2,700	0.51	33.5	0.6		
145th	Bryan Rock	55	5,280	1.00	65.5	1.1		
Bryan Rock	133rd Street	55	1,440	0.27	17.9	0.3		
133rd Street	TH 41	55	3,120	0.59	38.7	0.6		
TH 41	55 MPH Transition	55	5,200	0.98	64.5	1.1		
55 MPH Transition	CSAH 69 Overpass	65	1,500	0.28	15.7	0.3		
	TOTAL TRAVEL		19,240	3.64	235.7	3.9		
Intersection Delay					AM	AM	PM	PM
US 169 at TH 41 Signal	Through				97.9	1.6	37.6	0.6
Uncontrolled Delays	Through	Sum of All Minor Access Delay			60.8	1.0	19.5	0.3
	TOTAL DELAY				158.7	2.6	57.1	1.0
TOTAL TRAVEL/DELAY TIME					**394.4**	**6.6**	**292.8**	**4.9**

EB TH 41 to NB US 169 - S.River Bridge to CSAH 69 Overpass (NB 169)

Description		Speed Limit	Distance (ft)	Distance (mi)	Time (sec)	Time (min)		
S. River Bridge	Railroad	55	1,630	0.31	20.2	0.3		
Railroad	Dem Con Dr	55	1,050	0.20	13.0	0.2		
Dem Con Dr	NB US 169	55	1,350	0.26	16.7	0.3		
NB US 169	55 MPH Transition	55	5,200	0.98	64.5	1.1		
55 MPH Transition	CSAH 69 Overpass	65	1,500	0.28	15.7	0.3		
	TOTAL TRAVEL		10,730	2.03	130.2	2.2		
Intersection Delay					AM	AM	PM	PM
TH 41 at Dem Con Signal	Through				60.7	1.0	25.8	0.4
US 169 at TH 41 Signal	Left				314.2	5.2	129.1	2.2
Uncontrolled Delay US 169	Through	Sum of All Minor Access Delay			14.0	0.2	7.9	0.1
Uncontrolled Delay TH 41	Through	Sum of All Minor Access Delay			57.8	1.0	10.2	0.2
	TOTAL DELAY				446.7	7.4	173.0	2.9
TOTAL TRAVEL/DELAY TIME					**576.9**	**9.6**	**303.2**	**5.1**

SB US 169 to WB TH 41 - CSAH 69 Overpass to S. River Bridge (TH 41)

Description		Speed Limit	Distance (ft)	Distance (mi)	Time (sec)	Time (min)		
CSAH 69 Overpass	55 MPH Transition	65	1,500	0.28	15.7	0.3		
55 MPH Transition	TH 41	55	5,200	0.98	64.5	1.1		
TH 41	Dem Con Dr	55	1,350	0.26	16.7	0.3		
Dem Con Dr	Railroad	55	1,050	0.20	13.0	0.2		
Railroad	S. River Bridge	55	1,630	0.31	20.2	0.3		
	TOTAL TRAVEL		10,730	2.03	130.2	2.2		
Intersection Delay					AM	AM	PM	PM
US 169 at TH 41 Signal	Right				15.6	0.3	17.4	0.3
TH 41 at Dem Con Signal	Through				31.6	0.5	27.0	0.5
Uncontrolled Delay US 169	Through	Sum of All Minor Access Delay			8.3	0.1	29.9	0.5
Uncontrolled Delay TH 41	Through	Sum of All Minor Access Delay			7.5	0.1	5.1	0.1
	TOTAL DELAY				63.0	1.1	79.4	1.3
TOTAL TRAVEL/DELAY TIME					**193.2**	**3.2**	**209.6**	**3.5**

Notes:

All distances are approximate; Travel time assumes all vehicles travel at the posted speed limit.

Intersection Delays from Synchro/SimTraffic analysis results

Travel Time Analysis

Alternative A - Partial Interchange with Displaced Left Turn

2040 Forecast

Exhibit 3

	Distance (miles)	AM (min)	PM (min)
Southbound US 169	3.64	4.0	4.0
Northbound US 169	3.64	5.7	4.5
EB TH 41 to NB US 169	2.02	3.7	3.1
SB US 169 to WB TH 41	2.03	2.5	2.5

SOUTHBOUND US 169 - CSAH 69 Overpass to CSAH 14

Description		Speed Limit	Distance (ft)	Distance (mi)	Time (sec)	Time (min)		
CSAH 69 Overpass	55 MPH Transition	65	1,500	0.28	15.7	0.3		
55 MPH Transition	TH 41 Exit	55	3,840	0.73	47.6	0.8		
TH 41 Exit	TH 41 Entrance	55	2,900	0.55	36.0	0.6		
TH 41 Entrance	133rd Street (closed)	55	1,580	0.30	19.6	0.3		
133rd Street (closed)	Bryan Rock	55	1,440	0.27	17.9	0.3		
Bryan Rock	145th	55	5,280	1.00	65.5	1.1		
145th	CSAH 14	55	2,700	0.51	33.5	0.6		
	TOTAL TRAVEL		19,240	3.64	235.7	3.9		
Intersection Delay					AM	AM	PM	PM
US 169 at TH 41 Signal	Through					0.0		0.0
US 169 at CR 14 RI/RO	Through				2.5	0.0	3.3	0.1
	TOTAL DELAY				2.5	0.0	3.3	0.1
TOTAL TRAVEL/DELAY TIME					**238.2**	**4.0**	**239.0**	**4.0**

NORTHBOUND US 169 - CSAH 14 to CSAH 69 Overpass

Description		Speed Limit	Distance (ft)	Distance (mi)	Time (sec)	Time (min)		
CSAH 14	145th	55	2,700	0.51	33.5	0.6		
145th	Bryan Rock	55	5,280	1.00	65.5	1.1		
Bryan Rock	133rd Street	55	1,440	0.27	17.9	0.3		
133rd Street	TH 41	55	3,120	0.59	38.7	0.6		
TH 41	55 MPH Transition	55	5,200	0.98	64.5	1.1		
55 MPH Transition	CSAH 69 Overpass	65	1,500	0.28	15.7	0.3		
	TOTAL TRAVEL		19,240	3.64	235.7	3.9		
Intersection Delay					AM	AM	PM	PM
US 169 at TH 41 Signal	Through				105.9	1.8	33.7	0.6
US 169 at CR 14 RI/RO	Through				3.2	0.1	1.6	0.0
	TOTAL DELAY				109.1	1.8	35.3	0.6
TOTAL TRAVEL/DELAY TIME					**344.8**	**5.7**	**271.0**	**4.5**

EB TH 41 to NB US 169 - S.River Bridge to CSAH 69 Overpass (NB 169)

Description		Speed Limit	Distance (ft)	Distance (mi)	Time (sec)	Time (min)		
S. River Bridge	Railroad	55	1,630	0.31	20.2	0.3		
Railroad	Dem Con Dr	55	1,050	0.20	13.0	0.2		
Dem Con Dr	DLT Int	55	775	0.15	9.6	0.2		
DLT Int	SB Ramp Terminal	55	450	0.09	5.6	0.1		
SB Ramp Terminal	TH 41 Entrance (LT)	20	150	0.03	5.1	0.1		
TH 41 Entrance (LT)	TH 41 Entrance	50	1,350	0.26	18.4	0.3		
TH 41 Entrance	CSAH 69 Overpass	65	5,250	0.99	55.1	0.9		
	TOTAL TRAVEL		10,655	2.02	127.0	2.1		
Intersection Delay					AM	AM	PM	PM
TH 41 at Dem Con Signal	Through				20.5	0.3	12.2	0.2
US 169 SB DLT Signal	Left				65.3	1.1	38.6	0.6
US 169 SB at TH 41 Signal	Through				4.8	0.1	3.4	0.1
Uncontrolled Delay US 169	Through	Sum of All Minor Access Delay			0.0	0.0	0.0	0.0
Uncontrolled Delay TH 41	Through	Sum of All Minor Access Delay			2.8	0.0	3.1	0.1
	TOTAL DELAY				93.4	1.6	57.3	1.0
TOTAL TRAVEL/DELAY TIME					**220.4**	**3.7**	**184.3**	**3.1**

SB US 169 to WB TH 41 - CSAH 69 Overpass to S. River Bridge (TH 41)

Description		Speed Limit	Distance (ft)	Distance (mi)	Time (sec)	Time (min)		
CSAH 69 Overpass	TH 41 Exit	65	5,340	1.01	56.0	0.9		
TH 41 Exit	TH 41 Exit Ramp	50	1,475	0.28	20.1	0.3		
TH 41 Exit Ramp	Dem Con Dr	55	1,225	0.23	15.2	0.3		
Dem Con Dr	Railroad	55	1,050	0.20	13.0	0.2		
Railroad	S. River Bridge	55	1,630	0.31	20.2	0.3		
	TOTAL TRAVEL		10,720	2.03	124.5	2.1		
Intersection Delay					AM	AM	PM	PM
US 169 SB at TH 41 Signal	Right				6.3	0.1	5.9	0.1
TH 41 at DLT Signal	Merge				5.4	0.1	2.9	0.0
TH 41 at Dem Con Signal	Through				11.8	0.2	9.7	0.2
Uncontrolled Delay US 169	Through	Sum of All Minor Access Delay			0.0	0.0	0.0	0.0
Uncontrolled Delay TH 41	Through	Sum of All Minor Access Delay			4.9	0.1	4.9	0.1
	TOTAL DELAY				28.4	0.5	23.4	0.4
TOTAL TRAVEL/DELAY TIME					**152.9**	**2.5**	**147.9**	**2.5**

Notes:

All distances are approximate; Travel time assumes all vehicles travel at the posted speed limit.

Intersection Delays from Synchro/SimTraffic analysis results

Travel Time Analysis
Alternative B - TDI with SE Loop
2040 Forecast

Exhibit 4

	Distance (miles)	AM (min)	PM (min)
Southbound US 169	3.64	3.4	3.4
Northbound US 169	3.64	3.4	3.4
EB TH 41 to NB US 169	2.27	3.7	3.3
SB US 169 to WB TH 41	2.03	2.6	2.4

SOUTHBOUND US 169 - CSAH 69 Overpass to CSAH 14

Description		Speed Limit	Distance (ft)	Distance (mi)	Time (sec)	Time (min)		
CSAH 69 Overpass	TH 41 Exit	65	5,340	1.01	56.0	0.9		
TH 41 Exit	TH 41 Entrance	65	2,900	0.55	30.4	0.5		
TH 41 Entrance	133rd Street (closed)	65	1,580	0.30	16.6	0.3		
133rd Street (closed)	Bryan Rock	65	1,440	0.27	15.1	0.3		
Bryan Rock	145th	65	5,280	1.00	55.4	0.9		
145th	CSAH 14	65	2,700	0.51	28.3	0.5		
	TOTAL TRAVEL		19,240	3.64	201.8	3.4		
Intersection Delay					AM	AM	PM	PM
US 169 at TH 41 Signal	Through					0.0		0.0
US 169 at CR 14 RI/RO	Through				2.7	0.0	4.2	0.1
	TOTAL DELAY				2.7	0.0	4.2	0.1
TOTAL TRAVEL/DELAY TIME					**204.5**	**3.4**	**206.0**	**3.4**

NORTHBOUND US 169 - CSAH 14 to CSAH 69 Overpass

Description		Speed Limit	Distance (ft)	Distance (mi)	Time (sec)	Time (min)		
CSAH 14	145th	65	2,700	0.51	28.3	0.5		
145th	Bryan Rock	65	5,280	1.00	55.4	0.9		
Bryan Rock	133rd Street (closed)	65	1,440	0.27	15.1	0.3		
133rd Street (closed)	TH 41 Exit	65	1,650	0.31	17.3	0.3		
TH 41 Exit	TH 41 Entrance	65	2,620	0.50	27.5	0.5		
TH 41 Entrance	CSAH 69 Overpass	65	5,550	1.05	58.2	1.0		
	TOTAL TRAVEL		19,240	3.64	201.8	3.4		
Intersection Delay					AM	AM	PM	PM
US 169 at TH 41 Signal	Through					0.0		0.0
US 169 at CR 14 RI/RO	Through				3.3	0.1	1.6	0.0
	TOTAL DELAY				3.3	0.1	1.6	0.0
TOTAL TRAVEL/DELAY TIME					**205.1**	**3.4**	**203.4**	**3.4**

EB TH 41 to NB US 169 - S.River Bridge to CSAH 69 Overpass (NB 169)

Description		Speed Limit	Distance (ft)	Distance (mi)	Time (sec)	Time (min)		
S. River Bridge	Railroad	55	1,630	0.31	20.2	0.3		
Railroad	Dem Con Dr	55	1,050	0.20	13.0	0.2		
Dem Con Dr	SB Ramp Terminal	55	1,275	0.24	15.8	0.3		
SB Ramp Terminal	NB Ramp Terminal	55	550	0.10	6.8	0.1		
NB Ramp Terminal	TH 41 Entrance (25 mph)	25	720	0.14	19.6	0.3		
TH 41 Entrance (25 mph)	TH 41 Entrance	50	1,200	0.23	16.4	0.3		
TH 41 Entrance	CSAH 69 Overpass	65	5,550	1.05	58.2	1.0		
	TOTAL TRAVEL		11,975	2.27	150.1	2.5		
Intersection Delay					AM	AM	PM	PM
TH 41 at Dem Con Signal	Through				19.5	0.3	13.7	0.2
US 169 SB at TH 41 Signal	Through				26.1	0.4	16.8	0.3
US 169 NB at TH 41 Signal	Right				25.8	0.4	16.4	0.3
Uncontrolled Delay US 169	Through	Sum of All Minor Access Delay			0.0	0.0	0.0	0.0
Uncontrolled Delay TH 41	Through	Sum of All Minor Access Delay			2.7	0.0	3.2	0.1
	TOTAL DELAY				74.1	1.2	50.1	0.8
TOTAL TRAVEL/DELAY TIME					**224.2**	**3.7**	**200.2**	**3.3**

SB US 169 to WB TH 41 - CSAH 69 Overpass to S. River Bridge (TH 41)

Description		Speed Limit	Distance (ft)	Distance (mi)	Time (sec)	Time (min)		
CSAH 69 Overpass	TH 41 Exit	65	5,340	1.01	56.0	0.9		
TH 41 Exit	TH 41 Exit Ramp	50	1,475	0.28	20.1	0.3		
TH 41 Exit Ramp	Dem Con Dr	55	1,225	0.23	15.2	0.3		
Dem Con Dr	Railroad	55	1,050	0.20	13.0	0.2		
Railroad	S. River Bridge	55	1,630	0.31	20.2	0.3		
	TOTAL TRAVEL		10,720	2.03	124.5	2.1		
Intersection Delay					AM	AM	PM	PM
US 169 SB at TH 41 Signal	Right				11.6	0.2	8.4	0.1
TH 41 at Dem Con Signal	Through				13.0	0.2	9.1	0.2
Uncontrolled Delay US 169	Through	Sum of All Minor Access Delay			0.0	0.0	0.0	0.0
Uncontrolled Delay TH 41	Through	Sum of All Minor Access Delay			5.6	0.1	4.4	0.1
	TOTAL DELAY				30.2	0.5	21.9	0.4
TOTAL TRAVEL/DELAY TIME					**154.7**	**2.6**	**146.4**	**2.4**

Notes:
All distances are approximate; Travel time assumes all vehicles travel at the posted speed limit.
Intersection Delays from Synchro/SimTraffic analysis results

Travel Time Analysis
Alternative C - TDI
2040 Forecast

Exhibit 5

	Distance (miles)	AM (min)	PM (min)
Southbound US 169	3.64	3.4	3.4
Northbound US 169	3.64	3.4	3.4
EB TH 41 to NB US 169	2.06	3.0	3.1
SB US 169 to WB TH 41	2.03	2.5	2.5

SOUTHBOUND US 169 - CSAH 69 Overpass to CSAH 14

Description		Speed Limit	Distance (ft)	Distance (mi)	Time (sec)	Time (min)		
CSAH 69 Overpass	TH 41 Exit	65	5,340	1.01	56.0	0.9		
TH 41 Exit	TH 41 Entrance	65	2,900	0.55	30.4	0.5		
TH 41 Entrance	133rd Street (closed)	65	1,580	0.30	16.6	0.3		
133rd Street (closed)	Bryan Rock	65	1,440	0.27	15.1	0.3		
Bryan Rock	145th	65	5,280	1.00	55.4	0.9		
145th	CSAH 14	65	2,700	0.51	28.3	0.5		
	TOTAL TRAVEL		19,240	3.64	201.8	3.4		
Intersection Delay					AM	AM	PM	PM
US 169 at TH 41 Signal	Through					0.0		0.0
US 169 at CR 14 RI/RO	Through				2.7	0.0	4.2	0.1
	TOTAL DELAY				2.7	0.0	4.2	0.1
TOTAL TRAVEL/DELAY TIME					**204.5**	**3.4**	**206.0**	**3.4**

NORTHBOUND US 169 - CSAH 14 to CSAH 69 Overpass

Description		Speed Limit	Distance (ft)	Distance (mi)	Time (sec)	Time (min)		
CSAH 14	145th	65	2,700	0.51	28.3	0.5		
145th	Bryan Rock	65	5,280	1.00	55.4	0.9		
Bryan Rock	133rd Street (closed)	65	1,440	0.27	15.1	0.3		
133rd Street (closed)	TH 41 Exit	65	1,650	0.31	17.3	0.3		
TH 41 Exit	TH 41 Entrance	65	2,620	0.50	27.5	0.5		
TH 41 Entrance	CSAH 69 Overpass	65	5,550	1.05	58.2	1.0		
	TOTAL TRAVEL		19,240	3.64	201.8	3.4		
Intersection Delay					AM	AM	PM	PM
US 169 at TH 41 Signal	Through					0.0		0.0
US 169 at CR 14 RI/RO	Through				3.5	0.1	1.6	0.0
	TOTAL DELAY				3.5	0.1	1.6	0.0
TOTAL TRAVEL/DELAY TIME					**205.3**	**3.4**	**203.4**	**3.4**

EB TH 41 to NB US 169 - S.River Bridge to CSAH 69 Overpass (NB 169)

Description		Speed Limit	Distance (ft)	Distance (mi)	Time (sec)	Time (min)		
S. River Bridge	Railroad	55	1,630	0.31	20.2	0.3		
Railroad	Dem Con Dr	55	1,050	0.20	13.0	0.2		
Dem Con Dr	SB Ramp Terminal	55	1,275	0.24	15.8	0.3		
SB Ramp Terminal	NB Ramp Terminal	55	225	0.04	2.8	0.0		
NB Ramp Terminal	TH 41 Entrance	50	1,400	0.27	19.1	0.3		
TH 41 Entrance	CSAH 69 Overpass	65	5,300	1.00	55.6	0.9		
	TOTAL TRAVEL		10,880	2.06	126.5	2.1		
Intersection Delay					AM	AM	PM	PM
TH 41 at Dem Con Signal	Through				15.3	0.3	12.4	0.2
US 169 SB at TH 41 Signal	Through				16.3	0.3	14.3	0.2
US 169 NB at TH 41 Signal	Left				20.1	0.3	29.4	0.5
Uncontrolled Delay US 169	Through	Sum of All Minor Access Delay			0.0	0.0	0.0	0.0
Uncontrolled Delay TH 41	Through	Sum of All Minor Access Delay			2.6	0.0	3.2	0.1
	TOTAL DELAY				54.3	0.9	59.3	1.0
TOTAL TRAVEL/DELAY TIME					**180.8**	**3.0**	**185.8**	**3.1**

SB US 169 to WB TH 41 - CSAH 69 Overpass to S. River Bridge (TH 41)

Description		Speed Limit	Distance (ft)	Distance (mi)	Time (sec)	Time (min)		
CSAH 69 Overpass	TH 41 Exit	65	5,340	1.01	56.0	0.9		
TH 41 Exit	TH 41 Exit Ramp	50	1,475	0.28	20.1	0.3		
TH 41 Exit Ramp	Dem Con Dr	55	1,225	0.23	15.2	0.3		
Dem Con Dr	Railroad	55	1,050	0.20	13.0	0.2		
Railroad	S. River Bridge	55	1,630	0.31	20.2	0.3		
	TOTAL TRAVEL		10,720	2.03	124.5	2.1		
Intersection Delay					AM	AM	PM	PM
US 169 SB at TH 41 Signal	Right				10.4	0.2	8.2	0.1
TH 41 at Dem Con Signal	Through				12.5	0.2	9.9	0.2
Uncontrolled Delay US 169	Through	Sum of All Minor Access Delay			0.0	0.0	0.0	0.0
Uncontrolled Delay TH 41	Through	Sum of All Minor Access Delay			5.3	0.1	4.6	0.1
	TOTAL DELAY				28.2	0.5	22.7	0.4
TOTAL TRAVEL/DELAY TIME					**152.7**	**2.5**	**147.2**	**2.5**

Notes:
All distances are approximate; Travel time assumes all vehicles travel at the posted speed limit.
Intersection Delays from Synchro/SimTraffic analysis results

Travel Time Analysis
Alternative D - SPUI
2040 Forecast

Exhibit 6

	Distance (miles)	AM (min)	PM (min)
Southbound US 169	3.64	3.4	3.4
Northbound US 169	3.64	3.4	3.4
EB TH 41 to NB US 169	2.07	3.0	2.8
SB US 169 to WB TH 41	2.03	2.6	2.5

SOUTHBOUND US 169 - CSAH 69 Overpass to CSAH 14

Description		Speed Limit	Distance (ft)	Distance (mi)	Time (sec)	Time (min)		
CSAH 69 Overpass	TH 41 Exit	65	5,340	1.01	56.0	0.9		
TH 41 Exit	TH 41 Entrance	65	2,900	0.55	30.4	0.5		
TH 41 Entrance	133rd Street (closed)	65	1,580	0.30	16.6	0.3		
133rd Street (closed)	Bryan Rock	65	1,440	0.27	15.1	0.3		
Bryan Rock	145th	65	5,280	1.00	55.4	0.9		
145th	CSAH 14	65	2,700	0.51	28.3	0.5		
	TOTAL TRAVEL		19,240	3.64	201.8	3.4		
Intersection Delay					AM	AM	PM	PM
US 169 at TH 41 Signal	Through					0.0		0.0
US 169 at CR 14 RI/RO	Through				2.6	0.0	4.4	0.1
	TOTAL DELAY				2.6	0.0	4.4	0.1
TOTAL TRAVEL/DELAY TIME					**204.4**	**3.4**	**206.2**	**3.4**

NORTHBOUND US 169 - CSAH 14 to CSAH 69 Overpass

Description		Speed Limit	Distance (ft)	Distance (mi)	Time (sec)	Time (min)		
CSAH 14	145th	65	2,700	0.51	28.3	0.5		
145th	Bryan Rock	65	5,280	1.00	55.4	0.9		
Bryan Rock	133rd Street (closed)	65	1,440	0.27	15.1	0.3		
133rd Street (closed)	TH 41 Exit	65	1,650	0.31	17.3	0.3		
TH 41 Exit	TH 41 Entrance	65	2,620	0.50	27.5	0.5		
TH 41 Entrance	CSAH 69 Overpass	65	5,550	1.05	58.2	1.0		
	TOTAL TRAVEL		19,240	3.64	201.8	3.4		
Intersection Delay					AM	AM	PM	PM
US 169 at TH 41 Signal	Through					0.0		0.0
US 169 at CR 14 RI/RO	Through				3.4	0.1	1.6	0.0
	TOTAL DELAY				3.4	0.1	1.6	0.0
TOTAL TRAVEL/DELAY TIME					**205.2**	**3.4**	**203.4**	**3.4**

EB TH 41 to NB US 169 - S.River Bridge to CSAH 69 Overpass (NB 169)

Description		Speed Limit	Distance (ft)	Distance (mi)	Time (sec)	Time (min)		
S. River Bridge	Railroad	55	1,630	0.31	20.2	0.3		
Railroad	Dem Con Dr	55	1,050	0.20	13.0	0.2		
Dem Con Dr	SPUI	55	1,300	0.25	16.1	0.3		
SPUI	TH 41 Entrance	50	1,650	0.31	22.5	0.4		
TH 41 Entrance	CSAH 69 Overpass	65	5,300	1.00	55.6	0.9		
	TOTAL TRAVEL		10,930	2.07	127.4	2.1		
Intersection Delay					AM	AM	PM	PM
TH 41 at Dem Con Signal	Through				15.5	0.3	10.5	0.2
US 169 at TH 41 Signal	Left				34.3	0.6	25.0	0.4
Uncontrolled Delay US 169	Through	Sum of All Minor Access Delay			0.0	0.0	0.0	0.0
Uncontrolled Delay TH 41	Through	Sum of All Minor Access Delay			2.4	0.0	3.0	0.1
	TOTAL DELAY				52.2	0.9	38.5	0.6
TOTAL TRAVEL/DELAY TIME					**179.6**	**3.0**	**165.9**	**2.8**

SB US 169 to WB TH 41 - CSAH 69 Overpass to S. River Bridge (TH 41)

Description		Speed Limit	Distance (ft)	Distance (mi)	Time (sec)	Time (min)		
CSAH 69 Overpass	TH 41 Exit	65	5,340	1.01	56.0	0.9		
TH 41 Exit	TH 41 Exit Ramp	50	1,475	0.28	20.1	0.3		
TH 41 Exit Ramp	Dem Con Dr	55	1,225	0.23	15.2	0.3		
Dem Con Dr	Railroad	55	1,050	0.20	13.0	0.2		
Railroad	S. River Bridge	55	1,630	0.31	20.2	0.3		
	TOTAL TRAVEL		10,720	2.03	124.5	2.1		
Intersection Delay					AM	AM	PM	PM
US 169 SB at TH 41 Signal	Right				9.4	0.2	6.3	0.1
TH 41 at Dem Con Signal	Through				19.8	0.3	14.8	0.2
Uncontrolled Delay US 169	Through	Sum of All Minor Access Delay			0.0	0.0	0.0	0.0
Uncontrolled Delay TH 41	Through	Sum of All Minor Access Delay			5.0	0.1	3.6	0.1
	TOTAL DELAY				34.2	0.6	24.7	0.4
TOTAL TRAVEL/DELAY TIME					**158.7**	**2.6**	**149.2**	**2.5**

Notes:

All distances are approximate; Travel time assumes all vehicles travel at the posted speed limit.

Intersection Delays from Synchro/SimTraffic analysis results

Travel Time Analysis
Alternative E - DDI
2040 Forecast

Exhibit 7

	Distance (miles)	AM (min)	PM (min)
Southbound US 169	3.64	3.4	3.4
Northbound US 169	3.64	3.4	3.4
EB TH 41 to NB US 169	2.06	2.7	2.6
SB US 169 to WB TH 41	2.02	2.6	2.5

SOUTHBOUND US 169 - CSAH 69 Overpass to CSAH 14

Description		Speed Limit	Distance (ft)	Distance (mi)	Time (sec)	Time (min)		
CSAH 69 Overpass	TH 41 Exit	65	5,340	1.01	56.0	0.9		
TH 41 Exit	TH 41 Entrance	65	2,900	0.55	30.4	0.5		
TH 41 Entrance	133rd Street (closed)	65	1,580	0.30	16.6	0.3		
133rd Street (closed)	Bryan Rock	65	1,440	0.27	15.1	0.3		
Bryan Rock	145th	65	5,280	1.00	55.4	0.9		
145th	CSAH 14	65	2,700	0.51	28.3	0.5		
	TOTAL TRAVEL		19,240	3.64	201.8	3.4		
Intersection Delay					AM	AM	PM	PM
US 169 at TH 41 Signal	Through					0.0		0.0
US 169 at CR 14 RI/RO	Through				2.7	0.0	4.4	0.1
	TOTAL DELAY				2.7	0.0	4.4	0.1
TOTAL TRAVEL/DELAY TIME					**204.5**	**3.4**	**206.2**	**3.4**

NORTHBOUND US 169 - CSAH 14 to CSAH 69 Overpass

Description		Speed Limit	Distance (ft)	Distance (mi)	Time (sec)	Time (min)		
CSAH 14	145th	65	2,700	0.51	28.3	0.5		
145th	Bryan Rock	65	5,280	1.00	55.4	0.9		
Bryan Rock	133rd Street (closed)	65	1,440	0.27	15.1	0.3		
133rd Street (closed)	TH 41 Exit	65	1,650	0.31	17.3	0.3		
TH 41 Exit	TH 41 Entrance	65	2,620	0.50	27.5	0.5		
TH 41 Entrance	CSAH 69 Overpass	65	5,550	1.05	58.2	1.0		
	TOTAL TRAVEL		19,240	3.64	201.8	3.4		
Intersection Delay					AM	AM	PM	PM
US 169 at TH 41 Signal	Through					0.0		0.0
US 169 at CR 14 RI/RO	Through				3.4	0.1	1.6	0.0
	TOTAL DELAY				3.4	0.1	1.6	0.0
TOTAL TRAVEL/DELAY TIME					**205.2**	**3.4**	**203.4**	**3.4**

EB TH 41 to NB US 169 - S.River Bridge to CSAH 69 Overpass (NB 169)

Description		Speed Limit	Distance (ft)	Distance (mi)	Time (sec)	Time (min)		
S. River Bridge	Railroad	55	1,630	0.31	20.2	0.3		
Railroad	Dem Con Dr	55	1,050	0.20	13.0	0.2		
Dem Con Dr	SB Ramp Terminal	55	1,210	0.23	15.0	0.2		
SB Ramp Terminal	NB Ramp Terminal	55	300	0.06	3.7	0.1		
NB Ramp Terminal	TH 41 Entrance	50	1,400	0.27	19.1	0.3		
TH 41 Entrance	CSAH 69 Overpass	65	5,300	1.00	55.6	0.9		
	TOTAL TRAVEL		10,890	2.06	126.6	2.1		
Intersection Delay					AM	AM	PM	PM
TH 41 at Dem Con Signal	Through				14.6	0.2	10.8	0.2
US 169 SB at TH 41 Signal	Through				13.9	0.2	12.9	0.2
US 169 NB at TH 41 Signal	Left				2.3	0.0	1.7	0.0
Uncontrolled Delay US 169	Through	Sum of All Minor Access Delay			0.0	0.0	0.0	0.0
Uncontrolled Delay TH 41	Through	Sum of All Minor Access Delay			2.6	0.0	3.2	0.1
	TOTAL DELAY				33.4	0.6	28.6	0.5
TOTAL TRAVEL/DELAY TIME					**160.0**	**2.7**	**155.2**	**2.6**

SB US 169 to WB TH 41 - CSAH 69 Overpass to S. River Bridge (TH 41)

Description		Speed Limit	Distance (ft)	Distance (mi)	Time (sec)	Time (min)		
CSAH 69 Overpass	TH 41 Exit	65	5,340	1.01	56.0	0.9		
TH 41 Exit	TH 41 Exit Ramp	50	1,475	0.28	20.1	0.3		
TH 41 Exit Ramp	Dem Con Dr	55	1,150	0.22	14.3	0.2		
Dem Con Dr	Railroad	55	1,050	0.20	13.0	0.2		
Railroad	S. River Bridge	55	1,630	0.31	20.2	0.3		
	TOTAL TRAVEL		10,645	2.02	123.6	2.1		
Intersection Delay					AM	AM	PM	PM
US 169 SB at TH 41 Signal	Right				14.4	0.2	13.0	0.2
TH 41 at Dem Con Signal	Through				10.4	0.2	8.7	0.1
Uncontrolled Delay US 169	Through	Sum of All Minor Access Delay			0.0	0.0	0.0	0.0
Uncontrolled Delay TH 41	Through	Sum of All Minor Access Delay			5.3	0.1	4.1	0.1
	TOTAL DELAY				30.1	0.5	25.8	0.4
TOTAL TRAVEL/DELAY TIME					**153.7**	**2.6**	**149.4**	**2.5**

Notes:
All distances are approximate; Travel time assumes all vehicles travel at the posted speed limit.
Intersection Delays from Synchro/SimTraffic analysis results

Travel Time Analysis
Alternative F - SPUI Offset
2040 Forecast

Exhibit 8

	Distance (miles)	AM (min)	PM (min)
Southbound US 169	3.64	3.4	3.4
Northbound US 169	3.64	3.4	3.4
EB TH 41 to NB US 169	2.07	2.9	2.8
SB US 169 to WB TH 41	2.03	2.6	2.4

SOUTHBOUND US 169 - CSAH 69 Overpass to CSAH 14

Description		Speed Limit	Distance (ft)	Distance (mi)	Time (sec)	Time (min)		
CSAH 69 Overpass	TH 41 Exit	65	5,340	1.01	56.0	0.9		
TH 41 Exit	TH 41 Entrance	65	2,900	0.55	30.4	0.5		
TH 41 Entrance	133rd Street (closed)	65	1,580	0.30	16.6	0.3		
133rd Street (closed)	Bryan Rock	65	1,440	0.27	15.1	0.3		
Bryan Rock	145th	65	5,280	1.00	55.4	0.9		
145th	CSAH 14	65	2,700	0.51	28.3	0.5		
	TOTAL TRAVEL		19,240	3.64	201.8	3.4		
Intersection Delay					AM	AM	PM	PM
US 169 at TH 41 Signal	Through					0.0		0.0
US 169 at CR 14 RI/RO	Through				2.7	0.0	4.2	0.1
	TOTAL DELAY				2.7	0.0	4.2	0.1
TOTAL TRAVEL/DELAY TIME					**204.5**	**3.4**	**206.0**	**3.4**

NORTHBOUND US 169 - CSAH 14 to CSAH 69 Overpass

Description		Speed Limit	Distance (ft)	Distance (mi)	Time (sec)	Time (min)		
CSAH 14	145th	65	2,700	0.51	28.3	0.5		
145th	Bryan Rock	65	5,280	1.00	55.4	0.9		
Bryan Rock	133rd Street (closed)	65	1,440	0.27	15.1	0.3		
133rd Street (closed)	TH 41 Exit	65	1,650	0.31	17.3	0.3		
TH 41 Exit	TH 41 Entrance	65	2,620	0.50	27.5	0.5		
TH 41 Entrance	CSAH 69 Overpass	65	5,550	1.05	58.2	1.0		
	TOTAL TRAVEL		19,240	3.64	201.8	3.4		
Intersection Delay					AM	AM	PM	PM
US 169 at TH 41 Signal	Through					0.0		0.0
US 169 at CR 14 RI/RO	Through				3.4	0.1	1.6	0.0
	TOTAL DELAY				3.4	0.1	1.6	0.0
TOTAL TRAVEL/DELAY TIME					**205.2**	**3.4**	**203.4**	**3.4**

EB TH 41 to NB US 169 - S.River Bridge to CSAH 69 Overpass (NB 169)

Description		Speed Limit	Distance (ft)	Distance (mi)	Time (sec)	Time (min)		
S. River Bridge	Railroad	55	1,630	0.31	20.2	0.3		
Railroad	Dem Con Dr	55	1,050	0.20	13.0	0.2		
Dem Con Dr	SPUI	55	1,210	0.23	15.0	0.2		
SPUI	TH 41 Entrance	50	1,740	0.33	23.7	0.4		
TH 41 Entrance	CSAH 69 Overpass	65	5,300	1.00	55.6	0.9		
	TOTAL TRAVEL		10,930	2.07	127.5	2.1		
Intersection Delay					AM	AM	PM	PM
TH 41 at Dem Con Signal	Through				16.1	0.3	11.2	0.2
US 169 at TH 41 Signal	Left				30.6	0.5	24.5	0.4
Uncontrolled Delay US 169	Through	Sum of All Minor Access Delay			0.0	0.0	0.0	0.0
Uncontrolled Delay TH 41	Through	Sum of All Minor Access Delay			2.5	0.0	2.9	0.0
	TOTAL DELAY				49.2	0.8	38.6	0.6
TOTAL TRAVEL/DELAY TIME					**176.7**	**2.9**	**166.1**	**2.8**

SB US 169 to WB TH 41 - CSAH 69 Overpass to S. River Bridge (TH 41)

Description		Speed Limit	Distance (ft)	Distance (mi)	Time (sec)	Time (min)		
CSAH 69 Overpass	TH 41 Exit	65	5,340	1.01	56.0	0.9		
TH 41 Exit	TH 41 Exit Ramp	50	1,475	0.28	20.1	0.3		
TH 41 Exit Ramp	Dem Con Dr	55	1,210	0.23	15.0	0.2		
Dem Con Dr	Railroad	55	1,050	0.20	13.0	0.2		
Railroad	S. River Bridge	55	1,630	0.31	20.2	0.3		
	TOTAL TRAVEL		10,705	2.03	124.4	2.1		
Intersection Delay					AM	AM	PM	PM
US 169 SB at TH 41 Signal	Right				16.4	0.3	7.9	0.1
TH 41 at Dem Con Signal	Through				11.7	0.2	9.1	0.2
Uncontrolled Delay US 169	Through	Sum of All Minor Access Delay			0.0	0.0	0.0	0.0
Uncontrolled Delay TH 41	Through	Sum of All Minor Access Delay			5.1	0.1	3.5	0.1
	TOTAL DELAY				33.2	0.6	20.5	0.3
TOTAL TRAVEL/DELAY TIME					**157.6**	**2.6**	**144.9**	**2.4**

Notes:

All distances are approximate; Travel time assumes all vehicles travel at the posted speed limit.

Intersection Delays from Synchro/SimTraffic analysis results

Attachment E – Noise Analysis Memo

I. Highway Traffic Noise

TH 169/TH 41/CSAH 78/CSAH 14 Intersection Improvements Project includes construction of an interchange at the existing signalized TH 169 and TH 41/CSAH 78 intersection and a new overpass near the existing TH 169 and CSAH 14 intersection located in Jackson and Louisville Townships in Scott County. The project also includes construction of frontage roads parallel to TH 169, pedestrian/bicycle accommodations along TH 41 and CSAH 78, and stormwater treatment. The project is intended to improve safety and mobility for commuter and freight traffic.

Noise is defined as any unwanted sound. Sound travels in a wave motion and produces a sound pressure level. This sound pressure level is commonly measured in decibels. Decibels represent the logarithmic measure of sound energy relative to a reference energy level. A sound increase of three dBA is barely perceptible to the human ear, a five dBA increase is clearly noticeable, and a 10 dBA increase is heard twice as loud.

For highway traffic noise, an adjustment, or weighting, of the high- and low-pitched sounds is made to approximate the way that an average person hears sounds. The adjusted sound levels are stated in units of "A-weighted decibels" (dBA). In Minnesota, state noise standards are based on the "L_{10}" and "L_{50}" A-weighted noise levels, which are the noise levels that are exceeded 10 percent and 50 percent of the time, respectively, during the hour of the day and/or night when traffic noise is loudest. The L_{10} value is used for comparison with Federal Highway Administration (FHWA) noise abatement criteria. Both sets of standards apply to this project. **Table 1** provides a rough comparison of the noise levels of some common noise sources.

Table 1: Decibel Levels of Common Noise Sources

Sound Pressure Level (dBA)	Noise Source
140	Jet Engine (at 25 meters)
130	Jet Aircraft (at 100 meters)
120	Rock and Roll Concert
110	Pneumatic Chipper
100	Jointer / Planer
90	Chainsaw
80	Heavy Truck Traffic
70	Business Office
60	Conversational Speech
50	Library
40	Bedroom
30	Secluded Woods
20	Whisper

Source: "A Guide to Noise Control in Minnesota," MPCA

Along with the volume of traffic and other factors (i.e., topography of the area and vehicle types and speeds) that contribute to the loudness of traffic noise, the distance of a receptor from a sound's source is also an important factor. Sound levels decrease as distance from a source increases. The following rule of thumb regarding sound decreases due to distance is commonly used: Beyond approximately 50 feet, each time the distance between a line source (such as a road) and a receptor is doubled, sound levels decrease by 3 decibels over hard ground, such as pavement or water, and by 4.5 decibels over vegetated areas.

Minnesota State noise standards have been established specifically for daytime (7:00 AM-10:00 PM) and nighttime (10:00 PM-7:00 AM) periods by the Minnesota Pollution Control Agency (MPCA). For residential land uses including apartments, churches, and schools (Noise Area Classification 1 or NAC-1), the Minnesota State standards for L_{10} are 65 decibels for daytime and 55 decibels for nighttime; the standards for L_{50} are 60 decibels for daytime and 50 decibels for nighttime. For commercial land uses (NAC-2), the Minnesota State Standards for L_{10} are 70 decibels for daytime and nighttime; the standards for L_{50} are 65 decibels for daytime and nighttime. For industrial land uses (NAC-3), the Minnesota State Standards for L_{10} are 80 decibels for daytime and nighttime; the standards for L_{50} are 75 decibels for daytime and nighttime. Minnesota State Noise Standards are shown in **Table 2**. State noise standards apply to trunk highway (TH) facilities in Minnesota, including TH 169 and TH 41.

Table 2: MPCA State Noise Standards – Hourly A-Weighted Sound Levels

Land Use	Code	Day (7:00 AM to 10:00 PM) dBA		Night (10:00 PM - 7:00 AM) dBA	
		L_{10}	L_{50}	L_{10}	L_{50}
Residential[1]	NAC - 1	65	60	55	50
Commercial[2]	NAC - 2	70	65	70	65
Industrial[3]	NAC - 3	80	75	80	75

[1] NAC-1 includes household units, transient lodging and hotels, educational, religious, cultural, entertainment, camping, and picnicking land uses. Note the daytime standards apply during the nighttime for NAC-1 activities that do not include overnight sleeping/lodging.
[2] NAC-2 includes retail and restaurants, transportation terminals, professional offices, parks, recreational, and amusement land uses.
[3] NAC-3 includes industrial manufacturing, transportation facilities (except terminals), and utilities land uses.

The FHWA has a separate set of noise standards that vary by land use. For residential uses (Federal Land Use Category B), the Federal L_{10} standard is 70 dBA for both daytime and nighttime. For recreational areas, medical facilities, libraries, places of worship and daycare centers evaluated at an exterior location (Federal Land Use Category C) the Federal L_{10} standard is 70 dBA for daytime and nighttime use. For medical facilities, libraries, places of worship and daycare centers evaluated an interior location (Federal Land Use Category D) the Federal L_{10} standard is 55 dBA for daytime and nighttime use. For hotels, bars/restaurants and offices (Federal Land Use Category E), the Federal L_{10} standard is 75 dBA for both daytime and nighttime. For commercial, industrial and undeveloped areas (Federal Land Use Categories F & G), there are no defined L_{10} criteria for both daytime and nighttime. Locations where noise levels are "approaching" (defined as being within one decibel of the criterion threshold, e.g., 69 dBA for Categories B or C and 74 dBA for Category E) or exceeding the criterion level must be evaluated for noise abatement reasonableness. Federal Noise Abatement Criteria (NAC) are shown in **Table 3.**

Table 3: FHWA Noise Abatement Criteria – Hourly A-Weighted Sound Levels[1]

Activity Category	Activity[1, 2] Leq (h)	Criteria[1, 2] L_{10} (h)	Evaluation Location	Description of Activity Category
A	57 dB(A)	60 dBA	Exterior	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B[3]	67 dB(A)	70 dBA	Exterior	Residential.
C[3]	67 dB(A)	70 dBA	Exterior	Active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails, and trail crossings.
D	52 dB(A)	55 dBA	Interior	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios.
E[4]	72 dB(A)	75 dBA	Interior	Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A-D or F.
F	N/A	N/A	Exterior	Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing.
G	N/A	N/A	N/A	Undeveloped lands that are not permitted.

[1] Either Leq(h) or L10(h) (but not both) may be used on a project.
[2] The Leq(h) and L10(h) Activity Criteria values are for impact determination only, and are not design standards for noise abatement measures.
[3] Includes undeveloped lands permitted for this activity category.

For this project, FHWA Noise Standards have been applied, as defined in Title 23 of the United States Code of Federal Regulations Part 772 (23 CFR 772). 23 CFR 772 applies to any "Type I" project, which is defined as any proposed Federal or Federal-aid highway project that is on new location, involves significant changes to either the horizontal or vertical alignment, increases the number of through-traffic lanes (including high occupancy vehicle and high occupancy transit facilities and ramp/interchange lanes), or changes the configuration of an existing weigh station, ride share lot, or toll plaza. The proposed improvements to the TH 169/TH 41 intersection include construction of a diverging diamond interchange. This interchange will require exit and entrance ramps for movements to and from TH 169 and TH 41. Per federal standard 23 CFR 772, this triggers a Type I noise analysis because of

the substantial change in the intersection geometrics. 23 CFR 772 applies to all federally-funded roadway projects that meet the definition of Type I, regardless of their functional classification.

The requirements for FHWA Type I projects, as stated in 23 CFR 772, include the following: (1) identification of traffic noise impacts (23 CFR 772.11); (2) examination of potential mitigation measures (23 CFR 772.13); (3) the incorporation of reasonable and feasible noise mitigation measures into the highway project (23 CFR 772.13); and (4) coordination with local officials to provide helpful information on compatible land use planning and control (23 CFR 772.17). The FHWA defines a traffic noise impact as follows: Design year build condition noise levels that approach or exceed the NAC listed in **Table 3** for the future build condition; or design year build condition noise levels that create a substantial noise increase over existing noise levels. The Minnesota Department of Transportation (MnDOT) considers an increase of 5 dBA or greater in the L_{10} noise level a substantial noise level increase. In predicting noise levels and assessing noise impacts, traffic characteristics are used which yield the worst hourly traffic noise impact on a regular basis in the design year.

All of the adjacent land within the project area falls under Federal Land Use Categories B, E, F, or G and State Land Use categories NAC-1, NAC-2, or NAC-3. There is a mix of land uses in the project area, with commercial (Category F, NAC-2), industrial (Category F, NAC-3), and undeveloped land (Category G) comprising most of the adjacent land. There are also single family homes located north and south of TH 41/CSAH 78 along TH 169 as well as two manufactured home communities near TH 169 (Category B, NAC-1). State Noise Standards are shown in **Table 2** and the Federal Noise Abatement Criteria (NAC) are shown in **Table 3.**

Monitoring

Noise level monitoring is commonly performed during a noise study to document existing noise levels. Existing noise levels can be used as a "baseline" against which future scenarios are compared. In addition, when studying future noise levels projected with computer models, monitored noise levels for existing conditions are compared to modeled results for existing conditions to validate the computer modeling techniques and results.

Noise monitoring was conducted at seven locations in November of 2015 near the TH 169 corridor to calibrate the noise model. Two additional monitoring locations were added in August of 2016 due to the southward expansion of the project limits. Monitoring methods used in this study comply with state and federal guidelines. A trained noise monitoring technician was present at each session for the entire monitoring session to ensure correct operation of the instrumentation. These recordings occurred over two consecutive 30-minute monitoring periods for each monitoring site. The computer noise model was validated using the monitored noise levels and existing traffic volumes using the same roadway information to ensure accuracy of the noise model. The noise monitoring locations are shown on **Figures 1 and 2.**

Noise monitoring results are presented in **Table 4**. Monitoring results are presented along with the results of computer modeling for each of the monitoring site's traffic conditions. The monitored noise

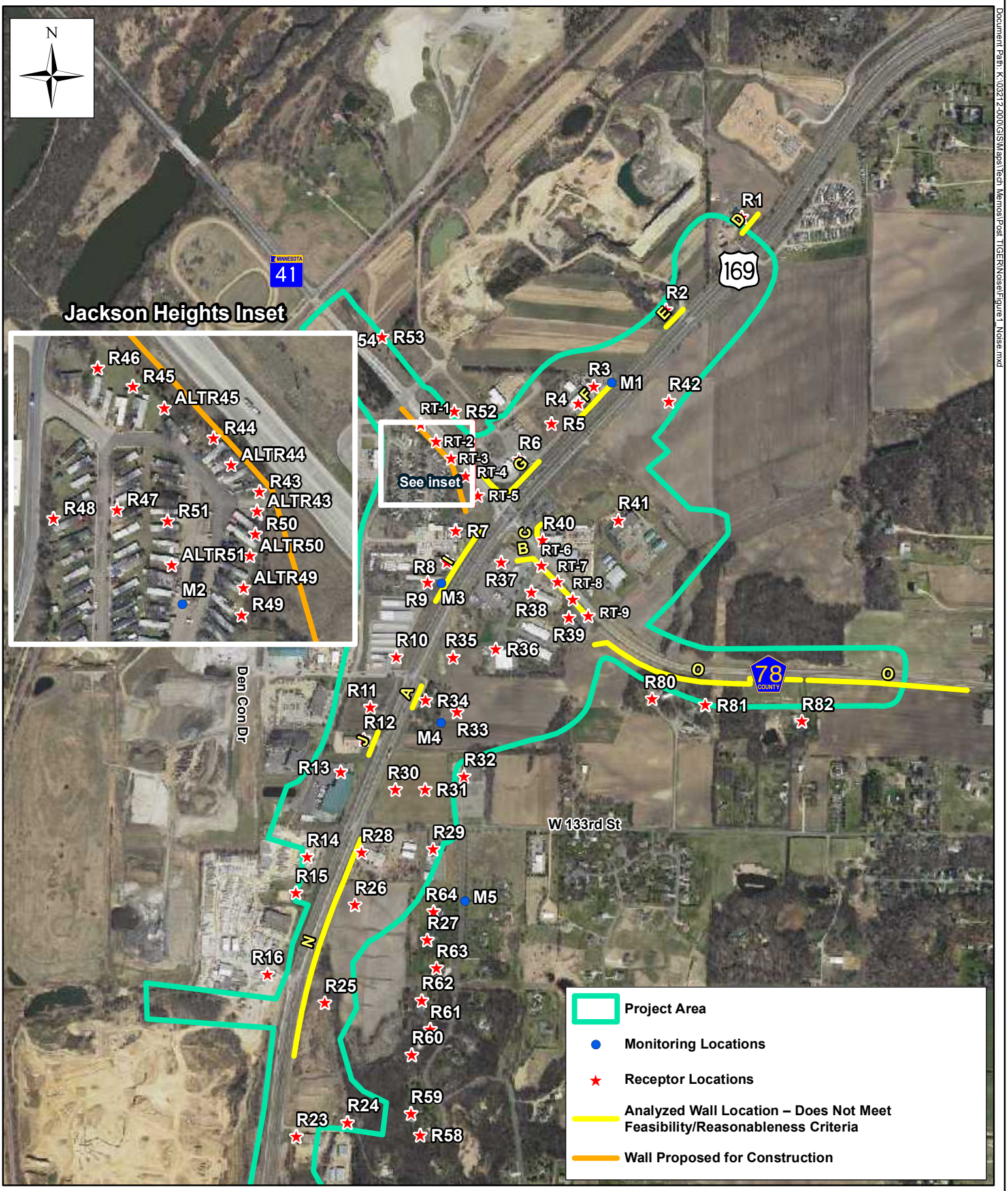


Figure 1: Noise Monitoring Sites, Receptors, and Analyzed Noise Wall Locations (North Project Area)

US 169/TH 41/CSAH 78/CSAH 14 Intersection Improvements
SP 070-596-013/7005-121/7009-84/7010-109
Scott County, MN
April 2017

0 1,100 Feet

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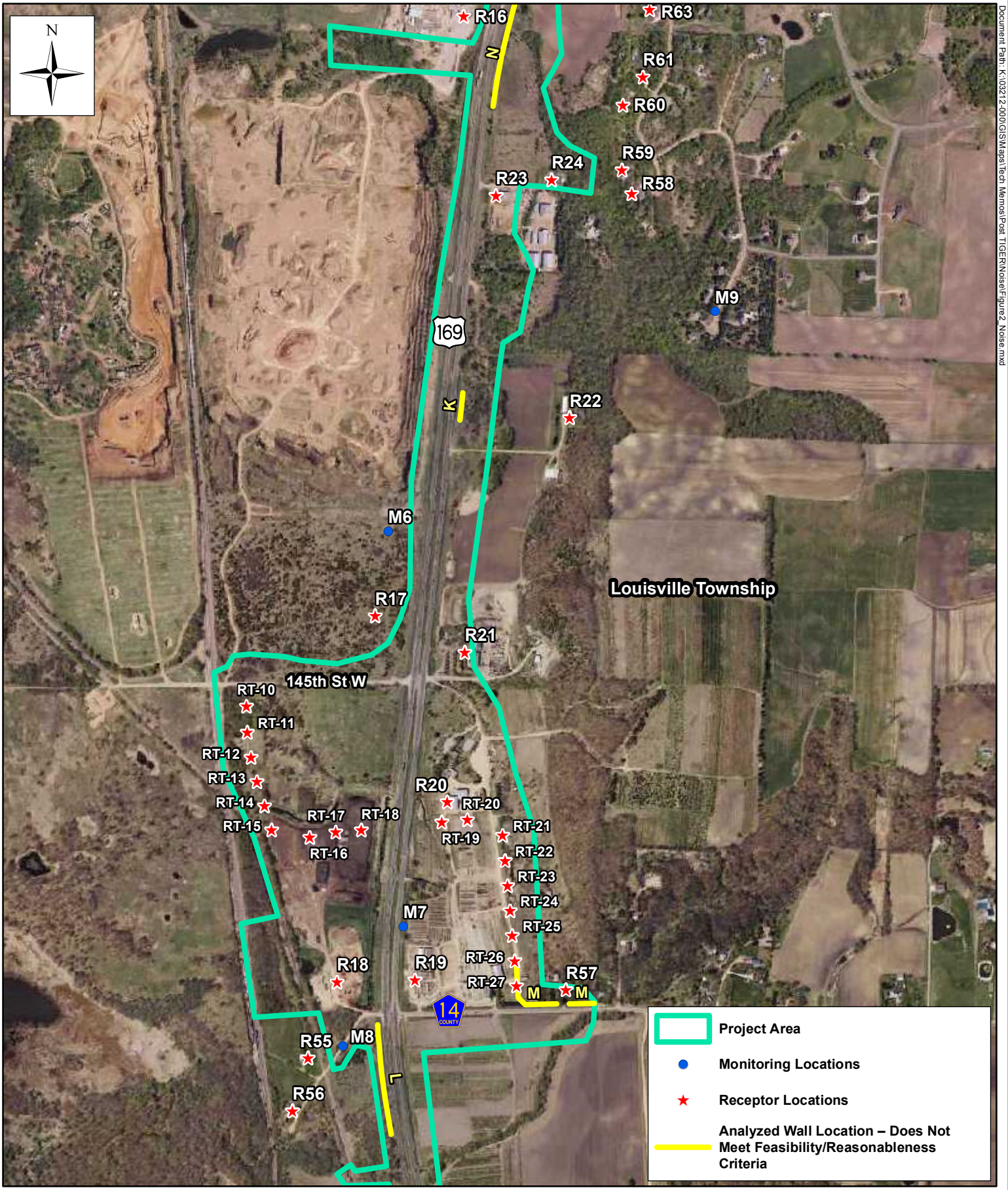

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Figure 2: Noise Monitoring Sites, Receptors, and Analyzed Noise Wall Locations (South Project Area)

US 169/TH 41/CSAH 78/CSAH 14 Intersection Improvements
SP 070-596-013/7005-121/7009-84/7010-109
Scott County, MN
April 2017

0 1,000 Feet

levels are within three decibels of the modeled noise levels, supporting the validity of the model in predicting future noise levels.

Table 4: Existing Noise Levels and Model Calibration

Location	Date	Time[1]	L_{10} (dBA) Monitored[2]	L_{10} (dBA) Modeled	Difference
M1	12/10/2015	8:21/8:52 AM	76.9	75.6	-1.3
M2	12/11/2015	7:07/7:38 AM	56.0	57.8	1.8
M3	12/10/2015	10:49/11:24 AM	74.3	74.7	0.5
M4	12/10/2018	12:10/12:42 PM	60.7	62.4	1.7
M5	12/10/2015	1:28/1:59 PM	52.9	55.2	2.4
M6	12/11/2015	8:28/8:59 AM	60.2	62.4	2.3
M7	12/10/2015	2:48/3:19 PM	74.8	76.8	2.0
M8	8/16/2016	8:30/9:00 AM	58.1	61	2.9
M9	8/16/2016	11:00/11:30 AM	51.0	50.4	-0.6

[1] Two 30-minute samples taken at each monitoring location. Each value is start time for measurement

[2] Average of two samples taken at each location

Modeling

Traffic noise impacts were assessed by modeling noise levels at receptor sites (i.e., businesses and residences) likely to be most affected by changes in roadway alignment resulting from construction of the proposed project. The limits of the noise model include the receptors within 500 feet of the construction limits on TH 169, TH 41/CSAH 78, and the proposed easterly frontage road. The existing roads used for modeling included TH 169, TH 41, CSAH 78, CSAH 14, Dem Con Drive, 130th Street, 133rd Street, Ventura Road and Emery Way. The proposed easterly frontage road south of TH 41, the proposed westerly frontage roads north and south of TH 41 and the new CSAH 14 overpass were modeled for build conditions. There are no regional airports in the area that would add to noise conditions, but there is a railway running parallel to TH 169 on the west side that varies from over 2,000 feet to approximately 700 feet from designated receptors. No rail noise was modeled for this analysis.

Noise modeling receptors were selected at 33 residential sites, 19 commercial sites, eight industrial sites, 13 undeveloped sites and 27 trail sites in the project area. Noise modeling receptors were selected to represent those receptors that are likely sensitive to potential traffic noise impacts resulting from construction of the proposed project. Receptor locations are shown on **Figures 1 and 2**. All residential receptor sites are classified within the definition of State of Minnesota NAC-1 and Federal Land Use Category B. The motel receptor site is classified within the definition of Minnesota NAC-2 and Federal Land use Category E. The 27 trail sites are classified within the definition of State of Minnesota NAC-2 and Federal Land Use Category C. Unlike other receptors, there was no model created for existing or no-build conditions for the trail receptors because they do not represent an existing facility. The commercial/business sites are classified with the definition of Minnesota NAC-2 and Federal Land Use Category E. The industrial sites are classified with the definition of Minnesota NAC-3 and Federal Land Use Category F. The undeveloped areas are classified with the definition of Federal Land Use

Category G. Noise modeling was completed using the noise prediction program MINNOISEV31, a version of the FHWA STAMINA model adapted by MnDOT. This model uses peak-hour vehicle volume, speed, vehicle class, and the typical characteristics of the roadway being analyzed to estimate traffic noise levels. Vehicle class percentages used for all roadways are based on turning movement count information provided by Scott County. Speed data was collected for TH 169 south of TH 41, TH 41 and Dem Con Drive south of TH 41. Speeds used for US 169 south of TH 41 were used for TH 169 north of TH 41, Speeds for TH 41 were used for CSAH 78 and Speeds for Dem Con Drive were used for 130th Street, 133rd Street, Ventura Court and Emery Way.

Traffic volumes for the proposed Diverging Diamond Interchange (DDI), CSAH 14 overpass and frontage roadways were developed using Scott County projections for 2040 average daily traffic (ADT). The hourly traffic volumes were then derived by using the directional splits and total hourly vehicle percentages of nearby existing roadways of similar cross-section and volume. The percentage breakdown of passenger vehicles, medium trucks, and heavy trucks for the proposed roadways were calculated in the same fashion. Speeds for the proposed roadways were established by matching similar existing roadways based on posted speeds, geometrics and traffic volumes.

Several factors can increase the loudness of traffic noise. Higher speeds, higher percentages of heavy vehicles and higher overall traffic volumes will all increase the amount of traffic noise at a receptor location. WSB selected four different time periods for analysis to determine the worst noise hour during 24 hour period. The AM peak hour of traffic, PM peak hour of traffic, the apparent daytime worst noise hour and apparent nighttime worst noise hour were used for comparison. Traffic volumes, directional splits, medium and heavy commercial vehicle volumes, and speeds were all considered in selecting the apparent worst daytime/nighttime analysis periods. Specifically, WSB chose to analyze the daytime hour with the largest percentage of heavy and medium truck traffic because total vehicle volume was comparable to AM peak hour traffic. For comparison purposes, WSB selected eight receptor locations within the project area representative of all potential receptors.

The loudest hour for the area falls between 8:30 am and 9:30 am. This would logically correlate with higher vehicle speeds following morning peak traffic and also high percentages of heavy truck traffic entering and leaving the aggregate processing plant and other industrial facilities within the project boundaries after businesses open for the day. The receivers on the north end of the project – R1 and R42 – may be modeling lower noise levels than other receivers at the same time of day due to lack of access roads to commercial/industrial sites. The L_{10} and L_{50} noise levels at the eight receptor locations over four time periods are listed in **Table 5** below.

Table 5 – Worst Hourly Traffic Noise Summary

Receptor	Land Use	Modeled Level (dBA) by Time Period							
		6:00-7:00 AM		AM Peak Hour		8:30-9:30 AM		PM Peak Hour	
		L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}
R1	Commercial	68.6	64.4	68.9	65	68.8	64.9	69.3	**65.5**
R6	Commercial	*72.7*	*68.6*	**73**	**69.2**	**73**	**69.2**	**73.4**	**69.7**
R19	Commercial	*71.5*	*66.5*	**72**	**67.1**	**72.6**	**67.7**	**71.9**	**67**
R20	Commercial	64.4	60	64.9	60.6	65.5	61.3	64.9	60.8
R21	Commercial	64.1	59.7	64.5	60.4	65.2	61	64.6	60.6
R22	Residential	*55.5*	*52.5*	55.9	53.1	56.6	53.8	56	53.4
R27	Residential	*56.1*	*53.3*	56.6	53.9	57.2	54.6	56.7	54.2
R34	Residential	*70.7*	*66*	**71.1**	**66.7**	**71.8**	**67.5**	**71.4**	**67.4**
R46	Residential	*69.8*	*65.8*	**70**	**66.4**	**70.4**	**66.3**	**70.2**	**66.5**

Bold Numbers Exceed Daytime MPCA Standards for Designated Land Use
Italicized Numbers Exceed Nighttime MPCA Standards for Designated Land Use
Underlined Numbers Approach or Exceed Federal Noise Abatement Criteria (NAC) for Designated Land Use

Modeling Results

Noise modeling results for residential and commercial receptors for existing (2016) conditions and for the year 2040 are presented in **Tables 6 and 7** Both daytime and nighttime L_{10} and L_{50} are shown for the existing (year 2016) condition and for year 2040 under two project alternatives: No Build and Build.

Table 6 – Daytime Noise Results

Receptor	Land Use	Existing (2016)		2040 No-Build Condition		2040 Build Condition		Difference (Existing to No-Build)		Difference (Existing to Build)	
		L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}
R1	Commercial	68.9	65	69.7	66.1	70.2	66.8	0.8	1.1	1.3	1.8
R2	Residential	74.6	70.8	75.4	71.9	75.9	72.6	0.8	1.1	1.3	1.8
R3	Commercial	73.5	69.8	74.3	70.9	74.7	71.3	0.8	1.1	1.2	1.5
R4	Commercial	74.5	70.8	75.3	71.9	75	71.8	0.8	1.1	0.5	1
R5*	Undeveloped	68.7	64.9	69.5	66.1	69.2	65.8	0.8	1.2	0.5	0.9
R6	Commercial	73.1	69.9	73.9	71.1	73.6	70.8	0.8	1.2	0.5	0.9
R7	Commercial	71.3	68.2	72.7	70	72.3	69.7	1.4	1.8	1	1.5
R8	Commercial	72.7	68.8	74.2	71	73.9	70.7	1.5	2.2	1.2	1.9
R9	Commercial	71.6	67.9	73.2	70.1	73	70	1.6	2.2	1.4	2.1
R10	Industrial	73.1	68.8	74.7	71.2	74.7	71.3	1.6	2.4	1.6	2.5
R11*	Undeveloped	67.9	63.3	69.6	65.7	69.9	66.2	1.7	2.4	2	2.9
R12	Commercial	73.4	68.9	75.1	71.3	75.6	72	1.7	2.4	2.2	3.1
R13	Industrial	71.6	67.7	73.2	70	73.8	70.8	1.6	2.3	2.2	3.1
R14	Industrial	71.7	67.7	73.3	70	73.9	70.8	1.6	2.3	2.2	3.1
R15	Industrial	72.1	68	73.8	70.4	74.4	71.2	1.7	2.4	2.3	3.2

* Undeveloped Land, Federal NAC Not Applicable

Exceeds MPCA Daytime/Nighttime Standards

Total Property Acquisition

Underlined Text Represents Values that Approach or Exceed Federal NAC Standards

Trail Receptors Modeled Under 2040 Build Conditions Only

Receptor	Land Use	Existing (2016)		2040 No-Build Condition		2040 Build Condition		Difference (Existing to No-Build)		Difference (Existing to Build)	
		L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}
R16	Industrial	71.7	67.7	73.4	70	74	70.9	1.7	2.3	2.3	3.2
R17*	Undeveloped	64.3	60.4	66	62.7	66.6	63.6	1.7	2.3	2.3	3.2
R18	Industrial	68.9	65.4	70.6	67.7	69.9	67	1.7	2.3	1	1.6
R19	Commercial	73.6	69	75.3	71.6	72.9	69.4	1.7	2.6	-0.7	0.4
R20	Commercial	65.8	61.6	67.5	64	68.1	64.9	1.7	2.4	2.3	3.3
R21	Commercial	65.5	61.4	67.1	63.7	67.9	64.7	1.6	2.3	2.4	3.3
R22	Residential	57.3	54.6	58.9	56.8	59.3	57.3	1.6	2.2	2	2.7
R23	Industrial	73.4	68.9	75.1	71.3	76.2	72.1	1.7	2.4	2.8	3.2
R24	Commercial	60.8	57.6	62.4	59.9	63.1	60.7	1.6	2.3	2.3	3.1
R25*	Undeveloped	67.2	62.8	68.9	65.2	71.1	64.7	1.7	2.4	3.9	1.9
R26*	Undeveloped	67.4	62.9	69	65.3	69.7	66.2	1.6	2.4	2.3	3.3
R27	Residential	57.5	54.9	59.2	57.1	59.9	57.9	1.7	2.2	2.4	3
R28	Commercial	75	69.9	76.7	72.4	77.3	73.3	1.7	2.5	2.3	3.4
R29	Commercial	60.3	56.8	62	59	64.4	59	1.7	2.2	4.1	2.2
R30*	Undeveloped	69	64.1	70.7	66.5	71.3	67.4	1.7	2.4	2.3	3.3
R31*	Undeveloped	63.3	59.7	64.9	62	73.7	61	1.6	2.3	10.4	1.3
R32	Commercial	59.7	56.9	61.3	59	62.5	60	1.6	2.1	2.8	3.1
R33*	Undeveloped	63.3	59.8	64.9	62	66	62.7	1.6	2.2	2.7	2.9
R34	Residential	74.3	69.6	76	72	76.3	72.4	1.7	2.4	2	2.8
R35*	Undeveloped	68.5	63.9	70.2	66.3	70.1	66.2	1.7	2.4	1.6	2.3

* Undeveloped Land, Federal NAC Not Applicable

Exceeds MPCA Daytime/Nighttime Standards

Total Property Acquisition

Underlined Text Represents Values that Approach or Exceed Federal NAC Standards

Trail Receptors Modeled Under 2040 Build Conditions Only

Receptor	Land Use	Existing (2016)		2040 No-Build Condition		2040 Build Condition		Difference (Existing to No-Build)		Difference (Existing to Build)	
		L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}
R36	Industrial	62.5	59.4	64.1	61.5	64	61.6	1.6	2.1	1.5	2.2
R37	Commercial	74.9	70.5	76.4	72.7	76.8	72.6	1.5	2.2	1.9	2.1
R38	Commercial	69.5	66.5	70.9	68.4	71	68.6	1.4	1.9	1.5	2.1
R39	Commercial	67.3	64.2	68.9	66.1	69.9	67	1.6	1.9	2.6	2.8
R40	Commercial	73.6	68.9	75.1	70.8	74.9	71.1	1.5	1.9	1.3	2.2
R41	Commercial	61.2	58.7	62.2	60	62	60	1	1.3	0.8	1.3
R42*	Undeveloped	66.8	63.3	67.5	64.4	67.8	64.8	0.7	1.1	1	1.5
R43	Residential	73.7	68.9	74.3	70	74.4	69.9	0.6	1.1	0.7	1
R43A	Residential	72.4	68.4	73.1	69.6	73.2	69.5	0.7	1.2	0.8	1.1
R44	Residential	73.5	68.5	74.1	69.5	74.2	69.3	0.6	1	0.7	0.8
R44A	Residential	73.2	68.4	73.8	69.4	73.9	69.3	0.6	1	0.7	0.9
R45	Residential	71.2	67.2	72	68.4	71.9	68.2	0.8	1.2	0.7	1
R45A	Residential	71.9	67.7	72.6	68.8	72.6	68.5	0.7	1.1	0.7	0.8
R46	Residential	70.5	66.8	71.6	68.2	71.5	67.9	1.1	1.4	1	1.1
R47	Residential	66.3	63.7	67.7	65.4	67.7	65.3	1.4	1.7	1.4	1.6
R48	Residential	68.2	60.9	70.5	63.5	71.9	65.4	2.3	2.6	3.7	4.5
R49	Residential	69.5	67.1	70.6	68.5	70.4	68.3	1.1	1.4	0.9	1.2
R49A	Residential	69.8	67.3	70.7	68.6	70.6	68.4	0.9	1.3	0.8	1.1
R50	Residential	71.4	68	72.1	69.2	72.1	69.1	0.7	1.2	0.7	1.1
R50A	Residential	70.5	67.6	71.3	68.8	71.3	68.7	0.8	1.2	0.8	1.1

* Undeveloped Land, Federal NAC Not Applicable

Exceeds MPCA Daytime/Nighttime Standards

Total Property Acquisition

Underlined Text Represents Values that Approach or Exceed Federal NAC Standards

Trail Receptors Modeled Under 2040 Build Conditions Only

Receptor	Land Use	Existing (2016)		2040 No-Build Condition		2040 Build Condition		Difference (Existing to No-Build)		Difference (Existing to Build)	
		L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}
R51	Residential	66.8	64.3	67.8	65.7	67.7	65.6	1	1.4	0.9	1.3
R51A	Residential	66.4	64.1	67.5	65.6	67.4	65.5	1.1	1.5	1	1.4
R52*	Undeveloped	64.9	61.1	65.5	62	65.9	62.3	0.6	0.9	1	1.2
R53*	Undeveloped	65.3	60.5	65.8	61.2	65.8	61.2	0.5	0.7	0.5	0.7
R54*	Undeveloped	67.4	62	67.9	62.7	68.1	62.8	0.5	0.7	0.7	0.8
R55	Residential	58.2	54.7	59.8	57	59.5	56.7	1.6	2.3	1.3	2
R56	Residential	55.8	52.3	57.5	54.7	57.5	54.7	1.7	2.4	1.7	2.4
R57	Residential	57.7	50.1	61.8	55.1	61.4	54.7	4.1	5	3.7	4.6
R58	Residential	53.2	50.9	54.9	53	55.5	53.7	1.7	2.1	2.3	2.8
R59	Residential	53.9	51.5	55.6	53.6	56.2	54.4	1.7	2.1	2.3	2.9
R60	Residential	55.9	53.5	57.6	55.6	58.2	56.4	1.7	2.1	2.3	2.9
R61	Residential	55.2	52.9	56.9	55	57.5	55.7	1.7	2.1	2.3	2.8
R62	Residential	56.6	54.2	58.3	56.3	58.9	57.1	1.7	2.1	2.3	2.9
R63	Residential	56.4	53.9	58	56	58.7	56.9	1.6	2.1	2.3	3
R64	Residential	57.8	55.2	59.5	57.3	60.4	58.2	1.7	2.1	2.6	3
R80	Residential	57.7	53.3	59.6	55.8	61	56.9	1.9	2.5	3.3	3.6
R81	Residential	58	52.7	60	55.5	61.6	56.8	2	2.8	3.6	4.1
R82	Residential	55.7	50.7	57.6	53.4	58.3	54.3	1.9	2.7	2.6	3.6
RTRAIL1	Trail	N/A	N/A	N/A	N/A	77.1	69.6	N/A	N/A	N/A	N/A
RTRAIL2	Trail	N/A	N/A	N/A	N/A	77.1	69.6	N/A	N/A	N/A	N/A

* Undeveloped Land, Federal NAC Not Applicable

Exceeds MPCA Daytime/Nighttime Standards

Total Property Acquisition

Underlined Text Represents Values that Approach or Exceed Federal NAC Standards

Trail Receptors Modeled Under 2040 Build Conditions Only

Receptor	Land Use	Existing (2016)		2040 No-Build Condition		2040 Build Condition		Difference (Existing to No-Build)		Difference (Existing to Build)	
		L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}
RTRAIL3	Trail	N/A	N/A	N/A	N/A	77.2	69.6	N/A	N/A	N/A	N/A
RTRAIL4	Trail	N/A	N/A	N/A	N/A	77.6	69.7	N/A	N/A	N/A	N/A
RTRAIL5	Trail	N/A	N/A	N/A	N/A	74.9	68.8	N/A	N/A	N/A	N/A
RTRAIL6	Trail	N/A	N/A	N/A	N/A	73.9	66.3	N/A	N/A	N/A	N/A
RTRAIL7	Trail	N/A	N/A	N/A	N/A	73.9	66	N/A	N/A	N/A	N/A
RTRAIL8	Trail	N/A	N/A	N/A	N/A	73	65.6	N/A	N/A	N/A	N/A
RTRAIL9	Trail	N/A	N/A	N/A	N/A	72.9	65.5	N/A	N/A	N/A	N/A
RTRAIL10	Trail	N/A	N/A	N/A	N/A	59.4	53	N/A	N/A	N/A	N/A
RTRAIL11	Trail	N/A	N/A	N/A	N/A	60.1	52.5	N/A	N/A	N/A	N/A
RTRAIL12	Trail	N/A	N/A	N/A	N/A	60.5	52.7	N/A	N/A	N/A	N/A
RTRAIL13	Trail	N/A	N/A	N/A	N/A	60.9	53	N/A	N/A	N/A	N/A
RTRAIL14	Trail	N/A	N/A	N/A	N/A	61.5	53.1	N/A	N/A	N/A	N/A
RTRAIL15	Trail	N/A	N/A	N/A	N/A	62.1	52.4	N/A	N/A	N/A	N/A
RTRAIL16	Trail	N/A	N/A	N/A	N/A	61.9	59.4	N/A	N/A	N/A	N/A
RTRAIL17	Trail	N/A	N/A	N/A	N/A	64.3	61.7	N/A	N/A	N/A	N/A
RTRAIL18	Trail	N/A	N/A	N/A	N/A	68.1	64.8	N/A	N/A	N/A	N/A
RTRAIL19	Trail	N/A	N/A	N/A	N/A	68.7	65.4	N/A	N/A	N/A	N/A
RTRAIL20	Trail	N/A	N/A	N/A	N/A	65	62.2	N/A	N/A	N/A	N/A
RTRAIL21	Trail	N/A	N/A	N/A	N/A	64.1	56.4	N/A	N/A	N/A	N/A
RTRAIL22	Trail	N/A	N/A	N/A	N/A	64	55.4	N/A	N/A	N/A	N/A
RTRAIL23	Trail	N/A	N/A	N/A	N/A	63.9	54.8	N/A	N/A	N/A	N/A

* Undeveloped Land, Federal NAC Not Applicable

Exceeds MPCA Daytime/Nighttime Standards

Total Property Acquisition

Underlined Text Represents Values that Approach or Exceed Federal NAC Standards

Trail Receptors Modeled Under 2040 Build Conditions Only

Receptor	Land Use	Existing (2016)		2040 No-Build Condition		2040 Build Condition		Difference (Existing to No-Build)		Difference (Existing to Build)	
		L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}
RTRAIL24	Trail	N/A	N/A	N/A	N/A	64	54.3	N/A	N/A	N/A	N/A
RTRAIL25	Trail	N/A	N/A	N/A	N/A	63.6	53.4	N/A	N/A	N/A	N/A
RTRAIL26	Trail	N/A	N/A	N/A	N/A	63.4	52.9	N/A	N/A	N/A	N/A
RTRAIL27	Trail	N/A	N/A	N/A	N/A	63.4	53	N/A	N/A	N/A	N/A

Table 7 – Nighttime Noise Results

Receptor	Land Use	Existing (2016)		2040 No-Build Condition		2040 Build Condition		Difference (Existing to No-Build)		Difference (Existing to Build)	
		L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}
R1	Commercial	68.6	64.4	69.4	65.6	69.9	66.3	0.8	1.2	1.3	1.9
R2	Residential	74.3	70.2	75.1	71.4	75.6	72	0.8	1.2	1.3	1.8
R3	Commercial	73.1	69.2	73.9	70.3	73.8	70.2	0.8	1.1	0.7	1
R4	Commercial	74.1	70.2	75	71.3	74	70.5	0.9	1.1	-0.1	0.3
R5*	Undeveloped	68.4	64.3	69.2	65.5	68	64.3	0.8	1.2	-0.4	0
R6	Commercial	72.7	69.3	73.5	70.5	72.4	69.4	0.8	1.2	-0.3	0.1
R7	Commercial	70.3	67.1	71.7	68.9	71	68.2	1.4	1.8	0.7	1.1
R8	Commercial	71.5	67.4	73.1	69.5	72.6	69	1.6	2.1	1.1	1.6

* Undeveloped Land, Federal NAC Not Applicable

Exceeds MPCA Daytime/Nighttime Standards

Total Property Acquisition

Underlined Text Represents Values that Approach or Exceed Federal NAC Standards

Trail Receptors Modeled Under 2040 Build Conditions Only

Receptor	Land Use	Existing (2016)		2040 No-Build Condition		2040 Build Condition		Difference (Existing to No-Build)		Difference (Existing to Build)	
		L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}
R9	Residential	70.5	66.5	72	68.7	71.7	68.4	1.5	2.2	1.2	1.9
R10	Industrial	71.9	67.2	73.5	69.6	73.3	69.5	1.6	2.4	1.4	2.3
R11*	Undeveloped	66.6	61.5	68.4	64	68.7	64.5	1.8	2.5	2.1	3
R12	Commercial	72.2	67.2	73.9	69.7	74.4	70.4	1.7	2.5	2.2	3.2
R13	Industrial	70.4	66.1	72	68.4	72.6	69.2	1.6	2.3	2.2	3.1
R14	Industrial	70.4	66	72.1	68.4	72.7	69.3	1.7	2.4	2.3	3.3
R15	Industrial	70.9	66.3	72.6	68.7	73.2	69.6	1.7	2.4	2.3	3.3
R16	Industrial	70.5	66	72.2	68.4	72.8	69.3	1.7	2.4	2.3	3.3
R17*	Undeveloped	63.1	58.8	64.7	61.1	65.3	62	1.6	2.3	2.2	3.2
R18	Industrial	67.7	63.8	69.4	66.2	68.8	65.6	1.7	2.4	1.1	1.8
R19	Commercial	72.1	67.4	73.9	70	71.7	68	1.8	2.6	-0.4	0.6
R20	Commercial	64.4	60	66.1	62.4	66.7	63.3	1.7	2.4	2.3	3.3
R21	Commercial	64.1	59.8	65.8	62.2	66.5	63.1	1.7	2.4	2.4	3.3
R22	Residential	56	53.1	57.6	55.3	57.9	55.8	1.6	2.2	1.9	2.7
R23	Industrial	72	67.3	73.7	69.8	74.8	70.5	1.7	2.5	2.8	3.2
R24	Commercial	59.5	56.1	61.1	58.3	61.8	59.2	1.6	2.2	2.3	3.1
R25*	Undeveloped	65.8	61.2	67.5	63.6	69.7	62.8	1.7	2.4	3.9	1.6
R26*	Undeveloped	65.9	61.3	67.6	63.7	68.3	64.7	1.7	2.4	2.4	3.4
R27	Residential	56.2	53.4	57.8	55.6	58.6	56.4	1.6	2.2	2.4	3
R28	Commercial	73.5	68.4	75.3	70.9	75.9	71.8	1.8	2.5	2.4	3.4

* Undeveloped Land, Federal NAC Not Applicable

Exceeds MPCA Daytime/Nighttime Standards

Total Property Acquisition

Underlined Text Represents Values that Approach or Exceed Federal NAC Standards

Trail Receptors Modeled Under 2040 Build Conditions Only

Receptor	Land Use	Existing (2016)		2040 No-Build Condition		2040 Build Condition		Difference (Existing to No-Build)		Difference (Existing to Build)	
		L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}
R29	Commercial	58.6	55.4	60.3	57.5	62.9	57.2	1.7	2.1	4.3	1.8
R30*	Undeveloped	67.5	62.4	69.2	64.9	69.9	65.9	1.7	2.5	2.4	3.5
R31*	Undeveloped	61.9	58.1	63.5	60.4	72	59.2	1.6	2.3	10.1	1.1
R32	Commercial	58.4	55.4	60	57.5	61.1	58.4	1.6	2.1	2.7	3
R33*	Undeveloped	61.9	58.3	63.6	60.5	64.5	61	1.7	2.2	2.6	2.7
R34	Residential	72.9	68.1	74.6	70.5	74.8	70.8	1.7	2.4	1.9	2.7
R35*	Undeveloped	67.1	62.3	68.8	64.7	68.5	64.5	1.7	2.4	1.4	2.2
R36	Industrial	61.3	58	62.8	60.1	62.6	59.9	1.5	2.1	1.3	1.9
R37	Commercial	73.6	69.2	75.2	71.3	75.1	70.9	1.6	2.1	1.5	1.7
R38	Commercial	68.8	65.4	70	67.2	69.8	67	1.2	1.8	1	1.6
R39	Commercial	66.2	63.2	67.7	65	68.3	65.5	1.5	1.8	2.1	2.3
R40	Commercial	72.7	68	74.2	69.8	73.6	69.3	1.5	1.8	0.9	1.3
R41	Commercial	60.9	58.1	61.8	59.4	60.8	58.7	0.9	1.3	-0.1	0.6
R42*	Undeveloped	66.5	62.8	67.3	64	67.5	64.2	0.8	1.2	1	1.4
R43	Residential	73.1	68.3	73.8	69.3	73.8	69	0.7	1	0.7	0.7
R43A	Residential	71.9	67.8	72.5	68.9	72.5	68.5	0.6	1.1	0.6	0.7
R44	Residential	73	67.9	73.6	68.9	73.6	68.6	0.6	1	0.6	0.7
R44A	Residential	72.7	67.9	73.3	68.8	73.2	68.5	0.6	0.9	0.5	0.6
R45	Residential	70.7	66.6	71.4	67.7	71.3	67.3	0.7	1.1	0.6	0.7
R45A	Residential	71.4	67.1	72.1	68.1	72	67.7	0.7	1	0.6	0.6

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Exceeds MPCA Daytime/Nighttime Standards

Total Property Acquisition

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Trail Receptors Modeled Under 2040 Build Conditions Only

Receptor	Land Use	Existing (2016)		2040 No-Build Condition		2040 Build Condition		Difference (Existing to No-Build)		Difference (Existing to Build)	
		L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}
R46	Residential	69.9	66.1	70.9	67.3	70.7	67	1	1.2	0.8	0.9
R47	Residential	65.5	62.9	66.8	64.4	66.6	64.1	1.3	1.5	1.1	1.2
R48	Residential	67	59.8	69.1	61.8	70.4	63.3	2.1	2	3.4	3.5
R49	Residential	68.8	66.3	69.8	67.6	69.4	67.1	1	1.3	0.6	0.8
R49A	Residential	69.1	66.5	70	67.7	69.7	67.3	0.9	1.2	0.6	0.8
R50	Residential	70.8	67.3	71.5	68.4	71.4	68.1	0.7	1.1	0.6	0.8
R50A	Residential	69.9	66.9	70.7	68.1	70.5	67.7	0.8	1.2	0.6	0.8
R51	Residential	65.5	63.6	67.1	64.8	66.3	64.5	0.9	1.2	0.8	0.9
R51A	Residential	65.7	63.3	66.7	64.7	66.1	64.3	1	1.4	0.4	1
R52*	Undeveloped	64.5	60.5	65	61.4	65.2	61.5	0.5	0.9	0.7	1
R53*	Undeveloped	64.8	60	65.3	60.7	65.3	60.6	0.5	0.7	0.5	0.6
R54*	Undeveloped	66.9	61.5	67.4	62.2	67.6	62.3	0.5	0.7	0.7	0.8
R55	Residential	56.9	53.1	58.6	55.4	58.7	55.7	1.7	2.3	1.8	2.6
R56	Residential	54.6	50.7	56.2	53.1	56.7	53.7	1.6	2.4	2.1	3
R57	Residential	56.3	48.3	60.2	53.3	60	53.1	3.9	5	3.7	4.8
R58	Residential	51.9	49.4	53.6	51.5	54.2	52.3	1.7	2.1	2.3	2.9
R59	Residential	52.6	50	54.2	52.1	54.8	52.9	1.6	2.1	2.2	2.9
R60	Residential	54.6	52	56.3	54.1	56.9	54.9	1.7	2.1	2.3	2.9
R61	Residential	53.9	51.4	55.5	53.5	56.2	54.3	1.6	2.1	2.3	2.9
R62	Residential	55.3	52.7	57	54.8	57.6	55.6	1.7	2.1	2.3	2.9

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Trail Receptors Modeled Under 2040 Build Conditions Only

Receptor	Land Use	Existing (2016)		2040 No-Build Condition		2040 Build Condition		Difference (Existing to No-Build)		Difference (Existing to Build)	
		L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}
R63	Residential	55	52.5	56.7	54.6	57.3	55.4	1.7	2.1	2.3	2.9
R64	Residential	56.5	53.7	58.1	55.8	59.1	56.7	1.6	2.1	2.6	3
R80	Residential	56.3	52	58.2	54.4	59.4	55.2	1.9	2.4	3.1	3.2
R81	Residential	56.6	51.4	58.6	54	60	55.1	2	2.6	3.4	3.7
R82	Residential	54.3	49.4	56.2	51.9	56.8	52.6	1.9	2.5	2.5	3.2
RTRAIL1	Trail	N/A	N/A	N/A	N/A	76.6	69	N/A	N/A	N/A	N/A
RTRAIL2	Trail	N/A	N/A	N/A	N/A	76.6	69	N/A	N/A	N/A	N/A
RTRAIL3	Trail	N/A	N/A	N/A	N/A	76.7	69.1	N/A	N/A	N/A	N/A
RTRAIL4	Trail	N/A	N/A	N/A	N/A	77.1	69.1	N/A	N/A	N/A	N/A
RTRAIL5	Trail	N/A	N/A	N/A	N/A	74.3	68	N/A	N/A	N/A	N/A
RTRAIL6	Trail	N/A	N/A	N/A	N/A	71.9	64.5	N/A	N/A	N/A	N/A
RTRAIL7	Trail	N/A	N/A	N/A	N/A	71.9	64.1	N/A	N/A	N/A	N/A
RTRAIL8	Trail	N/A	N/A	N/A	N/A	71.1	63.7	N/A	N/A	N/A	N/A
RTRAIL9	Trail	N/A	N/A	N/A	N/A	71	63.6	N/A	N/A	N/A	N/A
RTRAIL10	Trail	N/A	N/A	N/A	N/A	58.1	51	N/A	N/A	N/A	N/A
RTRAIL11	Trail	N/A	N/A	N/A	N/A	58.9	50.5	N/A	N/A	N/A	N/A
RTRAIL12	Trail	N/A	N/A	N/A	N/A	59.2	50.8	N/A	N/A	N/A	N/A
RTRAIL13	Trail	N/A	N/A	N/A	N/A	59.6	51.1	N/A	N/A	N/A	N/A
RTRAIL14	Trail	N/A	N/A	N/A	N/A	60.2	51.2	N/A	N/A	N/A	N/A
RTRAIL15	Trail	N/A	N/A	N/A	N/A	60.9	50.6	N/A	N/A	N/A	N/A

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Trail Receptors Modeled Under 2040 Build Conditions Only

Receptor	Land Use	Existing (2016)		2040 No-Build Condition		2040 Build Condition		Difference (Existing to No-Build)		Difference (Existing to Build)	
		L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}
RTRAIL16	Trail	N/A	N/A	N/A	N/A	60.7	58	N/A	N/A	N/A	N/A
RTRAIL17	Trail	N/A	N/A	N/A	N/A	63.1	60.1	N/A	N/A	N/A	N/A
RTRAIL18	Trail	N/A	N/A	N/A	N/A	66.9	63.2	N/A	N/A	N/A	N/A
RTRAIL19	Trail	N/A	N/A	N/A	N/A	67.3	63.8	N/A	N/A	N/A	N/A
RTRAIL20	Trail	N/A	N/A	N/A	N/A	63.7	60.6	N/A	N/A	N/A	N/A
RTRAIL21	Trail	N/A	N/A	N/A	N/A	62.7	54.7	N/A	N/A	N/A	N/A
RTRAIL22	Trail	N/A	N/A	N/A	N/A	62.6	53.7	N/A	N/A	N/A	N/A
RTRAIL23	Trail	N/A	N/A	N/A	N/A	62.5	53.1	N/A	N/A	N/A	N/A
RTRAIL24	Trail	N/A	N/A	N/A	N/A	62.6	52.7	N/A	N/A	N/A	N/A
RTRAIL25	Trail	N/A	N/A	N/A	N/A	62.2	51.8	N/A	N/A	N/A	N/A
RTRAIL26	Trail	N/A	N/A	N/A	N/A	62	51.3	N/A	N/A	N/A	N/A
RTRAIL27	Trail	N/A	N/A	N/A	N/A	62	51.5	N/A	N/A	N/A	N/A

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Exceeds MPCA Daytime/Nighttime Standards

Total Property Acquisition

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Trail Receptors Modeled Under 2040 Build Conditions Only

One receptor is anticipated to be a total acquisition with the proposed interchange: R37. Therefore, this receptor has not been included in the following discussion.

State Standards

None of the receptors classified in industrial or undeveloped areas exceed either the state L_{10} or the L_{50} nighttime standards. State L_{10} nighttime standards are exceeded at 36 of the 52 remaining commercial and residential receptors for existing conditions. State L_{50} nighttime standards are exceeded at 38 of the 52 remaining commercial and residential receptors for existing conditions. State L_{10} nighttime standards are exceeded at 40 of the remaining 52 receptors for both 2040 No Build and 2040 Build conditions, while state L_{50} nighttime standards are exceeded at 44 of the remaining 52 receptors for 2040 No Build and 45 out of 52 receptors for the 2040 Build conditions. All residential receptors experience nighttime noise levels that exceed state L_{50} standards, and all but two (R58 and R59) experience noise levels that exceed L_{10} standards under the 2040 No-Build and 2040 Build Conditions.

None of the receptors classified in industrial or undeveloped areas exceed either the state L_{10} or the L_{50} daytime standards. State L_{10} daytime standards are exceeded at 27 of the 52 remaining commercial and residential receptors under existing conditions. State L_{50} daytime standards for existing conditions are exceeded at 28 of the remaining 52 commercial and residential receptors. Under 2040 No Build conditions, state L_{10} standards are exceeded at 28 of 52 remaining residential and commercial receptors and state L_{50} conditions are exceeded at 30 of 52 remaining residential and commercial receptors. Likewise for 2040 Build conditions, L_{10} and L_{50} standards are exceeded at 30 of 52 commercial and residential receptors.

Nine of the 27 receptors assigned to the proposed trails exceed both the state daytime L_{10} and L_{50} standards for the 2040 Build conditions. One additional trail receptor exceeded only the state daytime L_{50} standard. For nighttime noise levels, L_{10} state standards are exceeded for the same nine trail receptors in 2040 build condition, and the L_{50} standards are exceeded at five locations under the 2040 Build Condition. There were no models created for the proposed trails under existing or no-build conditions.

Daytime noise levels for 2040 No Build conditions are predicted to be 0.5 to 4.1 decibels higher than existing L_{10} levels and 0.7 to 5 decibels higher than existing L_{50} levels. Nighttime noise levels for 2040 No Build conditions are predicted to be 0.5 to 3.9 decibels higher than existing L_{10} levels and 0.7 to 5 decibels higher than existing L_{50} levels. Increases in No Build noise levels are due to increases in future traffic volumes.

Daytime noise levels for the 2040 Build condition are predicted to be 0.5 to 4.1 decibels higher than existing L_{10} levels and 0.7 to 4.6 decibels higher than existing L_{50} levels. Nighttime noise levels for the 2040 Build condition are predicted to be 0.4 decibels less than to 4.3 decibels higher than existing L_{10} levels and 0 to 4.8 decibels higher than existing L_{50} levels. The greatest decreases in noise will occur at Receptors R3–R6 with the Build condition due to the profile change of TH 169. The greatest increases in

noise will occur at the receptors on the south side of the TH 169/TH 41 intersection due to the addition of entrance/exit ramps.

Federal NAC

Federal noise criteria would be approached or exceeded at 29 of the 100 receptors for the 2040 Build condition. A MnDOT-defined noise impact (an increase of 5 or more decibels over existing levels) does not occur at any receptor under the 2040 Build condition.

Receptors R5, R11, R17, R25, R26, R30, R31, R33, R35, R42 and R52–R54 are vacant land. These receptor locations represent points for future development. Scott County will be informed of noise impacts for these sites for planning purposes.

As part of the noise mitigation analysis, noise barriers were considered at Receptors R1–R4, R6–R9, R12, R22, R27, R28, R34, R38–R40, R43–R51, R43A–R45A, R49A–R51A, R55–R64 and R80-R82. The receptor and proposed barrier locations can be found in **Figures 1 and 2**.

Noise Mitigation Analysis

Because the federal criterion and/or state standards would be exceeded at many of the modeled residential and commercial receptor sites, mitigation measures were studied. This analysis included the evaluation of the reasonableness and feasibility of noise mitigation. 23 CFR 772 does not require that the noise abatement criteria be met in every instance of a traffic noise impact. Rather, it requires that every reasonable and feasible effort be made to provide noise mitigation. All receptors that exceed state and/or federal noise standards must be evaluated relative to the MnDOT Noise Barrier Reasonableness and Feasibility Criteria. Noise barriers are a feasible mitigation measure from an engineering standpoint where there are no structural, topographical, safety, drainage or space constraints preventing their construction. Acoustically feasible noise abatement measures must achieve a noise reduction of at least 5 dBA for at least one impacted receptor. MnDOT has established a maximum noise barrier height of 20 feet above the finished ground line at the noise barrier. In addition, MnDOT has established a maximum noise barrier height of 10 feet above the bridge deck when it is necessary for a noise barrier to be attached to an existing bridge structure.

A noise barrier was not considered feasible for receptors RTRAIL1-RTRAIL27 due to the trails' lateral offset of 10-feet from the curb of the proposed roadway geometrics. The barrier would have to be constructed in the boulevard area of the roadway section, which puts it inside of the 13-foot to 14-foot clear zone. Additionally, constructing a barrier at these locations would eliminate snow storage space along the roadways, creating maintenance issues during the winter months.

The analysis considered noise barriers of varying heights (6, 10, 15, and 20 feet) for reasonableness during the daytime worst noise hour. As per MnDOT standard guidelines, the cost effectiveness of the barrier shall not exceed $43,500/dBA per benefitted receptor. A receptor's inclusion in the cost effectiveness calculation shall be contingent on the receptor receiving a minimum of 5 dBA reduction due to the construction of the barrier. Additionally a barrier must reduce noise by 7 dBA for at least one receptor to satisfy the state reasonableness guidelines.

The following formula can be used to determine the cost-effectiveness of the barrier:

$$\textbf{Cost Effectiveness} = \frac{\text{Cost of Noise Barrier}^{1} + \text{Cost of Right-of-Way}}{\text{Total Number of Benefitted Residences}}$$

[1]The cost of a noise wall is calculated using $20 per square foot of wall, based on historical data over the five year period from 2005 to 2010

Cost effectiveness is the first consideration in determining the reasonableness of potential noise barriers. If noise mitigation is found to be cost-effective, additional reasonableness factors, such as the desires of affected property owners are considered.

A benefited property is defined as a receptor adjacent to a proposed noise abatement measure that receives a noise reduction equal to or greater than 5 dBA. Only receptors that experience a five or greater decibel decrease in noise following construction of a noise barrier are considered in this analysis. If benefited residents and property owners indicate that a proposed noise barrier is not desired, then the noise barrier is removed from further consideration and would not be constructed. First, the desires of the benefited property owners and residents are solicited through a public involvement process (e.g., open house meeting, direct mailing of a solicitation form). Second, the input received from benefited property owners and residents through this public involvement process is expressed in a vote that is weighted as follows:

The owner of a benefited property immediately adjacent to the highway right-of-way for the proposed project (i.e., first-row properties) receives 4 points and the resident (owner or renter) receives 2 points. The owner/resident of a benefited property receives a total of 6 points.

The owner of a benefited property not immediately adjacent to the highway right-of-way for the proposed project (e.g., second-row properties, third-row properties) receives 2 points and the resident (owner or renter) receives 1 point. The owner/resident of a benefited property receives a total of 3 points.

Only those benefited property owners and residents, including individual units of multi-family residential building that are considered to be benefited receptors, regardless of floor location (e.g., first floor, second floor, etc.), have a vote according to the point system described above. Non-benefiting receptors do not receive points.

Initial Solicitation: If 50 percent or more of all possible voting points from eligible voters are received after the initial request for votes, the majority of points (based upon the votes received) determine the outcome of the noise barrier. If there is a tie, where there are equal numbers of points for and against a noise barrier, the noise barrier will be constructed. If less than 50 percent of the possible voting points for a barrier are received after this initial request, then a second ballot will be distributed to the benefited property owners who did not respond.

Second Solicitation (if required): If 25 percent or more of all possible points for a barrier are received after the second request for votes, then the outcome is determined by the majority of votes received. If less than 25 percent of total possible points for a noise barrier are received after the second request for votes, then the barrier will not be constructed. If there is a tie, where there are equal numbers of points for and against a noise barrier, the noise barrier will be constructed.

Results of the noise mitigation cost-effectiveness studies are shown in **Table 8 and 9**. Both the daytime L_{10} and nighttime L_{10} values were examined to determine the greatest amount of noise reduction for each proposed wall. Analyzed noise barrier locations can be found in **Figures 1 and 2.**

Noise Mitigation Results

Wall A

A 677-foot noise barrier was modeled along the east side of TH 169 to shield receptor R34. Receptor R34 represents a single family residence adjacent to TH 169. A 20-foot tall, 677-foot long barrier was modeled and reduced noise at receptor R34 by 8.7 dBA. The cost of this wall is $270,800 per receptor which does not meet MnDOT's cost effectiveness criteria. A shorter 15-foot wall of the same length was modeled and reduced noise by 7.5 dBA. The cost of the 15-foot wall is $203,100 per receptor which also does not meet MnDOT's cost effectiveness criteria. The wall was then modeled at 10-feet and 6-feet tall with the same length and did not meet the 7 dBA minimum for reasonableness. The analyzed barrier at this location will not be proposed.

Wall B

An 840-foot noise barrier was modeled along the south side of CSAH 78 to shield receptors R38 and R39. Receptors R38 and R39 represent commercial businesses adjacent to CSAH 78. The modeled 6-foot, 10-foot, 15-foot and 20-foot tall barriers produced noise reductions in a range of 1.2 to 3.8 dBA; therefore, a cost estimate was not performed as none of the modeled wall heights was able to reduce noise by MnDOT's reasonableness criteria of 7 dBA.

Wall C

A 222-foot noise barrier was modeled along the east side of TH 169 to shield receptor R40. Receptor R40 represents a commercial business adjacent to TH 169. The modeled 6-foot, 10-foot, 15-foot, and 20-foot tall barriers produced noise reductions in a range of 3.1 to 5.3 dBA; therefore, a cost estimate was not performed as none of the modeled wall heights was able to reduce noise by MnDOT's reasonableness criteria of 7 dBA.

Wall D

A 1,346-foot noise barrier was modeled along the west side of TH 169 to shield receptor R1. Receptor R1 represents a commercial business adjacent to TH 169. The modeled 6-foot, 10-foot, 15-foot, and 20-foot tall barriers produced noise reductions in a range of 0.1 to 6.6 dBA; therefore, a cost estimate was not performed as none of the modeled wall heights was able to reduce noise by MnDOT's reasonableness criteria of 7 dBA.

Wall E

A 616-foot noise barrier was modeled along the west side of TH 169 to shield receptor R2. Receptor R2 represents a single family home adjacent to TH 169. A 20-foot tall, 616-foot long barrier was modeled and reduced noise at receptor R34 by 8.9 dBA. The cost of this wall is $246,400 per receptor which does not meet MnDOT's cost effectiveness criteria. A shorter 15-foot wall of the same length was modeled and reduced noise by 8.0 dBA. The cost of the 15-foot wall is $184,000 per receptor which also does not meet MnDOT's cost effectiveness criteria. The wall was then modeled at 10-feet and 6-feet tall with the

same length and did not meet the 7 dBA minimum for reasonableness. The analyzed barrier at this location will not be proposed.

Wall F

An 872-foot noise barrier was modeled along the west side of TH 169 to shield receptors R3 and R4. Receptors R3 and R4 represent commercial businesses adjacent to TH 169. A 20-foot high, 872-foot long barrier was modeled and reduced noise at receptor R3 by 9.4 dBA and R4 by 9.1 dBA. The cost of this wall is $174,400 per receptor which does not meet MnDOT's cost effectiveness criteria. A lower 15-foot wall of the same length was modeled and reduced noise by 7.7 and 7.8 dBA respectively at receptors R3 and R4. The cost of the 15-foot high wall is $130,800 per receptor which also does not meet MnDOT's cost effectiveness criteria. The wall was then modeled at 10-feet and 6-feet high with the same length and did not meet the 7 dBA minimum for reasonableness. The analyzed barrier at this location will not be proposed.

Wall G

An 873-foot noise barrier was modeled along the northwest quadrant of the TH 169 and TH 41 intersection to shield receptor R6. Receptor R6 represents a commercial business adjacent to the TH 169 and TH 41 intersection. The modeled 6-foot, 10-foot, 15-foot and 20-foot tall barriers produced noise reductions in a range of 0.9 to 4.2 dBA; therefore, a cost estimate was not performed as none of the modeled wall heights was able to reduce noise by MnDOT's reasonableness criteria of 7 dBA.

Wall H

A 1,090-foot noise barrier was modeled along the southwest quadrant of the TH 169 and TH 41 intersection just inside the proposed right of way, to shield modeled receptors R43–R45, R49–R51, R43A–R45A and R49A–R51A. All of the modeled receptors represent one or more single family residences in the Jackson Heights manufactured home community. In all, there are 14 potentially benefitted receptors. The modeled 20-foot barrier reduced the noise by greater than 5 dBA at 14 receptors with a maximum reduction of 13.1 dBA. The cost effectiveness of this barrier is $31,143 which is less than MnDOT's criterion of $43,500; therefore, a 20-foot barrier is reasonable in this area.

Wall I

A 1,276-foot noise barrier was modeled along the west side of TH 169 to shield receptors R7, R8 and R9. Receptors R7 and R8 represent commercial businesses adjacent to TH 169 and receptor R9 represents a motel adjacent to TH 169. A 20-foot tall, 1,276-foot long barrier was modeled and reduced noise at receptor R7 by 3.8 dBA, R8 by 7.7 dBA and R by 4.2 dBA. The cost of this wall is $510,400 per receptor which does not meet MnDOT's cost effectiveness criteria. The wall was then modeled at 15-feet, 10-feet and 6-feet tall with the same length and did not meet the 7 dBA minimum for reasonableness. The analyzed barrier at this location will not be proposed.

Wall J

A 760-foot noise barrier was modeled along the west side of TH 169 to shield receptor R12. Receptor R12 represents a commercial business adjacent to TH 169. A 20-foot tall, 760-foot long barrier was modeled and reduced noise at receptor R12 by 9.8 dBA. The cost of this wall is $304,000 per receptor which does not meet MnDOT's cost effectiveness criteria. A shorter 15-foot wall of the same length was modeled and reduced noise by 8.7 dBA. The cost of the 15-foot wall is $228,000 per receptor which also does not meet MnDOT's cost effectiveness criteria. The wall was then modeled at 10-feet and 6-feet tall with the same length and did not meet the 7 dBA minimum for reasonableness. The analyzed barrier at this location will not be proposed.

Wall K

A 1,000-foot noise barrier was modeled along the east side of TH 169 to shield receptor R22. Receptor R22 represents a single family residence adjacent to TH 169. The modeled 6-foot, 10-foot, 15-foot, and 20-foot tall barriers produced noise reductions in a range of 0 to 1.2 dBA; therefore, a cost estimate was not performed as none of the modeled wall heights was able to reduce noise by MnDOT's reasonableness criteria of 7 dBA.

Wall L

A 1,873-foot noise barrier was modeled along the west side of TH 169 to shield receptors R55 and R56. Receptors R55 and R56 represent single family residences adjacent to TH 169 just south of CSAH 14. The modeled 6-foot, 10-foot, 15-foot, and 20-foot tall barriers produced noise reductions in a range of 0.1 to 5 dBA; therefore, a cost estimate was not performed as none of the modeled wall heights was able to reduce noise by MnDOT's reasonableness criteria of 7 dBA.

Wall M

A 780-foot noise barrier was modeled along the north side of CSAH 14 to shield receptor R57. Receptor R57 represents a single family residence adjacent to CSAH 14 just east of TH 169. The modeled 6-foot, 10-foot, 15-foot, and 20-foot tall barriers produced noise reductions in a range of 0.3 to 1.6 dBA; therefore, a cost estimate was not performed as none of the modeled wall heights was able to reduce noise by MnDOT's reasonableness criteria of 7 dBA. Additionally, Wall M would have to allow a gap for a driveway access which decreases the effectiveness of this analyzed wall.

Wall N

A 3,630-foot noise barrier was modeled along the east side of TH 169 to shield receptors R27, R28 and R58–R64. Receptors R27 and R58–R64 represent single family residences along Skyline Circle, which runs parallel to, and 1,200 feet east of, TH 169. Receptor R28 represents a commercial business in the southeast quadrant of the TH 169 and 133rd Street intersection. A 20-foot tall, 3,630-foot long barrier was modeled and reduced noise at receptor R28 by 8.0 dBA. The cost of this wall is $1,452,000 per receptor which does not meet MnDOT's cost effectiveness criteria. A shorter 15-foot wall of the same length was modeled and reduced noise by 7.3 dBA at receptor R28. The cost of the 15-foot wall is

$1,089,000 per receptor which also does not meet MnDOT's cost effectiveness criteria. The wall was then modeled at 10-feet and 6-feet tall with the same length and did not meet the 7 dBA minimum for reasonableness. The analyzed barrier at this location will not be proposed.

Wall O

A 3,344-foot noise barrier was modeled along the south side of CSAH 78 to shield receptors R80, R81 and R82. Receptors R80-R82 represent single family residences adjacent to CSAH 78 just east of TH 169. The modeled 20-foot tall barrier produced noise reductions in a range of 3.8 to 6.0 dBA; therefore, a cost estimate was not performed as the modeled wall height wasn't able to reduce noise by MnDOT's reasonableness criteria of 7 dBA. No further analysis on alternate geometries was conducted because the 20-foot tall, 3,344-foot long barrier is the largest both by height and length allowed by design limitations. Additionally, Wall O would have to allow for a gap for a driveway access which decreases the effectiveness of this analyzed wall.

Table 8: Noise Barrier Cost-Effectiveness Study Results (Daytime L_{10}).

Receptor	LOCATION	Length of Wall (ft)	*Estimated R/W Cost	Build 2040 No Barrier L_{10}	Build 2040 with 6' Barrier L_{10}	Reduction (in dBA) L_{10}	Total Cost of Noise Barrier	Cost per Benefitted Receptor	Build 2040 with 10' Barrier L_{10}	Reduction (in dBA) L_{10}	Total Cost of Noise Barrier	Cost per Benefitted Receptor	Build 2040 with 15' Barrier L_{10}	Reduction (in dBA) L_{10}	Total Cost of Noise Barrier	Cost per Benefitted Receptor	Build 2040 with 20' Barrier L_{10}	Reduction (in dBA) L_{10}	Total Cost of Noise Barrier	Cost per Benefitted Receptor
Wall A		677	Not Est.																	
R34 (1)	Single Family Residence East of TH 169			76.3	73.8	2.5	N/A	N/A	71.4	4.9	N/A	N/A	69	7.3	$203,100	$203,100	67.6	8.7	$270,800	$270,800
Wall B		840	Not Est.																	
R38 (1)	Commercial Business West of US TH 169			71	69.7	1.3	N/A	N/A	69.4	1.6	N/A	N/A	69.1	1.9	N/A	N/A	69	2	N/A	N/A
R39 (1)	Commercial Business West of US TH169			69.9	67.4	2.5	N/A	N/A	66.9	3	N/A	N/A	66.4	3.5	N/A	N/A	66.1	3.8	N/A	N/A
Wall C		222	Not Est.																	
R40 (1)	Commercial Business East of US TH 169			74.9	71.8	3.1	N/A	N/A	70.4	4.5	N/A	N/A	69.8	5.1	N/A	N/A	69.6	5.3	N/A	N/A
Wall D		1346	Not Est.																	
R1 (1)	Commercial Business West of TH 169			70.2	70.2	0	N/A	N/A	69.4	0.8	N/A	N/A	67.3	2.9	N/A	N/A	64	6.2	N/A	N/A
Wall E		616																		
R2 (1)	Single Family Residence West of TH 169			75.9	71.6	4.3	N/A	N/A	70.1	5.8	N/A	N/A	68.2	7.7	$184,800	$184,800	67.3	8.6	$246,400	$246,400
Wall F		872	Not Est.																	
R3 (1)	Commercial Business West of TH 169			74.7	71.2	3.5	N/A	N/A	69.5	5.2	N/A	N/A	67.1	7.6	$261,600	$130,800	65.3	9.4	$348,800	$174,400
R4 (1)	Commercial Business West of TH 169			75	71.1	3.9	N/A	N/A	69.7	5.3	N/A	N/A	67.4	7.6			66	9		
Wall G		874	Not Est.																	
R6 (1)	Commercial Business on NW Corner of TH 169 and TH 41			73.6	72.7	0.9	N/A	N/A	71.5	2.1	N/A	N/A	70.1	3.5	N/A	N/A	69.4	4.2	N/A	N/A
Wall H		1090	Not Est.																	
R43 (1)	Single Family Residence NW Corner of TH 169 & TH 41			74.7	70	4.7	N/A	N/A	67.1	7.6			63.8	10.9			62.3	12.4		
R43A (1)	Single Family Residence NW Corner of TH 169 & TH 41			73.4	68.8	4.6	N/A	N/A	66.8	6.6			64.2	9.2			62.7	10.7		
R44 (1)	Single Family Residence NW Corner of TH 169 & TH 41			74.5	74.4	0.1	N/A	N/A	74.2	0.3			71.6	2.9			67.2	7.3		
R44A (1)	Single Family Residence NW Corner of TH 169 & TH 41			74.1	69.7	4.4	N/A	N/A	67.2	6.9			63.7	10.4			61.8	12.3		
R45 (2)	Single Family Residence NW Corner of TH 169 & TH 41			72.2	68.8	3.4	N/A	N/A	67.6	4.6			66.2	6			65.5	6.7		
R45A (1)	Single Family Residence NW Corner of TH 169 & TH 41			72.8	70.3	2.5	N/A	N/A	67.8	5	$218,000	$36,333	65.4	7.4	$327,000	$29,727	64.2	8.6	$436,000	$31,143
R49 (2)	Single Family Residence NW Corner of TH 169 & TH 41			70.5	67.9	2.6	N/A	N/A	67.1	3.4			66.3	4.2			65.2	5.3		
R49A (2)	Single Family Residence NW Corner of TH 169 & TH 41			70.8	67.6	3.2	N/A	N/A	66.6	4.2			65.6	5.2			64.4	6.4		
R50 (2)	Single Family Residence NW Corner of TH 169 & TH 41			72.4	68	4.4	N/A	N/A	66.5	5.9			64.4	8			62.8	9.6		
R50A (1)	Single Family Residence NW Corner of TH 169 & TH 41			71.5	67.6	3.9	N/A	N/A	66.5	5			65	6.5			63.4	8.1		
R51 (2)	Single Family Residence NW Corner of TH 169 & TH 41			67.9	65.2	2.7	N/A	N/A	64.3	3.6			63.6	4.3			63	4.9		
R51A (2)	Single Family Residence NW Corner of TH 169 & TH 41			67.5	65.2	2.3	N/A	N/A	64.5	3			63.8	3.7			63.2	4.3		
Wall I		1276	Not Est.																	
R7 (1)	Commercial Business West of TH 169			72.3	71.6	0.7	N/A	N/A	71.3	1	N/A	N/A	70.7	1.6			68.6	3.7		
R8 (1)	Commercial Business West of TH 169			73.9	72.5	1.4	N/A	N/A	70.3	3.6	N/A	N/A	68	5.9	N/A	N/A	66.3	7.6	$510,400	$510,400
R9 (1)	Residential Property West of TH 169			73	70.9	2.1	N/A	N/A	70.1	2.9	N/A	N/A	69.3	3.7			68.9	4.1		

**Note: No cost for utility relocations included, all noise walls to be constructed within MnDOT right-of-way*

Noise wall cost = (wall height) x (wall length) x ($20 per square foot)

Number in () represents number of impacted receptors

Wall lengths include all end tapers

Benefitted receptor

Table 8 (Continued): Noise Barrier Cost-Effectiveness Study Results (Daytime L_{10})

Receptor	LOCATION	Length of Wall (ft)	*Estimated R/W Cost	Build 2040 No Barrier L_{10}	Build 2040 with 6' Barrier L_{10}	Reduction (in dBA) L_{10}	Total Cost of Noise Barrier	Cost per Benefitted Receptor	Build 2040 with 10' Barrier L_{10}	Reduction (in dBA) L_{10}	Total Cost of Noise Barrier	Cost per Benefitted Receptor	Build 2040 with 15' Barrier L_{10}	Reduction (in dBA) L_{10}	Total Cost of Noise Barrier	Cost per Benefitted Receptor	Build 2040 with 20' Barrier L_{10}	Reduction (in dBA) L_{10}	Total Cost of Noise Barrier	Cost per Benefitted Receptor
Wall J		760	Not Est.																	
R12 (1)	Commercial Business West of TH 169			75.6	71.3	4.3	N/A	N/A	69.6	6	N/A	N/A	67.2	8.4	$228,000	$228,000	66	9.6	$304,000	$304,000
Wall K		1000	Not Est																	
R22 (1)	Single Family Residence East of TH 169			59.3	59.3	0	N/A	N/A	59.3	0	N/A	N/A	58.9	0.4	N/A	N/A	58.1	1.2	N/A	N/A
Wall L		1873	Not Est.																	
R55 (1)	Single Family Residence West of TH 169			59.5	59.5	0	N/A	N/A	58.8	0.7	N/A	N/A	57.2	2.3	N/A	N/A	55.9	3.6	N/A	N/A
R56 (1)	Single Family Residence West of TH 169			57.5	57.5	0	N/A	N/A	56.5	1	N/A	N/A	54.7	2.8	N/A	N/A	52.9	4.6	N/A	N/A
Wall M		780	Not Est.																	
R57 (1)	Single Family Residence North of CSAH 14			61.4	61.1	0.3	N/A	N/A	60.7	0.7	N/A	N/A	60.2	1.2	N/A	N/A	59.8	1.6	N/A	N/A
Wall N		3630	Not Est.																	
R27 (1)	Single Family Residence East of TH 169			59.9	59.9	0	N/A	N/A	59.6	0.3	N/A	N/A	58.9	1			57.9	2		
R28 (1)	Commercial Business East of TH 169			77.3	74.2	3.1	N/A	N/A	72.2	5.1	N/A	N/A	70.1	7.2			69.4	7.9		
R58 (1)	Single Family Residence East of TH 169			55.5	55.5	0	N/A	N/A	55.5	0	N/A	N/A	55.2	0.3			54.4	1.1		
R59 (1)	Single Family Residence East of TH 169			56.2	56.2	0	N/A	N/A	56.2	0	N/A	N/A	56.1	0.1			55.5	0.7		
R60 (1)	Single Family Residence East of TH 169			58.2	58.2	0	N/A	N/A	58.2	0	N/A	N/A	58.1	0.1	$1,089,000	$1,089,000	57.7	0.5	$1,452,000	$1,452,000
R61 (1)	Single Family Residence East of TH 169			57.5	57.5	0	N/A	N/A	57.5	0	N/A	N/A	57.3	0.2			56.8	0.7		
R62 (1)	Single Family Residence East of TH 169			58.9	58.9	0	N/A	N/A	58.9	0	N/A	N/A	58.6	0.3			57.8	1.1		
R63 (1)	Single Family Residence East of TH 169			58.7	58.6	0.1	N/A	N/A	58.5	0.2	N/A	N/A	58	0.7			57	1.7		
R64 (1)	Single Family Residence East of TH 169			60.4	60.4	0	N/A	N/A	60.1	0.3	N/A	N/A	59.5	0.9			58.6	1.8		
Wall O			Not Est.																	
R80 (1)	Single Family Residence South of CSAH 78			61	N/A - Largest Possible Wall Did Not Reduce Noise By Minimum Amount for Reasonableness/Feasibility				N/A - Largest Possible Wall Did Not Reduce Noise By Minimum Amount for Reasonableness/Feasibility				N/A - Largest Possible Wall Did Not Reduce Noise By Minimum Amount for Reasonableness/Feasibility				57.1	3.9	N/A	N/A
R81 (1)	Single Family Residence South of CSAH 78			61.6													55.9	5.7		
R82 (1)	Single Family Residence South of CSAH 78			58.3													54	4.3		

**Note: No cost for utility relocations included, all noise walls to be constructed within MnDOT right-of-way*

Noise wall cost = (wall height) x (wall length) x ($20 per square foot)

Number in () represents number of impacted receptors

Wall lengths include all end tapers

Benefitted receptor

Table 9: Noise Barrier Cost-Effectiveness Study Results (Nighttime L_{10})

Receptor	LOCATION	Length of Wall (ft)	*Estimated R/W Cost	Build 2040 No Barrier L_{10}	Build 2040 with 6' Barrier L_{10}	Reduction (in dBA) L_{10}	Total Cost of Noise Barrier	Cost per Benefitted Receptor	Build 2040 with 10' Barrier L_{10}	Reduction (in dBA) L_{10}	Total Cost of Noise Barrier	Cost per Benefitted Receptor	Build 2040 with 15' Barrier L_{10}	Reduction (in dBA) L_{10}	Total Cost of Noise Barrier	Cost per Benefitted Receptor	Build 2040 with 20' Barrier L_{10}	Reduction (in dBA) L_{10}	Total Cost of Noise Barrier	Cost per Benefitted Receptor
Wall A		677	Not Est.																	
R34 (1)	Single Family Residence East of TH 169			74.8	71.7	3.1	N/A	N/A	69.6	5.2	N/A	N/A	67.3	7.5	$203,100	$203,100	66.1	8.7	$270,800	$270,800
Wall B		840	Not Est.																	
R38 (1)	Commercial Business West of US TH 169			69.8	68.6	1.2	N/A	N/A	68.3	1.5	N/A	N/A	68.1	1.7	N/A	N/A	67.9	1.9	N/A	N/A
R39 (1)	Commercial Business West of US TH169			68.3	65.8	2.5	N/A	N/A	65.4	2.9	N/A	N/A	64.9	3.4	N/A	N/A	64.6	3.7	N/A	N/A
Wall C		222	Not Est.																	
R40 (1)	Commercial Business East of US TH 169			74.9	71.8	3.1	N/A	N/A	70.4	4.5	N/A	N/A	69.8	5.1	N/A	N/A	69.6	5.3	N/A	N/A
Wall D		1346	Not Est.																	
R1 (1)	Commercial Business West of TH 169			69.9	69.8	0.1	N/A	N/A	68.9	1	N/A	N/A	66.6	3.3	N/A	N/A	63.3	6.6	N/A	N/A
Wall E		616																		
R2 (1)	Single Family Residence West of TH 169			75.6	71.1	4.5	N/A	N/A	69.5	6.1	N/A	N/A	67.6	8	$184,800	$184,800	66.7	8.9	$246,400	$246,400
Wall F		872	Not Est.																	
R3 (1)	Commercial Business West of TH 169			73.8	70.1	3.7	N/A	N/A	68.5	5.3	N/A	N/A	66.1	7.7	$261,600	$130,800	64.5	9.3	$348,800	$174,400
R4 (1)	Commercial Business West of TH 169			74	69.9	4.1	N/A	N/A	68.4	5.6	N/A	N/A	66.2	7.8			64.9	9.1		
Wall G		874	Not Est.																	
R6 (1)	Commercial Business on NW Corner of TH 169 and TH 41			72.4	71.4	1	N/A	N/A	70	2.4	N/A	N/A	68.8	3.6	N/A	N/A	68.2	4.2	N/A	N/A
Wall H		1090	Not Est.																	
R43 (1)	Single Family Residence NW Corner of TH 169 & TH 41			73.8	69	4.8	N/A	N/A	66	7.8			62.4	11.4			60.7	13.1		
R43A (1)	Single Family Residence NW Corner of TH 169 & TH 41			72.5	67.7	4.8	N/A	N/A	65.6	6.9			62.8	9.7			61.1	11.4		
R44 (1)	Single Family Residence NW Corner of TH 169 & TH 41			73.6	73.4	0.2	N/A	N/A	73.3	0.3			70.5	3.1			66.2	7.4		
R44A (1)	Single Family Residence NW Corner of TH 169 & TH 41			73.2	68.7	4.5	N/A	N/A	66.3	6.9			62.6	10.6			60.5	12.7		
R45 (2)	Single Family Residence NW Corner of TH 169 & TH 41			71.3	67.7	3.6	N/A	N/A	66.4	4.9			64.8	6.5			64.1	7.2		
R45A (1)	Single Family Residence NW Corner of TH 169 & TH 41			72	69.1	2.9	N/A	N/A	66.7	5.3	$218,000	$31,143	64.1	7.9	$327,000	$29,727	62.8	9.2	$436,000	$31,143
R49 (2)	Single Family Residence NW Corner of TH 169 & TH 41			69.4	66.5	2.9	N/A	N/A	65.7	3.7			64.7	4.7			63	6.4		
R49A (2)	Single Family Residence NW Corner of TH 169 & TH 41			69.7	66.3	3.4	N/A	N/A	65.2	4.5			64.1	5.6			62.4	7.3		
R50 (2)	Single Family Residence NW Corner of TH 169 & TH 41			71.4	66.8	4.6	N/A	N/A	65.3	6.1			63	8.4			61.2	10.2		
R50A (1)	Single Family Residence NW Corner of TH 169 & TH 41			70.5	66.4	4.1	N/A	N/A	65.1	5.4			63.4	7.1			61.8	8.7		
R51 (2)	Single Family Residence NW Corner of TH 169 & TH 41			66.3	63.8	2.5	N/A	N/A	62.9	3.4			62.2	4.1			61.4	4.9		
R51A (2)	Single Family Residence NW Corner of TH 169 & TH 41			66.1	63.8	2.3	N/A	N/A	63	3.1			62.3	3.8			61.4	4.7		
Wall I		1276	Not Est.																	
R7 (1)	Commercial Business West of TH 169			71	70.2	0.8	N/A	N/A	69.9	1.1	N/A	N/A	69.2	1.8			67.2	3.8		
R8 (1)	Commercial Business West of TH 169			72.6	71	1.6	N/A	N/A	68.8	3.8	N/A	N/A	66.6	6	N/A	N/A	64.9	7.7	$510,400	$510,400
R9 (1)	Residential Property West of TH 169			71.7	69.5	2.2	N/A	N/A	68.7	3	N/A	N/A	67.9	3.8			67.5	4.2		

**Note: No cost for utility relocations included, all noise walls to be constructed within MnDOT right-of-way*

Noise wall cost = (wall height) x (wall length) x ($20 per square foot)

Number in () represents number of impacted receptors

Wall lengths include all end tapers

Benefitted receptor

Table 9 (Continued): Noise Barrier Cost-Effectiveness Study Results (Nighttime L_{10})

Receptor	LOCATION	Length of Wall (ft)	*Estimated R/W Cost	Build 2040 No Barrier L_{10}	Build 2040 with 6' Barrier L_{10}	Reduction (in dBA) L_{10}	Total Cost of Noise Barrier	Cost per Benefitted Receptor	Build 2040 with 10' Barrier L_{10}	Reduction (in dBA) L_{10}	Total Cost of Noise Barrier	Cost per Benefitted Receptor	Build 2040 with 15' Barrier L_{10}	Reduction (in dBA) L_{10}	Total Cost of Noise Barrier	Cost per Benefitted Receptor	Build 2040 with 20' Barrier L_{10}	Reduction (in dBA) L_{10}	Total Cost of Noise Barrier	Cost per Benefitted Receptor
Wall J		760	Not Est.																	
R12 (1)	Commercial Business West of TH 169			74.4	69.9	4.5	N/A	N/A	68.1	6.3	N/A	N/A	65.7	8.7	$228,000	$228,000	64.6	9.8	$304,000	$304,000
Wall K		1000	Not Est																	
R22 (1)	Single Family Residence East of TH 169			57.9	57.9	0	N/A	N/A	57.9	0	N/A	N/A	57.4	0.5	N/A	N/A	56.7	1.2	N/A	N/A
Wall L		1873	Not Est.																	
R55 (1)	Single Family Residence West of TH 169			58.7	58.6	0.1	N/A	N/A	57.7	1	N/A	N/A	56	2.7	N/A	N/A	54.7	4	N/A	N/A
R56 (1)	Single Family Residence West of TH 169			56.7	56.6	0.1	N/A	N/A	55.4	1.3	N/A	N/A	53.4	3.3	N/A	N/A	51.7	5	N/A	N/A
Wall M		780	Not Est.																	
R57 (1)	Single Family Residence North of CSAH 14			60	59.6	0.4	N/A	N/A	59.2	0.8	N/A	N/A	58.7	1.3	N/A	N/A	58.4	1.6	N/A	N/A
Wall N		3630	Not Est.																	
R27 (1)	Single Family Residence East of TH 169			58.6	58.5	0.1	N/A	N/A	58.2	0.4	N/A	N/A	57.4	1.2			56.4	2.2		
R28 (1)	Commercial Business East of TH 169			75.9	72.3	3.6	N/A	N/A	70.5	5.4	N/A	N/A	68.6	7.3			67.9	8		
R58 (1)	Single Family Residence East of TH 169			54.2	54.1	0.1	N/A	N/A	54.1	0.1	N/A	N/A	53.8	0.4			52.9	1.3		
R59 (1)	Single Family Residence East of TH 169			54.8	54.8	0	N/A	N/A	54.8	0	N/A	N/A	54.7	0.1			53.9	0.9		
R60 (1)	Single Family Residence East of TH 169			56.9	56.9	0	N/A	N/A	56.9	0	N/A	N/A	56.7	0.2	$1,089,000	$1,089,000	56.2	0.7	$1,452,000	$1,452,000
R61 (1)	Single Family Residence East of TH 169			56.2	56.1	0.1	N/A	N/A	56.1	0.1	N/A	N/A	55.9	0.3			55.3	0.9		
R62 (1)	Single Family Residence East of TH 169			57.6	57.6	0	N/A	N/A	57.5	0.1	N/A	N/A	57.2	0.4			56.3	1.3		
R63 (1)	Single Family Residence East of TH 169			57.3	57.3	0	N/A	N/A	57.1	0.2	N/A	N/A	56.5	0.8			55.5	1.8		
R64 (1)	Single Family Residence East of TH 169			59.1	59	0.1	N/A	N/A	58.7	0.4	N/A	N/A	58	1.1			57.2	1.9		
Wall O			Not Est.																	
R80 (1)	Single Family Residence South of CSAH 78			59.4	N/A - Largest Possible Wall Did Not Reduce Noise By Minimum Amount for Reasonableness/Feasibility				N/A - Largest Possible Wall Did Not Reduce Noise By Minimum Amount for Reasonableness/Feasibility				N/A - Largest Possible Wall Did Not Reduce Noise By Minimum Amount for Reasonableness/Feasibility				55.6	3.8	N/A	N/A
R81 (1)	Single Family Residence South of CSAH 78			60													54	6		
R82 (1)	Single Family Residence South of CSAH 78			56.8													52.2	4.6		

**Note: No cost for utility relocations included, all noise walls to be constructed within MnDOT right-of-way*

Noise wall cost = (wall height) x (wall length) x ($20 per square foot)

Number in () represents number of impacted receptors

Wall lengths include all end tapers

Benefitted receptor

Solicitation Results (Benefited Property Owners and Residents)

Solicitation forms were mailed on September 19, 2016 to the benefited property owner and benefited residents adjacent to the proposed noise barrier ("Wall H"). A total of 15 solicitation forms were mailed to the benefited property owner and residents. Two public meetings for the proposed noise barrier were held on Thursday, October 6, 2016, at the Jackson Heights Manufactured Home Community. The meeting presented information about the noise evaluation process, the results of noise modeling in the area, and photos of typical noise barriers. The preliminary location of the proposed noise barrier was also marked with stakes and a boom truck was used to help illustrate the height and location of the proposed barrier. Layout maps of the project including the location of the proposed noise barrier were also presented. All printed materials were provided in English and Spanish, and two Spanish language interpreters were in attendance at the meetings. Benefited properties could submit their viewpoint through the mail or at the meetings. Solicitation forms and comments regarding the proposed noise barriers were received through October 21, 2016.

Wall H is located along the south side of TH 41 adjacent to the Jackson Heights Manufactured Home Community. Fifteen (15) benefited properties (the Jackson Heights Manufactured Home Community Owner and 14 manufactured homes) were identified adjacent to Wall H. The total number of possible voting points for Wall H is 84. Solicitation forms were received from 10 of the 15 benefited properties. A total of 74 voting points were in favor of the proposed noise barrier. Zero voting points were received against construction of the proposed noise barrier. A majority (88 percent) of all eligible voting points indicated a preference of "Yes" to construction of a noise barrier along the south side of TH 41 adjacent to the Jackson Heights Manufactured Home Community.

Alternative Noise Abatement

Noise abatement measures, other than noise barriers, were considered for the proposed project. Such measures included traffic control devices, signing for prohibition of certain vehicle types, time-use restrictions for certain vehicle types, modified speed limits, exclusive land use designations, and other methods listed in 23 CFR 772.13c. It was determined that these types of measures would not be feasible or practical for this project. To limit the vehicle types, time of use, and speeds on the roadways would not be consistent with their functions. The existing and proposed land use within the project corridor is consistent with the County's Comprehensive Plan.

Land Use Planning and Traffic Noise

In addition to residential, commercial and industrial sites, WSB also included undeveloped land parcels as receptors in the noise model for planning purposes. This was done to establish potential noise levels in areas that may be developed at a future time. Receptors located on undeveloped land were not considered for noise wall/barrier analysis because it is unknown what standards will be applicable to future conditions. The results of the noise modeling on the undeveloped parcels can be found in **Table 10.**

Table 10 – Projected Noise Levels on Undeveloped Parcels

Receptor	Land Use	Daytime 2040 Build Condition		Nighttime 2040 Build Condition		Distance from Receptor to Primary Noise Source
		L_{10}	L_{50}	L_{10}	L_{50}	
R11*	Undeveloped	69.9	66.2	68.7	64.5	214
R17*	Undeveloped	66.6	63.6	65.3	62	360
R25*	Undeveloped	71.1	64.7	69.7	62.8	244
R26*	Undeveloped	69.7	66.2	68.3	64.7	241
R30*	Undeveloped	71.3	67.4	69.9	65.9	185
R31*	Undeveloped	73.7	61	72	59.2	427
R33*	Undeveloped	66	62.7	64.5	61	433
R35*	Undeveloped	70.1	66.2	68.5	64.5	207
R42*	Undeveloped	67.8	64.8	67.5	64.2	323
R52*	Undeveloped	65.9	62.3	65.2	61.5	224
R53*	Undeveloped	65.8	61.2	65.3	60.6	194
R54*	Undeveloped	68.1	62.8	67.6	62.3	142

* Undeveloped Land, Federal NAC Not Applicable

Receptors in undeveloped parcels range from 142-feet to 433-feet from the primary source of traffic noise. TH 169 is the primary noise source for all receptors except for R52-R54. TH 41 is the primary noise source for receptors R52-R54.

Construction Noise

The construction activities associated with implementation of the proposed project will result in increased noise levels relative to existing conditions. These impacts will primarily be associated with construction equipment and pile driving.

Table 11 shows peak noise levels monitored at 50 feet from various types of construction equipment. This equipment is primarily associated with site grading/site preparation, which is generally the roadway construction phase associated with the greatest noise levels.

Table 11 - Typical Construction Equipment Noise Levels at 50 feet

Equipment Type	Manufacturers Sampled	Total Number of Models in Sample	Peak Noise Level (dBA)	
			Range	Average
Backhoes	5	6	74-92	83
Front Loaders	5	30	75-96	85
Dozers	8	41	65-95	85
Graders	3	15	72-92	84

Scrapers	2	27	76-98	87
Pile Drivers	N/A	N/A	95-105	101

Elevated noise levels are, to a degree, unavoidable for this type of project. The project contract and special provisions will require that construction equipment be properly muffled and in proper working order. Scott County will require contractor(s) to comply with applicable local noise restrictions and ordinances to the extent that is reasonable. Advanced notice will be provided to affected communities of any planned abnormally loud construction activities. It is anticipated that night construction may sometimes be required to minimize traffic impacts and to improve safety. However, construction will be limited to daytime hours as much as possible. This project is expected to be under construction for 18 months. If necessary, a detailed nighttime construction mitigation plan will be developed during the project final design stage.

Any associated high-impact equipment noise, such as pile driving, pavement sawing, or jack hammering, will be unavoidable with construction of the proposed project. Pile-driving noise is associated with any bridge construction and sheet piling necessary for retaining wall construction. While pile-driving equipment results in the highest peak noise level, as shown in **Table 11**, it is limited in duration to the activities noted above (e.g., bridge construction). The use of pile drivers, jack hammers, and pavement sawing equipment will be prohibited during nighttime hours.

Conclusions

The MnDOT-defined noise impact criterion (an increase of 5 or more dBA over existing levels) is not exceeded during the daytime or nighttime. Federal noise criteria would be approached or exceeded at modeled residential receptors R2, R9, R34, R43–R46, R43A–R45A, R48–R50, R49A–R51A and R55–R64 for the 2040 Build condition. Federal noise criteria would be approached or exceeded at modeled commercial receptors R3, R4, R12, R19, R28 and R40 for the 2040 Build condition. State noise standards were exceeded during either the daytime or nighttime worst noise hours at all modeled receptors listed above during either the no build (2040) or build (2040) scenarios. Receptors RTRAIL1-RTRAIL9 exceeded federal and state noise standards in daytime and nighttime hours.

Receptors R5, R11, R17, R25, R26, R31, R33, R35, R42 and R52–R54 are all undeveloped parcels of land. Receptor R37 is proposed for total acquisition with the proposed improvements.

Noise barriers were considered at 15 locations. The noise barrier cost effectiveness analysis shows that only Wall H is feasible, meets MnDOT's design reduction goal of at least 7 dBA and cost-effectiveness criteria of $43,500/benefited receptor, and is supported by adjacent benefited receptors. Therefore, noise barrier Wall H is recommended for construction with the proposed improvements. This wall will be approximately 1,090 feet in length, 20-feet high, and run along the southwest quadrant of TH 169 and TH 41 providing a barrier to the Jackson Heights Mobile Home Community.

Statement of Likelihood

The traffic noise analysis for the proposed noise barriers described above is based upon preliminary design studies completed to date. Final mitigation decisions will be subject to final design considerations and the viewpoint of benefited residents and property owners. If it subsequently develops during final design that conditions have substantially changed, noise abatement measures may be altered or not be provided. Affected benefited receptors and local officials would be notified of plans to eliminate or substantially modify a noise abatement measure prior to the completion of the final design process. This notification would explain changes in site conditions (if any), additional site information, any design changes implemented during the final design process, and an explanation of noise barrier feasibility and reasonableness. A final decision regarding installation of the proposed abatement measure will be made upon completion of the project's final design and the public involvement process.

Attachment F – Picha Creek Floodplain Assessment and Hydraulic Analysis

FLOODPLAIN ASSESSMENT

FLOODPLAIN ENCROACHMENT		
Floodplain	**Type of Encroachment**	**Length, ft**
Picha Creek: 100-year	Transverse (Location K, TH 169 Existing Bridge 8829)	150
Picha Creek: 100-year	Transverse (Location L, Old TH 169 Culvert)	50
Picha Creek: 100-year	Transverse (Location M, Railroad Spur Culverts)	75

**See figure for location*

TRANSVERSE or LONGITUDINAL ENCROACHMENT

1. There is no significant potential for interruption of a transportation facility which is needed for emergency vehicles or provides a community's only evacuation route.

   a. Is the roadway grade above the 100 year flood elevation? **NO**

Location of Crossing	Roadway Elevation	100 year flood elevation
TH 169 Existing Bridge 8829	747.6	747.7
Union Pacific Railroad Spur Culverts	747.4 (Railroad Elevation)	744.2

   NO Frequency of overtopping **100-Year**
   Reason(s) why roadway grade will not be raised: **No overtopping for the design event (50-year)**
   Are there reasonable alternative routes available that are above the 100 year flood elevations? **YES**

   b. If the 100 year flood elevation is not known, does roadway have a history of overtopping?
   YES Reference and length of record **2014**
   YES Discuss correcting deficiency **Proposed culverts will be enlarged to address existing overtopping concern**

   c. Describe how emergency services will be maintained during construction: **Emergency vehicles will continue to have access via the existing roadways**

2. There is no significant impact on natural and beneficial floodplain values.

   a. Impacts:

	Beneficial Impacts	Adverse Impacts
Fisheries	None	**N**

Wetlands	N	**N**
Plants	N	**N**
Open Space/Aesthetics	N	**N**
Public Access (boat/canoe)	N	**N**
Channel Changes	N	**N**
Boat Passage	N	**N**
Threatened/Endangered Species	N	**N**
Water Quality	N	**N**
Other	N	**N**

b. Minimization/Mitigation Measures: Wetland impacts due to the project will be mitigated. Water quality best management practices will be provided for the project impervious.

Project will be in compliance with all permit requirements, including NPDES, SWPPP, Minnesota DNR, and US Army Corps of Engineers.

3. There is no significant increased risk of flooding.

   a. Does the project result in any headwater or tailwater elevations that would endanger life or property? **NO**

      Stage Increase **Net Reduction in Stage**

   b. Are there any special hydraulic features? What is their purpose? **N/A**

4. The project will not support and/or result in incompatible floodplain development.

   Reason(s) why project will not cause incompatible floodplain development:

   The project includes replacement of two existing under capacity culverts. The two proposed culverts are needed for safe access of the railroad spur and TH 169 and to reduce the frequency of overtopping.

COORDINATION

Multiple permits will be required for the project, below is a list of the anticipated permits necessary:

- Minnesota Pollution Control Agency Phase II NPDES CSW permit
- Minnesota Pollution Control Agency Section 401 Certification
- Minnesota Department of Natural Resources License to Cross

- Minnesota Department of Natural Resources Construction Dewatering (if necessary)
- US Army Corps of Engineers Section 404 General Permit (GP-004)
- Wetland Conservation Act Replacement Plan
- Scott County Watershed Management Organization

CONCLUDING STATEMENT

Based on the above assessment, no significant floodplain impacts are expected.

PRELIMINARY (30 PERCENT) DRAINAGE DESIGN REPORT

Trunk Highway 169 / CSAH 14 Overpass Project
Picha Creek Analysis
Louisville Township, Scott County, Minnesota

Prepared For:

Scott County, Minnesota

March 10, 2017

Prepared By:

WSB & Associates, Inc.
701 Xenia Avenue S., Suite 300
Minneapolis, MN 55416
(763) 541-4800
(763) 541-1700 (Fax)

I. PICHA CREEK FLOODING ANALYSIS

Picha Creek analysis was initiated due to past overtopping of TH 169 and the proximity to the project area. The location is shown on attached **Figure 1, Appendix A**. Picha Creek flows through a series of culverts shown on **Figure 2**, traveling from upstream to downstream, under TH 169 (Bridge 8829), old TH 169 alignment, and then Union Pacific Railroad Spur. There is approximately 15 square miles (9,461 acres) tributary to Picha Creek. The purpose of the analysis is to determine the flood extents and potential options for addressing the road overtopping.

A portion of Picha Creek is designated FEMA Zone A floodplain (**Appendix C**). The Zone A designation indicates the elevation is approximate. Both the DNR and FEMA were contacted to verify if modeling was available. Both agencies indicated that no modeling was available for this portion of the creek. Therefore, it was necessary to generate a model of the area of concern.

I.1 StreamStats

The USGS's StreamStats program was used to calculate peak flows for the Picha Creek subwatershed due to its large size. StreamStats estimates streamflow statistics for ungaged sites based on a delineated drainage basin and USGS-developed regression equations. Flows per unit area from gaging stations near the ungaged site are applied to the drainage area for the ungaged site. The StreamStats output, including drainage areas and peak flow statistics, are in **Appendix B**.

Table 1 lists the peak discharge rates for the Picha Creek subwatershed measured at the upstream side of the TH 169 culverts.

Table 1 – Picha Creek Discharge Rates

Storm Event	2-year	10-year	50-year	100-year
Discharge Rate (cfs)	226	634	1,150	1,420

I.2 Hydraulic Analysis

A HEC-RAS model of Picha Creek was created using HEC-RAS version 4.0. The study area is shown in **Figure 1**. The cross-sections were cut based on LiDAR information and adjusted at surveyed culverts (August 8, 2016, WSB). The survey information for the existing culverts is shown on **Figure 2**.

Results

The existing conditions modeling results for the 50- and 100-year storms are provided in **Table 2**.

Table 2: Existing Conditions Modeling Results

Culvert ID	Water Surface Elevation[1]		Overflow Elevation	Culvert Open Area (SF)
	100-Year	50-Year		
2&3 (RR Spur culverts)	748.3	748.1	747.4	77
4 (Old TH 169 culvert)	748.3	748.1	744.8	80
5&6 (TH169 culverts)	749.0	748.7	Shoulder Elevation 746.7[2] Centerline 747.6[2]	120

[1]Measured at the upstream side of the culvert.

[2] Measured at the low point of TH 169, located north of 150th Street

The following summarizes the key findings for existing conditions:

- MnDOT Hydraulic Guidance for the minimum overtopping frequency is the 50-year event for TH 169, based on the ADT. There is approximately 2.0-feet of water (measured at the shoulder) over TH 169 for the 50-year event.
- Based on the modeling, overtopping occurs starting at the 10-year event.
- The 50-year event also overtops old TH 169 and the Union Pacific Railroad Spur.
- The 50-year high water level extends north into the project area.

The Minnesota River is downstream of Picha Creek. The FIRM panel (**Appendix C**) shows a Minnesota River floodplain elevation of 725 near where Picha Creek discharges to the river. It was therefore assumed that the tailwater from the river does not impact the high water levels in Picha Creek.

It is important to note that the modeling assumes that the culverts are not blocked by sediment or debris. A significant amount of sediment load from the upstream tributary area deposits at the entrance to this series of culverts which would impact the capacity.

Proposed Improvements

The following modifications are needed in order to meet MnDOT criteria and eliminate TH169 overtopping for the 50-year event:

- Replace TH 169 culverts with dual 14’ x 7’ box culverts
- Replace Union Pacific Railroad Spur with dual 14’ x 7’ box culverts
- Eliminate the existing culvert under the Old TH169 alignment unless this road is needed for maintenance access

Table 3 lists the existing and proposed floodplain elevations.

Table 3 – Proposed Conditions Modeling Results

Culvert ID	100-year Floodplain Elevation		50-year Floodplain Elevation	
	Existing	Proposed	Existing	Proposed
2&3 (RR Spur culverts)	748.3	744.2	748.1	743.7
4 (old TH 169 culvert)	748.3	N/A	748.1	N/A
5&6 (TH169 culverts)	749.0	747.7	748.7	746.1

The existing bridge under the mainline Union Pacific Railroad is included in the HECRAS model. This bridge is sufficient to pass the proposed flow without any modifications.

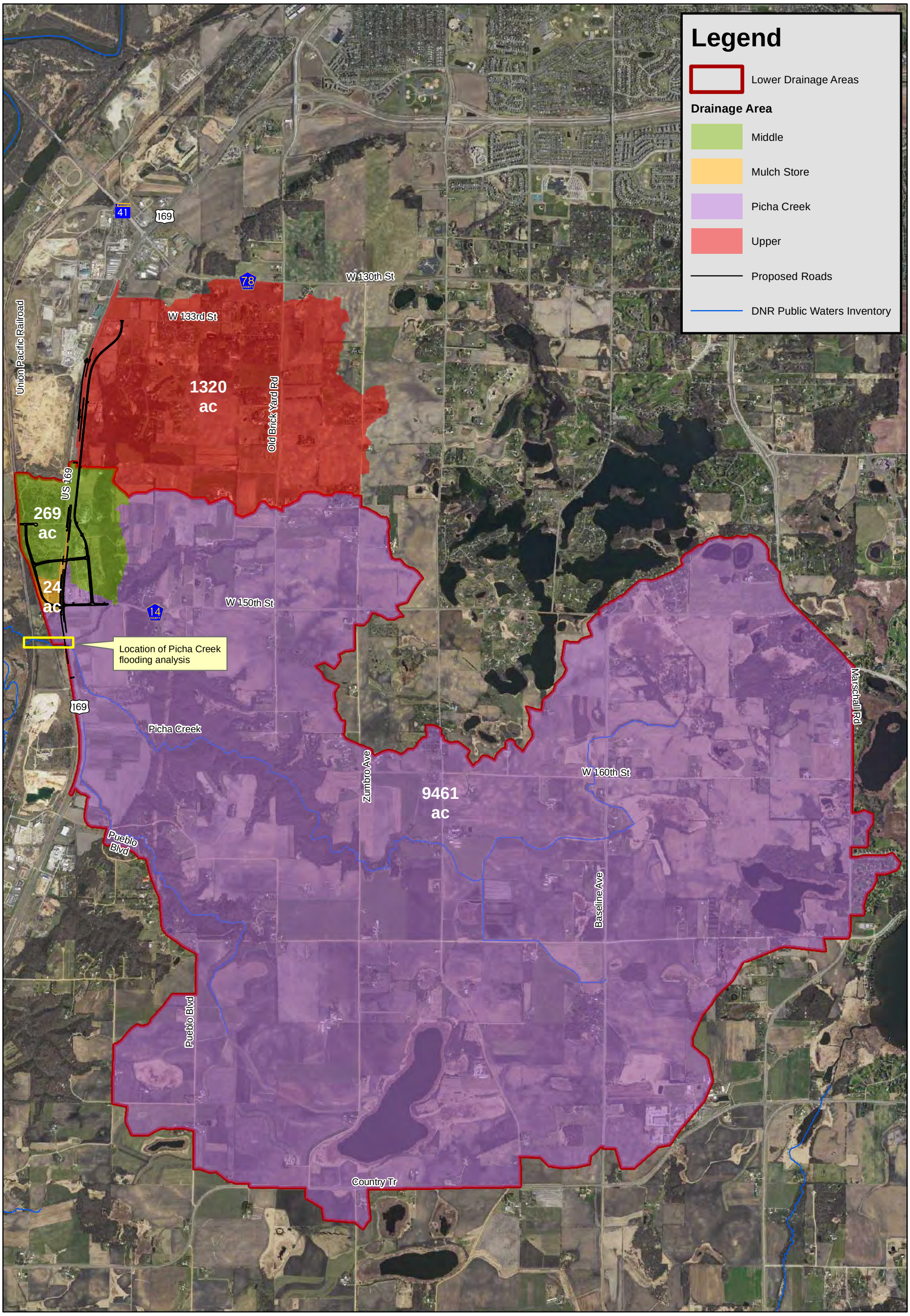
The culvert replacements will require permits and/or coordination with the following agencies:

- Picha Creek is a public waterbody and a permit will be required from the Department of Natural Resources (DNR).
- The proposed culverts are classified as a bridge and will require MnDOT review. The preliminary Hydraulic Assessments are included in **Appendix D**.
- Coordination with the Union Pacific Railroad for work within their right-of-way
- Coordination with the DNR and Scott County WMO on the reduction in the floodplain elevation and increase in peak discharge downstream.

The following justifications are provided for the increase in discharge rate:

1. The Minnesota River and Louisville Swamp are immediately downstream of the project. The increase in peak discharge is negligible in comparison to the flow in the river.
2. There are no properties downstream that are impacted
3. There is no increase in the channel velocity downstream of the railroad culverts.
4. The culvert replacement resolves existing significant flood issues for TH 169, Union Pacific Railroad Spur and multiple properties adjacent to the low point of TH 169.

Appendix A
Figures



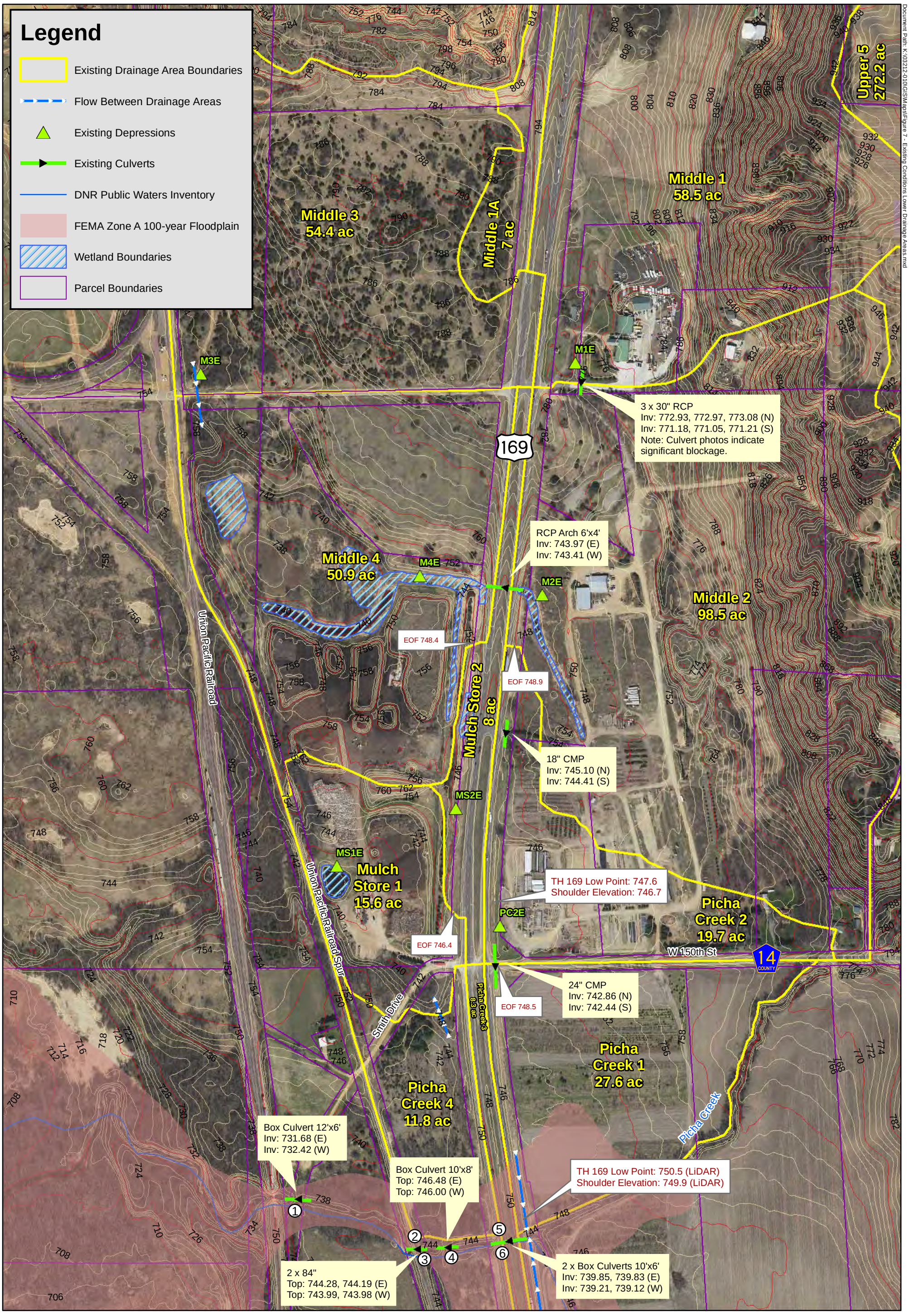
Document Path: K:\03212-010\GIS\Maps\Figure 2 - Drainage Areas.mxd

Figure 1: Drainage Area Map

Trunk Highway 169 / CSAH 14 Over Pass Project
Scott County, MN

0 1,400 2,800 Feet

N



Document Path: K:\03212-010\GIS\Maps\Figure 7 - Existing Conditions Lower Drainage Areas.mxd

Scott

Figure 2: Existing Conditions Lower Drainage Areas

Trunk Highway 169 / CSAH 14 Overpass Project
Scott County, MN

0 200 400 Feet

N

WSB

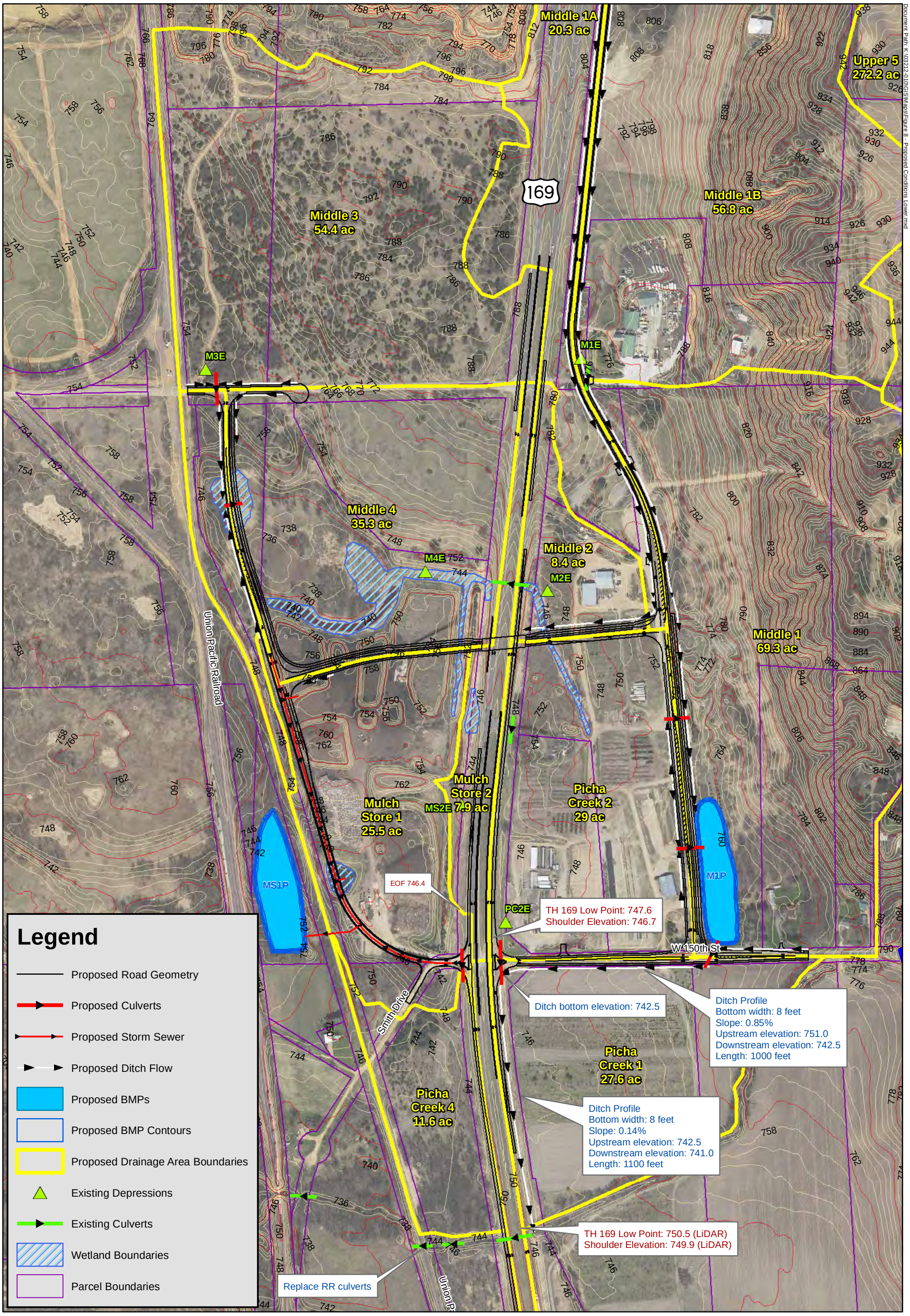


Figure 3: Proposed Conditions Lower Drainage Areas

Trunk Highway 169 / CSAH 14 Overpass Project
Scott County, MN

0 200 400 Feet

N

Appendix B
Streamstats

StreamStats Report

Region ID:

MN

Workspace ID:

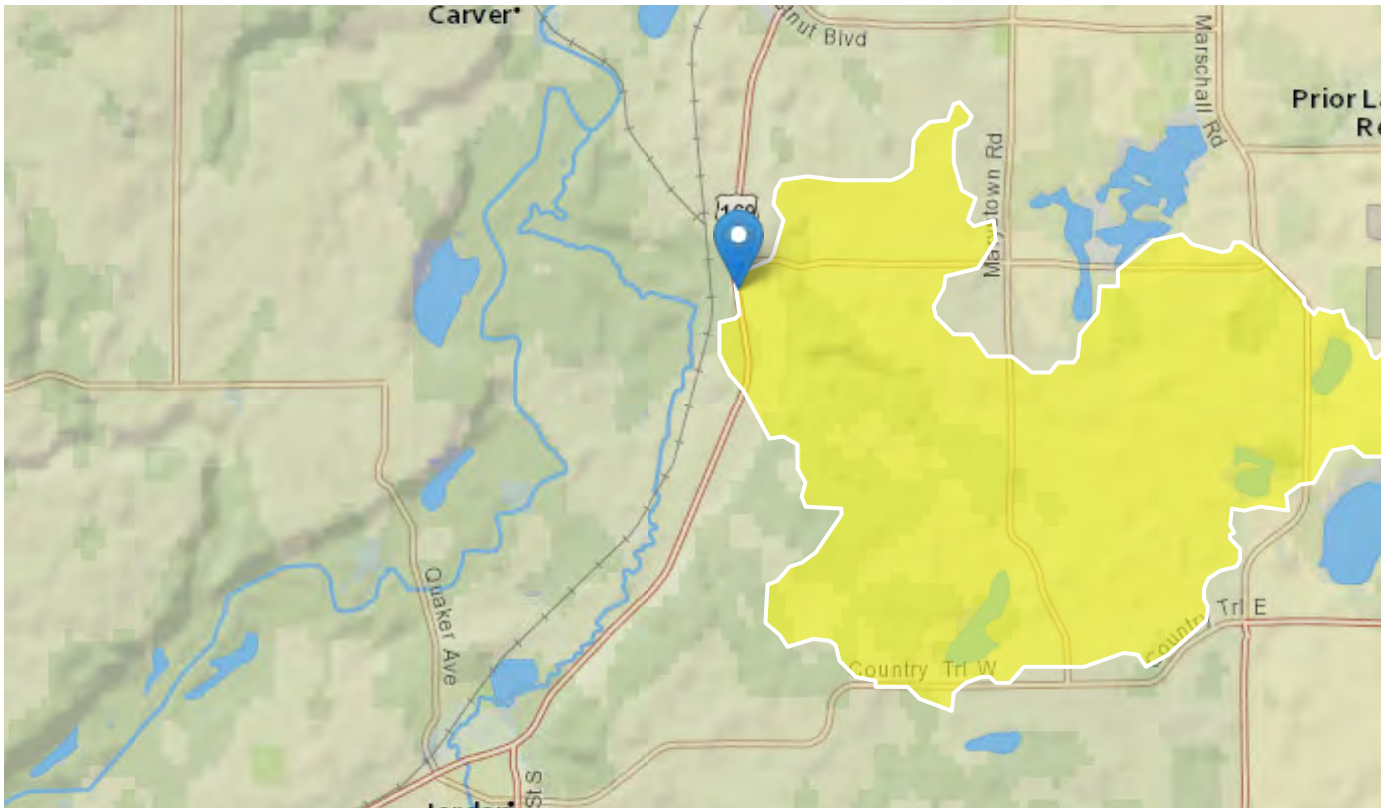
MN20170204093534902000

Clicked Point (Latitude, Longitude):

44.72945, -93.58807

Time:

2017-02-04 10:36:19 -0600



Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	15.75	square miles
CSL10_85	Change in elevation divided by length between points 10 and 85 percent of distance along main channel to basin divide - main channel method not known	27.7	feet per mi
LAKEAREA	Percentage of Lakes and Ponds	2.29	percent
GENRO	Generalized mean annual runoff in Minnesota 1951-85	5.61	inches

Peak-Flow Statistics Parameters [100.00 Percent Region D]

Parameter Code	Parameter Description	Value	Min Limit	Max Limit
DRNAREA	Drainage Area	15.75	0.15	2640
GENRO	Generalized Runoff	5.61	2.15	7.8
CSL10_85	Stream Slope 10 and 85 Method	27.7	1.49	77.2
LAKEAREA	Percent Lakes and Ponds	2.29	0	14

Peak-Flow Statistics Flow Report [100.00 Percent Region D]

Statistic	Value	Unit	Prediction Error (Percent)	Lower Prediction Interval	Upper Prediction Interval
1.5 Year Peak Flood	158	ft^3/s	56.3	55.1	342
2 Year Peak Flood	226	ft^3/s	56.2	89.2	461
5 Year Peak Flood	448	ft^3/s	49.7	201	846
10 Year Peak Flood	634	ft^3/s	42	287	1190
25 Year Peak Flood	910	ft^3/s	43.5	399	1750
50 Year Peak Flood	1150	ft^3/s	59.7	481	2260
100 Year Peak Flood	1420	ft^3/s	48.3	565	2890
500 Year Peak Flood	2130	ft^3/s	78	733	4700

Peak-Flow Statistics Flow Report [Area-Averaged]

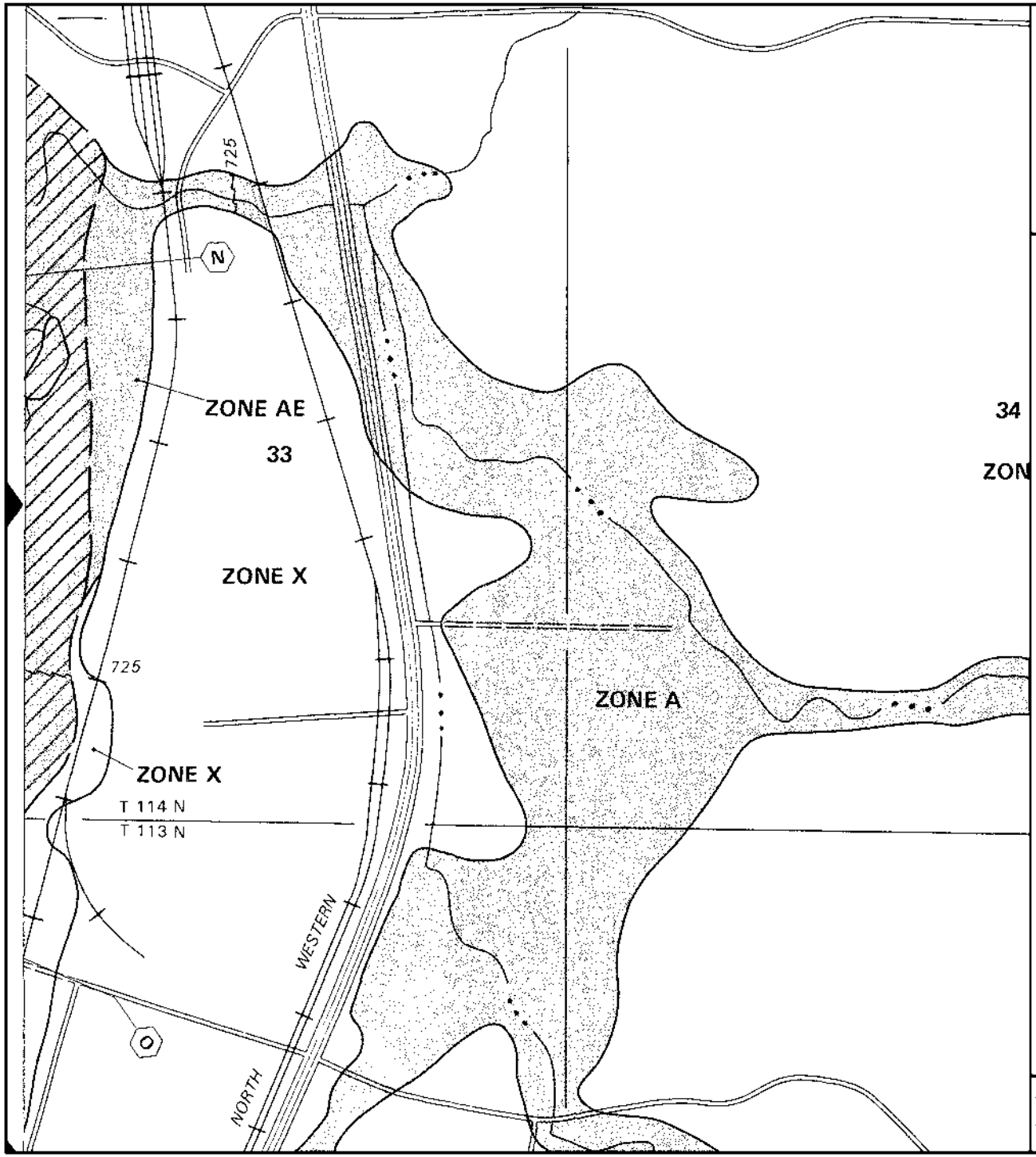
Statistic	Value	Unit
1.5 Year Peak Flood	158	ft^3/s
2 Year Peak Flood	226	ft^3/s
5 Year Peak Flood	448	ft^3/s
10 Year Peak Flood	634	ft^3/s
25 Year Peak Flood	910	ft^3/s

Statistic	Value	Unit
50 Year Peak Flood	1150	ft^3/s
100 Year Peak Flood	1420	ft^3/s
500 Year Peak Flood	2130	ft^3/s

Peak-Flow Statistics Citations

Lorenz, D.L., Sanocki, C.A., and Kocian, M.J.,2009, Techniques for Estimating the Magnitude and Frequency of Peak Flows on Small Streams in Minnesota Based on Data through Water Year 2005: U.S. Geological Survey Scientific Investigations Report 2009-5250, 54 p. (http://pubs.usgs.gov/sir/2009/5250/pdf/sir2009-5250.pdf)

Appendix C
FIRMETTE



APPROXIMATE SCALE IN FEET

1000 0 1000

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

SCOTT COUNTY, MINNESOTA
(UNINCORPORATED AREAS)

PANEL 20 OF 125

COMMUNITY-PANEL NUMBER
270428 0020 C

MAP REVISED:
FEBRUARY 19, 1987

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

Appendix D
PRELIMINARY HYDRAULIC ANALYSIS and RISK ASSESSMENT

Bridge Number 8829 (TH 169)

Date January 6, 2017

* Stream name	Picha Creek
Drainage area	14.8 square miles
Flood of record	Unknown
Maximum observed highwater elevation	Unknown
* Design flood (50 - year frequency)	1150 cfs
Road sag point elevation	747.6
Design stage	746.32
Total stage increase	-0.24 ft
* Headwater elevation	746.08
Stage increase of the inplace condition	2.36 ft
Min. waterway opening below elevation	196 ft2 at el. 746.08
Low member at or above elevation	N/A
Mean velocity through structure	6.0 fps
Main channel velocity	12.6 fps
Overtopping flood or Greatest flood (500 -year frequency)	1420 cfs (100-year)
Road sag point elevation	747.6
Stage	747.88
Total stage increase	-0.15 ft
* Headwater elevation	747.73
Stage increase of the inplace condition	1.09 ft
Mean velocity through structure	7.3 fps
* Basic flood (100-year frequency)	1420 cfs
Stage	747.88
Total stage increase	-0.15 ft
* Headwater elevation	747.73
Stage increase of the inplace condition	1.09 ft
Min. overflow area above sag point elev.	n/a
Mean overflow velocity	n/a
Mean velocity through structure	7.3 fps
Approximate flowline elevation	739.85
Estimated pier scour elevation	N/A
Year frequency scour was calculated for	N/A
Skew	0
Scour Code	E - Culvert

*Items to be shown on Grading Plan

*Elevation datum NAVD88 [adjusted]

Bridge Number 8829 (TH 169)

Date January 6, 2017

* Stream name	Picha Creek
Drainage area	14.8 square miles
Flood of record	Unknown
Maximum observed highwater elevation	Unknown
* Design flood (50 - year frequency)	1150 cfs
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Design stage	746.32
Total stage increase	-0.24 ft
* Headwater elevation	746.08
Stage increase of the inplace condition	2.36 ft
Min. waterway opening below elevation	196 ft2 at el. 746.08
Low member at or above elevation	N/A
Mean velocity through structure	6.0 fps
Main channel velocity	12.6 fps
Overtopping flood or Greatest flood (500 -year frequency)	1420 cfs (100-year)
Road sag point elevation	747.6
Stage	747.88
Total stage increase	-0.15 ft
* Headwater elevation	747.73
Stage increase of the inplace condition	1.09 ft
Mean velocity through structure	7.3 fps
* Basic flood (100-year frequency)	1420 cfs
Stage	747.88
Total stage increase	-0.15 ft
* Headwater elevation	747.73
Stage increase of the inplace condition	1.09 ft
Min. overflow area above sag point elev.	n/a
Mean overflow velocity	n/a
Mean velocity through structure	7.3 fps
Approximate flowline elevation	739.85
Estimated pier scour elevation	N/A
Year frequency scour was calculated for	N/A
Skew	0
Scour Code	E - Culvert

*Items to be shown on Grading Plan

*Elevation datum NAVD88 [adjusted]

RISK ASSESSMENT FOR ENCROACHMENT DESIGN

Date: 2/6/17

District: Metro **County:** Scott **Vicinity of:** TH169/CSAH14

DATA REQUIREMENTS

1. **Location of Crossing:** Union Pacific RR Spur **C.S.** **M.P.**

   Sec. 22 **T** 115N **R** 23W

2. **Name of Stream:** Picha Creek **Bridge No. Old:** Unknown **New:**

3. **Current ADT:** N/A **Projected ADT:** N/A

4. **Practicable detour available** ☑ Yes ☐ No

If no is checked, please explain:

If there is no practicable detour available, then the use of the road must be analyzed. Considerations such as emergency vehicle access, emergency supply and evacuation route, and the need for school bus, milk and mail routes should be studied. Factors to consider for this analysis include design frequency, depth, duration, and frequency of inundation if appropriate, and available funding.

5. **Hydraulic Data: (Fill in as appropriate)**

   Elevation Datum: NAVD88

Q_2 =		cfs	HW_2 Elevation		ft
Q_5 =		cfs	HW_5 Elevation		ft
Q_{10} =	634	cfs	HW_{10} Elevation	742.25	ft
Q_{25} =		cfs	HW_{25} Elevation		ft
Q_{50} =	1150	cfs	HW_{50} Elevation	743.67	ft
Q_{100} =	1420	cfs	HW_{100} Elevation	744.2	ft
Q_{500} =		cfs	HW_{500} Elevation		ft

Approximate Flowline Elevation: 737.28 Ft

Design Frequency Event: ☐ 100-yr ☑ 50-yr ☐ 25-yr ☐ 10-yr

Reasons for selecting Design Frequency: Consistent with TH 169 Criteria per MN State Statute

6. **Magnitude and Frequency of the smaller of "Overtopping" or "500 yr." (Greatest) flood:** 100-year

7. **Low member elevation:** 744.28

8. **Minimum roadway overflow elevation if appropriate:** 747.6 Union Pacific Railroad Spur

9. **Elevation of high risk property, i.e. residences:** 747.0
   Other buildings 747.0

10. **Horizontal location of overflow:**
    ☐ At Structure (See 12) ☑ Not At Structure:

11. **Type of proposed structure:**
    ☐ Bridge (See 12) ☑ Culvert(s)

12	If the proposed structure is a bridge with the sag point located on the bridge and there is ice and debris potential, strong consideration should be given to using Q_{50} as design discharge with 3' of clearance between the 50 year tailwater stage and low member.	
1.	**BACKWATER DAMAGE** - Major flood damage in this context refers to shopping centers, hospitals, chemical plants, power plants, housing developments, etc.	**LTEC Design**
1a.	Is the overtopping flood greater than the 100 yr. flood? ☑ Yes (Go to 1b) ☐ No (Go to 1e)	
1b.	Is the overtopping flood greater than the "greatest" flood (500 yr. Frequency)? ☐ Yes (Go to 1d) ☑ No (Go to 1c)	
1c.	Is there major flood damage potential for the overtopping flood? ☐ No (Go to 1e)	☑ Yes (Go to 1e)
1d.	Is there major flood damage potential for the greatest flood (500 year frequency)? ☐ No (Go to 1e)	☐ Yes (Go to 1e)
1e.	Will there be flood damage potential to residence(s) or other buildings during a 100 yr. flood? ☑ Yes (Go to 1f) ☐ No (Go to 2)	
1f.	Could this flood damage occur even if the roadway crossing wasn't there? ☑ Yes (Go to 1g) ☐ No (Go to 1h)	
1g.	Could this flood damage be significantly increased by the backwater caused by the proposed crossing? ☐ Yes (Go to 1h) ☑ No (Go to 2)	
1h.	Could the stream crossing be designed in such a manner so as to minimize this potential flood damage? ☐ Yes (Go to 1i) ☐ No (Go to 2)	
1i.	Does the value of the building(s) and/or its contents have sufficient value to justify further evaluation of risk and potential flood damage? ☐ No (Go to 2)	☐ Yes (Go to 2)
2.	**TRAFFIC RELATED LOSSES**	
2a.	Is the overtopping flood greater than the "greatest" flood (500 yr. frequency)? ☐ Yes (Go to 3) ☑ No (Go to 2b)	
2b.	Does the ADT exceed 50 vehicles per day? ☑ Yes (Go to 2c) ☐ No (Go to 3)	
2c.	Would the (duration of road closure in days) multiplied by the (length of detour minus the length of normal route in miles) exceed 20? ☐ Yes (Go to 2d) ☑ No (Go to 3)	
2d.	Does the annual risk cost for traffic related costs exceed 10% of the annual capital costs? ☐ No (Go to 3) (See figures A and B – Appendix A(2) - for Assistance)	☐ Yes (Go to 3)

3. ROADWAY AND/OR STRUCTURE REPAIR COSTS	
3a. Is the overtopping flood less than a 100 year frequency flood? ☐ Yes (Go to 3b) ☑ No (Go to 3i)	
3b. Compare the Tailwater (TW) elevation with the roadway sag point elevation for the overtopping flood. Check the appropriate category. ☐ When TW is above the sag point (Go to 4) ☐ TW is between 0 and 0.5' below sag point (Go to 3c) ☐ TW is between 0.5' and 1.0' below sag point (Go to 3d) ☐ When TW is 1.0' and 2.0' below sag point (Go to 3e) ☐ When TW is more than 2.0' below sag point (Go to 3g)	
3c. Does the embankment have a good erosion resistant vegetative cover? ☐ Yes (Go to 3i) ☐ No (Go to 3d)	
3d. Is the shoulder constructed from erosion resistant material such as paved, coarse gravel, or clay type soil? ☐ Yes (Go to 3i) ☐ No (Go to 3e)	
3e. Will the duration of overtopping for the 25-year flood exceed 1 hour? ☐ Yes (Go to 3f) ☐ No (Go to 3i)	
3f. Is the embankment constructed from erosion resistant material such as a clay type soil? ☐ Yes (Go to 3i) ☐ No (Go to 3g)	
3g. Is the overtopping flood less than a 25-year frequency flood? ☐ Yes (Go to 3h) ☐ No (Go to 3i)	
3h. Will the cost of protecting the roadway and/or embankment from severe damage caused by overtopping exceed the cost of providing additional culvert or bridge capacity? ☐ No (Go to 3i);	☐ Yes (Go to 3i)
3i. Is there damage potential to the structure caused by scour, ice, debris or other means during the lesser of the overtopping flood or the 100 year flood? ☐ Yes (Go to 3j) ☑ No (Go to 4)	
3j. Will the cost of protecting the structure from damage exceed the cost of providing additional culvert or bridge water capacity? ☐ No (Go to 4); protecting abutments from scour by riprap.	☐ Yes (Go to 4)
4. Will the capital cost of the structure exceed $1,000,000? ☑ No (Go to 5);	☐ Yes (Go to 5)
5. In your opinion, are there any other factors that you feel should require further study through a risk analysis? ☑ No (Go to 6);	☐ Yes (Indicate)

6. If there are no ✓'s in the LTEC Design column on the right, proceed with the design, selecting the lowest acceptable grade line and the smallest waterway opening consistent with the constraints imposed on the project. The risk assessment has demonstrated that potential flood damage costs, traffic related costs, roadway and/or structure repair costs are minor and therefore disregarded for this project.

One or more ✓'s in the LTEC Design column indicates further analysis in the category checked may be required utilizing the LTEC design process or justification (below) why it is not required.

JUSTIFICATION:

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

Signature: _____

License Number: 44235 Date: 2/7/17

RISK ASSESSMENT FOR ENCROACHMENT DESIGN

Date: 2/6/17

District: Metro **County:** Scott **Vicinity of:** TH169/CSAH14

DATA REQUIREMENTS

1. **Location of Crossing:** TH 169 **C.S.** _____ **M.P.** _____

   Sec. 22 **T** 115N **R** 23W

2. **Name of Stream:** Picha Creek **Bridge No. Old:** 8829 **New:** _____

3. **Current ADT:** 29,000 **Projected ADT:** 49,800

4. **Practicable detour available** ☑ Yes ☐ No

If no is checked, please explain: _____

If there is no practicable detour available, then the use of the road must be analyzed. Considerations such as emergency vehicle access, emergency supply and evacuation route, and the need for school bus, milk and mail routes should be studied. Factors to consider for this analysis include design frequency, depth, duration, and frequency of inundation if appropriate, and available funding.

5. **Hydraulic Data: (Fill in as appropriate)**

   Elevation Datum: NAVD88

Q_2 =		cfs	HW_2 Elevation		ft
Q_5 =		cfs	HW_5 Elevation		ft
Q_{10} =	634	cfs	HW_{10} Elevation	745.25	ft
Q_{25} =		cfs	HW_{25} Elevation		ft
Q_{50} =	1150	cfs	HW_{50} Elevation	746.08	ft
Q_{100} =	1420	cfs	HW_{100} Elevation	747.73	ft
Q_{500} =		cfs	HW_{500} Elevation		ft

Approximate Flowline Elevation: 739.85 Ft

Design Frequency Event: ☐ 100-yr ☑ 50-yr ☐ 25-yr ☐ 10-yr

Reasons for selecting Design Frequency: MN State Statute 6115.0231

6. **Magnitude and Frequency of the smaller of "Overtopping" or "500 yr." (Greatest) flood:** 100-year

7. **Low member elevation:** 746.85

8. **Minimum roadway overflow elevation if appropriate:** 747.6 TH169 north of 150th Street

9. **Elevation of high risk property, i.e. residences:** 747.0

   Other buildings 747.0

10. **Horizontal location of overflow:**

    ☐ At Structure (See 12) ☑ Not At Structure:

11. **Type of proposed structure:**

    ☐ Bridge (See 12) ☑ Culvert(s)

12 If the proposed structure is a bridge with the sag point located on the bridge and there is ice and debris potential,

strong consideration should be given to using Q_{50} as design discharge with 3' of clearance between the 50 year tailwater stage and low member.

		LTEC Design
1.	**BACKWATER DAMAGE** - Major flood damage in this context refers to shopping centers, hospitals, chemical plants, power plants, housing developments, etc.	
1a.	Is the overtopping flood greater than the 100 yr. flood? ☐ Yes (Go to 1b) ☑ No (Go to 1e)	
1b.	Is the overtopping flood greater than the "greatest" flood (500 yr. Frequency)? ☐ Yes (Go to 1d) ☐ No (Go to 1c)	
1c.	Is there major flood damage potential for the overtopping flood? ☐ No (Go to 1e)	☐ Yes (Go to 1e)
1d.	Is there major flood damage potential for the greatest flood (500 year frequency)? ☐ No (Go to 1e)	☐ Yes (Go to 1e)
1e.	Will there be flood damage potential to residence(s) or other buildings during a 100 yr. flood? ☑ Yes (Go to 1f) ☐ No (Go to 2)	
1f.	Could this flood damage occur even if the roadway crossing wasn't there? ☑ Yes (Go to 1g) ☐ No (Go to 1h)	
1g.	Could this flood damage be significantly increased by the backwater caused by the proposed crossing? ☐ Yes (Go to 1h) ☑ No (Go to 2)	
1h.	Could the stream crossing be designed in such a manner so as to minimize this potential flood damage? ☐ Yes (Go to 1i) ☐ No (Go to 2)	
1i.	Does the value of the building(s) and/or its contents have sufficient value to justify further evaluation of risk and potential flood damage? ☐ No (Go to 2)	☐ Yes (Go to 2)
2.	**TRAFFIC RELATED LOSSES**	
2a.	Is the overtopping flood greater than the "greatest" flood (500 yr. frequency)? ☐ Yes (Go to 3) ☑ No (Go to 2b)	
2b.	Does the ADT exceed 50 vehicles per day? ☑ Yes (Go to 2c) ☐ No (Go to 3)	
2c.	Would the (duration of road closure in days) multiplied by the (length of detour minus the length of normal route in miles) exceed 20? ☐ Yes (Go to 2d) ☑ No (Go to 3)	
2d.	Does the annual risk cost for traffic related costs exceed 10% of the annual capital costs? ☐ No (Go to 3) (See figures A and B – Appendix A(2) - for Assistance)	☐ Yes (Go to 3)
3.	**ROADWAY AND/OR STRUCTURE REPAIR COSTS**	

3a.	Is the overtopping flood less than a 100 year frequency flood? ☐ Yes (Go to 3b) ☑ No (Go to 3i)	
3b.	Compare the Tailwater (TW) elevation with the roadway sag point elevation for the overtopping flood. Check the appropriate category. ☐ When TW is above the sag point (Go to 4) ☐ TW is between 0 and 0.5' below sag point (Go to 3c) ☐ TW is between 0.5' and 1.0' below sag point (Go to 3d) ☐ When TW is 1.0' and 2.0' below sag point (Go to 3e) ☐ When TW is more than 2.0' below sag point (Go to 3g)	
3c.	Does the embankment have a good erosion resistant vegetative cover? ☐ Yes (Go to 3i) ☐ No (Go to 3d)	
3d.	Is the shoulder constructed from erosion resistant material such as paved, coarse gravel, or clay type soil? ☐ Yes (Go to 3i) ☐ No (Go to 3e)	
3e.	Will the duration of overtopping for the 25-year flood exceed 1 hour? ☐ Yes (Go to 3f) ☐ No (Go to 3i)	
3f.	Is the embankment constructed from erosion resistant material such as a clay type soil? ☐ Yes (Go to 3i) ☐ No (Go to 3g)	
3g.	Is the overtopping flood less than a 25-year frequency flood? ☐ Yes (Go to 3h) ☐ No (Go to 3i)	
3h.	Will the cost of protecting the roadway and/or embankment from severe damage caused by overtopping exceed the cost of providing additional culvert or bridge capacity? ☐ No (Go to 3i);	☐ Yes (Go to 3i)
3i.	Is there damage potential to the structure caused by scour, ice, debris or other means during the lesser of the overtopping flood or the 100 year flood? ☐ Yes (Go to 3j) ☑ No (Go to 4)	
3j.	Will the cost of protecting the structure from damage exceed the cost of providing additional culvert or bridge water capacity? ☐ No (Go to 4); protecting abutments from scour by riprap.	☐ Yes (Go to 4)
4.	Will the capital cost of the structure exceed $1,000,000? ☑ No (Go to 5);	☐ Yes (Go to 5)
5.	In your opinion, are there any other factors that you feel should require further study through a risk analysis? ☑ No (Go to 6);	☐ Yes (Indicate)

6. If there are no ✓'s in the LTEC Design column on the right, proceed with the design, selecting the lowest acceptable grade line and the smallest waterway opening consistent

with the constraints imposed on the project. The risk assessment has demonstrated that potential flood damage costs, traffic related costs, roadway and/or structure repair costs are minor and therefore disregarded for this project.

One or more ✓'s in the LTEC Design column indicates further analysis in the category checked may be required utilizing the LTEC design process or justification (below) why it is not required.

JUSTIFICATION:

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

Signature: _____

License Number: 44235 Date: 2/7/17

Attachment G – Flood Risk Assessments

G.1 – Floodplain Crossing A Risk Assessment

G.2 – Floodplain Crossing B Risk Assessment

G.3 – Floodplain Crossing C Risk Assessment

G.4 – Floodplain Crossing E Risk Assessment

G.5 – Floodplain Crossing F Risk Assessment

G.6 – Floodplain Crossing H Risk Assessment

G.7 – Floodplain Crossing I Risk Assessment

G.8 – Floodplain Crossing J Risk Assessment

G.9 – Floodplain Crossing at Picha Creek (TH 169 Culvert; Bridge #8829) Risk Assessment

G.10 – Floodplain Crossing at Picha Creek (Union Pacific Railroad Culvert) Risk Assessment

G.1 – Floodplain Crossing A Risk Assessment

RISK ASSESSMENT FOR ENCROACHMENT DESIGN

Date: 1/31/17

District: Metro **County:** Scott **Vicinity of:** TH 169 Interchange at /TH 41/CSAH 78

DATA REQUIREMENTS

1. **Location of Crossing:** NE Frontage Road STA 207+00 **C.S.** **M.P.**

   Sec. 22 **T** 115N **R** 23W

2. **Name of Stream:** N/A **Bridge No. Old:** N/A **New:**

3. **Current ADT:** N/A **Projected ADT:** 2,500

4. **Practicable detour available** ☑ Yes ☐ No

If no is checked, please explain:

If there is no practicable detour available, then the use of the road must be analyzed. Considerations such as emergency vehicle access, emergency supply and evacuation route, and the need for school bus, milk and mail routes should be studied. Factors to consider for this analysis include design frequency, depth, duration, and frequency of inundation if appropriate, and available funding.

5. **Hydraulic Data: (Fill in as appropriate)**

   Elevation Datum: NAVD88

Q_2 =		cfs	HW_2 Elevation		ft
Q_5 =		cfs	HW_5 Elevation		ft
Q_{10} =	119	cfs	HW_{10} Elevation	825.5	ft
Q_{25} =	175	cfs	HW_{25} Elevation	826.1	ft
Q_{50} =	227	cfs	HW_{50} Elevation	826.4	ft
Q_{100} =	285	cfs	HW_{100} Elevation	826.6	ft
Q_{500} =	457	cfs	HW_{500} Elevation	826.9	ft

Approximate Flowline Elevation: 823.0 Ft

Design Frequency Event: ☐ 100-yr ☑ 50-yr ☐ 25-yr ☐ 10-yr

Reasons for selecting Design Frequency: MN State Statute 6115.0231

6. **Magnitude and Frequency of the smaller of "Overtopping" or "500 yr." (Greatest) flood:** 227 cfs, 50-year

7. **Low member elevation:** 826.0

8. **Minimum roadway overflow elevation if appropriate:** 826.4 at SE Frontage Road STA 213+00

9. **Elevation of high risk property, i.e. residences:** 848

   Other buildings 830 (bowling alley)

10. **Horizontal location of overflow:**

    ☐ At Structure (See 12) ☑ Not At Structure:

11. **Type of proposed structure:**

    ☐ Bridge (See 12) ☑ Culvert(s)

12	If the proposed structure is a bridge with the sag point located on the bridge and there is ice and debris potential, strong consideration should be given to using Q_{50} as design discharge with 3' of clearance between the 50 year tailwater stage and low member.	
1.	**BACKWATER DAMAGE** - Major flood damage in this context refers to shopping centers, hospitals, chemical plants, power plants, housing developments, etc.	**LTEC Design**
1a.	Is the overtopping flood greater than the 100 yr. flood? ☐ Yes (Go to 1b) ☑ No (Go to 1e)	
1b.	Is the overtopping flood greater than the "greatest" flood (500 yr. Frequency)? ☐ Yes (Go to 1d) ☐ No (Go to 1c)	
1c.	Is there major flood damage potential for the overtopping flood? ☐ No (Go to 1e)	☐ Yes (Go to 1e)
1d.	Is there major flood damage potential for the greatest flood (500 year frequency)? ☐ No (Go to 1e)	☐ Yes (Go to 1e)
1e.	Will there be flood damage potential to residence(s) or other buildings during a 100 yr. flood? ☐ Yes (Go to 1f) ☑ No (Go to 2)	
1f.	Could this flood damage occur even if the roadway crossing wasn't there? ☐ Yes (Go to 1g) ☐ No (Go to 1h)	
1g.	Could this flood damage be significantly increased by the backwater caused by the proposed crossing? ☐ Yes (Go to 1h) ☐ No (Go to 2)	
1h.	Could the stream crossing be designed in such a manner so as to minimize this potential flood damage? ☐ Yes (Go to 1i) ☐ No (Go to 2)	
1i.	Does the value of the building(s) and/or its contents have sufficient value to justify further evaluation of risk and potential flood damage? ☐ No (Go to 2)	☐ Yes (Go to 2)
2.	**TRAFFIC RELATED LOSSES**	
2a.	Is the overtopping flood greater than the "greatest" flood (500 yr. frequency)? ☐ Yes (Go to 3) ☑ No (Go to 2b)	
2b.	Does the ADT exceed 50 vehicles per day? ☑ Yes (Go to 2c) ☐ No (Go to 3)	
2c.	Would the (duration of road closure in days) multiplied by the (length of detour minus the length of normal route in miles) exceed 20? ☐ Yes (Go to 2d) ☑ No (Go to 3)	
2d.	Does the annual risk cost for traffic related costs exceed 10% of the annual capital costs? ☐ No (Go to 3) (See figures A and B – Appendix A(2) - for Assistance)	☐ Yes (Go to 3)

3. ROADWAY AND/OR STRUCTURE REPAIR COSTS

3a. Is the overtopping flood less than a 100 year frequency flood?

☑ Yes (Go to 3b) ☐ No (Go to 3i)

3b. Compare the Tailwater (TW) elevation with the roadway sag point elevation for the overtopping flood. Check the appropriate category.

☐ When TW is above the sag point (Go to 4)

☑ TW is between 0 and 0.5' below sag point (Go to 3c)

☐ TW is between 0.5' and 1.0' below sag point (Go to 3d)

☐ When TW is 1.0' and 2.0' below sag point (Go to 3e)

☐ When TW is more than 2.0' below sag point (Go to 3g)

3c. Does the embankment have a good erosion resistant vegetative cover?

☑ Yes (Go to 3i) ☐ No (Go to 3d)

3d. Is the shoulder constructed from erosion resistant material such as paved, coarse gravel, or clay type soil?

☐ Yes (Go to 3i) ☐ No (Go to 3e)

3e. Will the duration of overtopping for the 25-year flood exceed 1 hour?

☐ Yes (Go to 3f) ☐ No (Go to 3i)

3f. Is the embankment constructed from erosion resistant material such as a clay type soil?

☐ Yes (Go to 3i) ☐ No (Go to 3g)

3g. Is the overtopping flood less than a 25-year frequency flood?

☐ Yes (Go to 3h) ☐ No (Go to 3i)

3h. Will the cost of protecting the roadway and/or embankment from severe damage caused by overtopping exceed the cost of providing additional culvert or bridge capacity?

☐ No (Go to 3i); ☐ Yes (Go to 3i)

3i. Is there damage potential to the structure caused by scour, ice, debris or other means during the lesser of the overtopping flood or the 100 year flood?

☐ Yes (Go to 3j) ☑ No (Go to 4)

3j. Will the cost of protecting the structure from damage exceed the cost of providing additional culvert or bridge water capacity?

☐ No (Go to 4); protecting abutments from scour by riprap. ☐ Yes (Go to 4)

4. Will the capital cost of the structure exceed $1,000,000?

☑ No (Go to 5); ☐ Yes (Go to 5)

5. In your opinion, are there any other factors that you feel should require further study through a risk analysis?

☑ No (Go to 6); ☐ Yes (Indicate)

6. If there are no ✓'s in the LTEC Design column on the right, proceed with the design, selecting the lowest acceptable grade line and the smallest waterway opening consistent with the constraints imposed on the project. The risk assessment has demonstrated that potential flood damage costs, traffic related costs, roadway and/or structure repair costs are minor and therefore disregarded for this project.

One or more ✓'s in the LTEC Design column indicates further analysis in the category checked may be required utilizing the LTEC design process or justification (below) why it is not required.

JUSTIFICATION:

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

Signature: _____

License Number: 44235 Date: 1/31/17

G.2 – Floodplain Crossing B Risk Assessment

RISK ASSESSMENT FOR ENCROACHMENT DESIGN

Date: 1/27/17

District: Metro **County:** Scott **Vicinity of:** TH 169 and CSAH 14

DATA REQUIREMENTS

1. **Location of Crossing:** TH 169 STA 594+00 **C.S.** **M.P.**

   Sec. 21 **T** 115N **R** 23W

2. **Name of Stream:** N/A **Bridge No. Old:** N/A **New:** N/A

3. **Current ADT:** 29,000 **Projected ADT:** 48,500

4. **Practicable detour available** ☑ Yes ☐ No

If no is checked, please explain:

If there is no practicable detour available, then the use of the road must be analyzed. Considerations such as emergency vehicle access, emergency supply and evacuation route, and the need for school bus, milk and mail routes should be studied. Factors to consider for this analysis include design frequency, depth, duration, and frequency of inundation if appropriate, and available funding.

5. **Hydraulic Data: (Fill in as appropriate)**

   Elevation Datum: NAVD88

Q_2 =		cfs	HW_2 Elevation		ft
Q_5 =		cfs	HW_5 Elevation		ft
Q_{10} =	70.7	cfs	HW_{10} Elevation	797.4	ft
Q_{25} =	99.9	cfs	HW_{25} Elevation	797.8	ft
Q_{50} =	159.4	cfs	HW_{50} Elevation	798.6	ft
Q_{100} =	257.0	cfs	HW_{100} Elevation	800.1	ft
Q_{500} =		cfs	HW_{500} Elevation		ft

Approximate Flowline Elevation: 795.0 Ft

Design Frequency Event: ☐ 100-yr ☑ 50-yr ☐ 25-yr ☐ 10-yr

Reasons for selecting Design Frequency: MN State Statute 6115.0231

6. **Magnitude and Frequency of the smaller of "Overtopping" or "500 yr." (Greatest) flood:** 500-year

7. **Low member elevation:** 798.0

8. **Minimum roadway overflow elevation if appropriate:** 801.25 TH 169

9. **Elevation of high risk property, i.e. residences:** 832

   Other buildings 798 (warehouse)

10. **Horizontal location of overflow:**

    ☐ At Structure (See 12) ☑ Not At Structure:

11. **Type of proposed structure:**

    ☐ Bridge (See 12) ☑ Culvert(s)

12	If the proposed structure is a bridge with the sag point located on the bridge and there is ice and debris potential, strong consideration should be given to using Q_{50} as design discharge with 3' of clearance between the 50 year tailwater stage and low member.	
1.	**BACKWATER DAMAGE** - Major flood damage in this context refers to shopping centers, hospitals, chemical plants, power plants, housing developments, etc.	**LTEC Design**
1a.	Is the overtopping flood greater than the 100 yr. flood? ☑ Yes (Go to 1b) ☐ No (Go to 1e)	
1b.	Is the overtopping flood greater than the "greatest" flood (500 yr. Frequency)? ☐ Yes (Go to 1d) ☑ No (Go to 1c)	
1c.	Is there major flood damage potential for the overtopping flood? ☑ No (Go to 1e)	☐ Yes (Go to 1e)
1d.	Is there major flood damage potential for the greatest flood (500 year frequency)? ☑ No (Go to 1e)	☐ Yes (Go to 1e)
1e.	Will there be flood damage potential to residence(s) or other buildings during a 100 yr. flood? ☑ Yes (Go to 1f) ☐ No (Go to 2)	
1f.	Could this flood damage occur even if the roadway crossing wasn't there? ☑ Yes (Go to 1g) ☐ No (Go to 1h)	
1g.	Could this flood damage be significantly increased by the backwater caused by the proposed crossing? ☐ Yes (Go to 1h) ☑ No (Go to 2)	
1h.	Could the stream crossing be designed in such a manner so as to minimize this potential flood damage? ☐ Yes (Go to 1i) ☐ No (Go to 2)	
1i.	Does the value of the building(s) and/or its contents have sufficient value to justify further evaluation of risk and potential flood damage? ☐ No (Go to 2)	☐ Yes (Go to 2)
2.	**TRAFFIC RELATED LOSSES**	
2a.	Is the overtopping flood greater than the "greatest" flood (500 yr. frequency)? ☐ Yes (Go to 3) ☑ No (Go to 2b)	
2b.	Does the ADT exceed 50 vehicles per day? ☑ Yes (Go to 2c) ☐ No (Go to 3)	
2c.	Would the (duration of road closure in days) multiplied by the (length of detour minus the length of normal route in miles) exceed 20? ☐ Yes (Go to 2d) ☑ No (Go to 3)	
2d.	Does the annual risk cost for traffic related costs exceed 10% of the annual capital costs? ☐ No (Go to 3) (See figures A and B – Appendix A(2) - for Assistance)	☐ Yes (Go to 3)

3. ROADWAY AND/OR STRUCTURE REPAIR COSTS

3a. Is the overtopping flood less than a 100 year frequency flood?

☐ Yes (Go to 3b) ☑ No (Go to 3i)

3b. Compare the Tailwater (TW) elevation with the roadway sag point elevation for the overtopping flood. Check the appropriate category.

☐ When TW is above the sag point (Go to 4)

☐ TW is between 0 and 0.5' below sag point (Go to 3c)

☐ TW is between 0.5' and 1.0' below sag point (Go to 3d)

☐ When TW is 1.0' and 2.0' below sag point (Go to 3e)

☐ When TW is more than 2.0' below sag point (Go to 3g)

3c. Does the embankment have a good erosion resistant vegetative cover?

☐ Yes (Go to 3i) ☐ No (Go to 3d)

3d. Is the shoulder constructed from erosion resistant material such as paved, coarse gravel, or clay type soil?

☐ Yes (Go to 3i) ☐ No (Go to 3e)

3e. Will the duration of overtopping for the 25-year flood exceed 1 hour?

☐ Yes (Go to 3f) ☐ No (Go to 3i)

3f. Is the embankment constructed from erosion resistant material such as a clay type soil?

☐ Yes (Go to 3i) ☐ No (Go to 3g)

3g. Is the overtopping flood less than a 25-year frequency flood?

☐ Yes (Go to 3h) ☐ No (Go to 3i)

3h. Will the cost of protecting the roadway and/or embankment from severe damage caused by overtopping exceed the cost of providing additional culvert or bridge capacity?

☐ No (Go to 3i); ☐ Yes (Go to 3i)

3i. Is there damage potential to the structure caused by scour, ice, debris or other means during the lesser of the overtopping flood or the 100 year flood?

☐ Yes (Go to 3j) ☑ No (Go to 4)

3j. Will the cost of protecting the structure from damage exceed the cost of providing additional culvert or bridge water capacity?

☐ No (Go to 4); protecting abutments from scour by riprap. ☐ Yes (Go to 4)

4. Will the capital cost of the structure exceed $1,000,000?

☑ No (Go to 5); ☐ Yes (Go to 5)

5. In your opinion, are there any other factors that you feel should require further study through a risk analysis?

☑ No (Go to 6); ☐ Yes (Indicate)

6. If there are no ✓'s in the LTEC Design column on the right, proceed with the design, selecting the lowest acceptable grade line and the smallest waterway opening consistent with the constraints imposed on the project. The risk assessment has demonstrated that potential flood damage costs, traffic related costs, roadway and/or structure repair costs are minor and therefore disregarded for this project.

One or more ✓'s in the LTEC Design column indicates further analysis in the category checked may be required utilizing the LTEC design process or justification (below) why it is not required.

JUSTIFICATION:

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

Signature: _____

License Number: 44235 Date: 3/15/17

G.3 – Floodplain Crossing C Risk Assessment

RISK ASSESSMENT FOR ENCROACHMENT DESIGN

Date: 3/15/17

District: Metro **County:** Scott **Vicinity of:** TH 169 and CSAH 14

DATA REQUIREMENTS

1. Location of Crossing: E Frontage Rd STA 171+00 **北S.** **M.P.**

Sec. 21 **T** 115N **R** 23W

2. Name of Stream: N/A **Bridge No. Old:** N/A **New:** N/A

3. Current ADT: N/A **Projected ADT:** 800

4. Practicable detour available ☑ Yes ☐ No

If no is checked, please explain:

If there is no practicable detour available, then the use of the road must be analyzed. Considerations such as emergency vehicle access, emergency supply and evacuation route, and the need for school bus, milk and mail routes should be studied. Factors to consider for this analysis include design frequency, depth, duration, and frequency of inundation if appropriate, and available funding.

5. Hydraulic Data: (Fill in as appropriate)

Elevation Datum: NAVD88

Q_2 =		cfs	HW_2 Elevation		ft
Q_5 =		cfs	HW_5 Elevation		ft
Q_{10} =	152.5	cfs	HW_{10} Elevation	795.8	ft
Q_{25} =	221.4	cfs	HW_{25} Elevation	798.3	ft
Q_{50} =	290.5	cfs	HW_{50} Elevation	799.7	ft
Q_{100} =	438.0	cfs	HW_{100} Elevation	800.4	ft
Q_{500} =		cfs	HW_{500} Elevation		ft

Approximate Flowline Elevation: 795.0 Ft

Design Frequency Event: ☐ 100-yr ☐ 50-yr ☑ 25-yr ☐ 10-yr

Reasons for selecting Design Frequency: MN State Statute 6115.0231

6. Magnitude and Frequency of the smaller of "Overtopping" or "500 yr." (Greatest) flood: 500-year

7. Low member elevation: 799.0

8. Minimum roadway overflow elevation if appropriate: 801.1 at E Frontage Rd STA approx.165+00 and 169+50

9. Elevation of high risk property, i.e. residences: 832

Other buildings 798 (warehouse)

10. Horizontal location of overflow:

☐ At Structure (See 12) ☑ Not At Structure:

11. Type of proposed structure:

☐ Bridge (See 12) ☑ Culvert(s)

12	If the proposed structure is a bridge with the sag point located on the bridge and there is ice and debris potential, strong consideration should be given to using Q_{50} as design discharge with 3' of clearance between the 50 year tailwater stage and low member.	
1.	**BACKWATER DAMAGE** - Major flood damage in this context refers to shopping centers, hospitals, chemical plants, power plants, housing developments, etc.	**LTEC Design**
1a.	Is the overtopping flood greater than the 100 yr. flood? ☑ Yes (Go to 1b) ☐ No (Go to 1e)	
1b.	Is the overtopping flood greater than the "greatest" flood (500 yr. Frequency)? ☐ Yes (Go to 1d) ☑ No (Go to 1c)	
1c.	Is there major flood damage potential for the overtopping flood? ☑ No (Go to 1e)	☐ Yes (Go to 1e)
1d.	Is there major flood damage potential for the greatest flood (500 year frequency)? ☐ No (Go to 1e)	☐ Yes (Go to 1e)
1e.	Will there be flood damage potential to residence(s) or other buildings during a 100 yr. flood? ☑ Yes (Go to 1f) ☐ No (Go to 2)	
1f.	Could this flood damage occur even if the roadway crossing wasn't there? ☑ Yes (Go to 1g) ☐ No (Go to 1h)	
1g.	Could this flood damage be significantly increased by the backwater caused by the proposed crossing? ☐ Yes (Go to 1h) ☑ No (Go to 2)	
1h.	Could the stream crossing be designed in such a manner so as to minimize this potential flood damage? ☐ Yes (Go to 1i) ☐ No (Go to 2)	
1i.	Does the value of the building(s) and/or its contents have sufficient value to justify further evaluation of risk and potential flood damage? ☐ No (Go to 2)	☐ Yes (Go to 2)
2.	**TRAFFIC RELATED LOSSES**	
2a.	Is the overtopping flood greater than the "greatest" flood (500 yr. frequency)? ☐ Yes (Go to 3) ☑ No (Go to 2b)	
2b.	Does the ADT exceed 50 vehicles per day? ☑ Yes (Go to 2c) ☐ No (Go to 3)	
2c.	Would the (duration of road closure in days) multiplied by the (length of detour minus the length of normal route in miles) exceed 20? ☐ Yes (Go to 2d) ☑ No (Go to 3)	
2d.	Does the annual risk cost for traffic related costs exceed 10% of the annual capital costs? ☐ No (Go to 3) (See figures A and B – Appendix A(2) - for Assistance)	☐ Yes (Go to 3)

3. ROADWAY AND/OR STRUCTURE REPAIR COSTS

3a. Is the overtopping flood less than a 100 year frequency flood?

☐ Yes (Go to 3b) ☑ No (Go to 3i)

3b. Compare the Tailwater (TW) elevation with the roadway sag point elevation for the overtopping flood. Check the appropriate category.

☐ When TW is above the sag point (Go to 4)

☐ TW is between 0 and 0.5' below sag point (Go to 3c)

☐ TW is between 0.5' and 1.0' below sag point (Go to 3d)

☐ When TW is 1.0' and 2.0' below sag point (Go to 3e)

☐ When TW is more than 2.0' below sag point (Go to 3g)

3c. Does the embankment have a good erosion resistant vegetative cover?

☐ Yes (Go to 3i) ☐ No (Go to 3d)

3d. Is the shoulder constructed from erosion resistant material such as paved, coarse gravel, or clay type soil?

☐ Yes (Go to 3i) ☐ No (Go to 3e)

3e. Will the duration of overtopping for the 25-year flood exceed 1 hour?

☐ Yes (Go to 3f) ☐ No (Go to 3i)

3f. Is the embankment constructed from erosion resistant material such as a clay type soil?

☐ Yes (Go to 3i) ☐ No (Go to 3g)

3g. Is the overtopping flood less than a 25-year frequency flood?

☐ Yes (Go to 3h) ☑ No (Go to 3i)

3h. Will the cost of protecting the roadway and/or embankment from severe damage caused by overtopping exceed the cost of providing additional culvert or bridge capacity?

☐ No (Go to 3i); ☐ Yes (Go to 3i)

3i. Is there damage potential to the structure caused by scour, ice, debris or other means during the lesser of the overtopping flood or the 100 year flood?

☐ Yes (Go to 3j) ☑ No (Go to 4)

3j. Will the cost of protecting the structure from damage exceed the cost of providing additional culvert or bridge water capacity?

☐ No (Go to 4); protecting abutments from scour by riprap. ☐ Yes (Go to 4)

4. Will the capital cost of the structure exceed $1,000,000?

☑ No (Go to 5); ☐ Yes (Go to 5)

5. In your opinion, are there any other factors that you feel should require further study through a risk analysis?

☑ No (Go to 6); ☐ Yes (Indicate)

6. If there are no ✓'s in the LTEC Design column on the right, proceed with the design, selecting the lowest acceptable grade line and the smallest waterway opening consistent with the constraints imposed on the project. The risk assessment has demonstrated that potential flood damage costs, traffic related costs, roadway and/or structure repair costs are minor and therefore disregarded for this project.

One or more ✓'s in the LTEC Design column indicates further analysis in the category checked may be required utilizing the LTEC design process or justification (below) why it is not required.

JUSTIFICATION:

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

Signature: _____

License Number: 44235 Date: 3/15/17

G.4 – Floodplain Crossing E Risk Assessment

RISK ASSESSMENT FOR ENCROACHMENT DESIGN

Date: 3/15/17

District: Metro **County:** Scott **Vicinity of:** TH 169 and CSAH 14

DATA REQUIREMENTS

1. **Location of Crossing:** TH 169 STA 590+00 **C.S.** **M.P.**

   Sec. 21 **T** 115N **R** 23W

2. **Name of Stream:** N/A **Bridge No. Old:** N/A **New:** N/A

3. **Current ADT:** 29,000 **Projected ADT:** 48,500

4. **Practicable detour available** ☑ Yes ☐ No

If no is checked, please explain:

If there is no practicable detour available, then the use of the road must be analyzed. Considerations such as emergency vehicle access, emergency supply and evacuation route, and the need for school bus, milk and mail routes should be studied. Factors to consider for this analysis include design frequency, depth, duration, and frequency of inundation if appropriate, and available funding.

5. **Hydraulic Data: (Fill in as appropriate)**

   Elevation Datum: NAVD88

Q_2 =		cfs	HW_2 Elevation		ft
Q_5 =		cfs	HW_5 Elevation		ft
Q_{10} =	70.7	cfs	HW_{10} Elevation	797.4	ft
Q_{25} =	99.9	cfs	HW_{25} Elevation	797.8	ft
Q_{50} =	159.4	cfs	HW_{50} Elevation	798.6	ft
Q_{100} =	257.0	cfs	HW_{100} Elevation	800.1	ft
Q_{500} =		cfs	HW_{500} Elevation		ft

Approximate Flowline Elevation: 795.1 Ft

Design Frequency Event: ☐ 100-yr ☑ 50-yr ☐ 25-yr ☐ 10-yr

Reasons for selecting Design Frequency: MN State Statute 6115.0231

6. **Magnitude and Frequency of the smaller of "Overtopping" or "500 yr." (Greatest) flood:** 500-year

7. **Low member elevation:** 798.1

8. **Minimum roadway overflow elevation if appropriate:** 801.25 TH 169

9. **Elevation of high risk property, i.e. residences:** 832

   Other buildings 798 (warehouse)

10. **Horizontal location of overflow:**

    ☐ At Structure (See 12) ☑ Not At Structure:

11. **Type of proposed structure:**

    ☐ Bridge (See 12) ☑ Culvert(s)

12	If the proposed structure is a bridge with the sag point located on the bridge and there is ice and debris potential, strong consideration should be given to using Q_{50} as design discharge with 3' of clearance between the 50 year tailwater stage and low member.	
1.	**BACKWATER DAMAGE** - Major flood damage in this context refers to shopping centers, hospitals, chemical plants, power plants, housing developments, etc.	**LTEC Design**
1a.	Is the overtopping flood greater than the 100 yr. flood? ☑ Yes (Go to 1b) ☐ No (Go to 1e)	
1b.	Is the overtopping flood greater than the "greatest" flood (500 yr. Frequency)? ☐ Yes (Go to 1d) ☑ No (Go to 1c)	
1c.	Is there major flood damage potential for the overtopping flood? ☑ No (Go to 1e)	☐ Yes (Go to 1e)
1d.	Is there major flood damage potential for the greatest flood (500 year frequency)? ☑ No (Go to 1e)	☐ Yes (Go to 1e)
1e.	Will there be flood damage potential to residence(s) or other buildings during a 100 yr. flood? ☑ Yes (Go to 1f) ☐ No (Go to 2)	
1f.	Could this flood damage occur even if the roadway crossing wasn't there? ☑ Yes (Go to 1g) ☐ No (Go to 1h)	
1g.	Could this flood damage be significantly increased by the backwater caused by the proposed crossing? ☐ Yes (Go to 1h) ☑ No (Go to 2)	
1h.	Could the stream crossing be designed in such a manner so as to minimize this potential flood damage? ☐ Yes (Go to 1i) ☐ No (Go to 2)	
1i.	Does the value of the building(s) and/or its contents have sufficient value to justify further evaluation of risk and potential flood damage? ☐ No (Go to 2)	☐ Yes (Go to 2)
2.	**TRAFFIC RELATED LOSSES**	
2a.	Is the overtopping flood greater than the "greatest" flood (500 yr. frequency)? ☐ Yes (Go to 3) ☑ No (Go to 2b)	
2b.	Does the ADT exceed 50 vehicles per day? ☑ Yes (Go to 2c) ☐ No (Go to 3)	
2c.	Would the (duration of road closure in days) multiplied by the (length of detour minus the length of normal route in miles) exceed 20? ☐ Yes (Go to 2d) ☑ No (Go to 3)	
2d.	Does the annual risk cost for traffic related costs exceed 10% of the annual capital costs? ☐ No (Go to 3) (See figures A and B – Appendix A(2) - for Assistance)	☐ Yes (Go to 3)

3. ROADWAY AND/OR STRUCTURE REPAIR COSTS

3a. Is the overtopping flood less than a 100 year frequency flood?

☐ Yes (Go to 3b) ☑ No (Go to 3i)

3b. Compare the Tailwater (TW) elevation with the roadway sag point elevation for the overtopping flood. Check the appropriate category.

☐ When TW is above the sag point (Go to 4)

☐ TW is between 0 and 0.5' below sag point (Go to 3c)

☐ TW is between 0.5' and 1.0' below sag point (Go to 3d)

☐ When TW is 1.0' and 2.0' below sag point (Go to 3e)

☐ When TW is more than 2.0' below sag point (Go to 3g)

3c. Does the embankment have a good erosion resistant vegetative cover?

☐ Yes (Go to 3i) ☐ No (Go to 3d)

3d. Is the shoulder constructed from erosion resistant material such as paved, coarse gravel, or clay type soil?

☐ Yes (Go to 3i) ☐ No (Go to 3e)

3e. Will the duration of overtopping for the 25-year flood exceed 1 hour?

☐ Yes (Go to 3f) ☐ No (Go to 3i)

3f. Is the embankment constructed from erosion resistant material such as a clay type soil?

☐ Yes (Go to 3i) ☐ No (Go to 3g)

3g. Is the overtopping flood less than a 25-year frequency flood?

☐ Yes (Go to 3h) ☐ No (Go to 3i)

3h. Will the cost of protecting the roadway and/or embankment from severe damage caused by overtopping exceed the cost of providing additional culvert or bridge capacity?

☐ No (Go to 3i); ☐ Yes (Go to 3i)

3i. Is there damage potential to the structure caused by scour, ice, debris or other means during the lesser of the overtopping flood or the 100 year flood?

☐ Yes (Go to 3j) ☑ No (Go to 4)

3j. Will the cost of protecting the structure from damage exceed the cost of providing additional culvert or bridge water capacity?

☐ No (Go to 4); protecting abutments from scour by riprap. ☐ Yes (Go to 4)

4. Will the capital cost of the structure exceed $1,000,000?

☑ No (Go to 5); ☐ Yes (Go to 5)

5. In your opinion, are there any other factors that you feel should require further study through a risk analysis?

☑ No (Go to 6); ☐ Yes (Indicate)

6. If there are no ✓'s in the LTEC Design column on the right, proceed with the design, selecting the lowest acceptable grade line and the smallest waterway opening consistent with the constraints imposed on the project. The risk assessment has demonstrated that potential flood damage costs, traffic related costs, roadway and/or structure repair costs are minor and therefore disregarded for this project.

One or more ✓'s in the LTEC Design column indicates further analysis in the category checked may be required utilizing the LTEC design process or justification (below) why it is not required.

JUSTIFICATION:

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

Signature: _____

License Number: 44235 Date: 3/15/17

G.5 – Floodplain Crossing F Risk Assessment

RISK ASSESSMENT FOR ENCROACHMENT DESIGN

Date: 3/15/17

District: Metro **County:** Scott **Vicinity of:** TH 169 and CSAH 14

DATA REQUIREMENTS

1. **Location of Crossing:** TH 169 STA 586+00 **C.S.** **M.P.**

   Sec. 28 **T** 115N **R** 23W

2. **Name of Stream:** N/A **Bridge No. Old:** N/A **New:** N/A

3. **Current ADT:** 29,000 **Projected ADT:** 48,500

4. **Practicable detour available** ☑ Yes ☐ No

If no is checked, please explain:

If there is no practicable detour available, then the use of the road must be analyzed. Considerations such as emergency vehicle access, emergency supply and evacuation route, and the need for school bus, milk and mail routes should be studied. Factors to consider for this analysis include design frequency, depth, duration, and frequency of inundation if appropriate, and available funding.

5. **Hydraulic Data: (Fill in as appropriate)**

   Elevation Datum: NAVD88

Q_2 =		cfs	HW_2 Elevation		ft
Q_5 =		cfs	HW_5 Elevation		ft
Q_{10} =	70.7	cfs	HW_{10} Elevation	797.4	ft
Q_{25} =	99.9	cfs	HW_{25} Elevation	797.8	ft
Q_{50} =	159.4	cfs	HW_{50} Elevation	798.6	ft
Q_{100} =	257.0	cfs	HW_{100} Elevation	800.1	ft
Q_{500} =		cfs	HW_{500} Elevation		ft

Approximate Flowline Elevation: 795.0 Ft

Design Frequency Event: ☐ 100-yr ☑ 50-yr ☐ 25-yr ☐ 10-yr

Reasons for selecting Design Frequency: MN State Statute 6115.0231

6. **Magnitude and Frequency of the smaller of "Overtopping" or "500 yr." (Greatest) flood:** 500-year

7. **Low member elevation:** 798.0

8. **Minimum roadway overflow elevation if appropriate:** 801.25 TH169

9. **Elevation of high risk property, i.e. residences:** 832

   Other buildings 781 (warehouse)

10. **Horizontal location of overflow:**

    ☐ At Structure (See 12) ☑ Not At Structure:

11. **Type of proposed structure:**

    ☐ Bridge (See 12) ☑ Culvert(s)

12	If the proposed structure is a bridge with the sag point located on the bridge and there is ice and debris potential, strong consideration should be given to using Q_{50} as design discharge with 3' of clearance between the 50 year tailwater stage and low member.	
1.	**BACKWATER DAMAGE** - Major flood damage in this context refers to shopping centers, hospitals, chemical plants, power plants, housing developments, etc.	**LTEC Design**
1a.	Is the overtopping flood greater than the 100 yr. flood? ☑ Yes (Go to 1b) ☐ No (Go to 1e)	
1b.	Is the overtopping flood greater than the "greatest" flood (500 yr. Frequency)? ☐ Yes (Go to 1d) ☑ No (Go to 1c)	
1c.	Is there major flood damage potential for the overtopping flood? ☑ No (Go to 1e)	☐ Yes (Go to 1e)
1d.	Is there major flood damage potential for the greatest flood (500 year frequency)? ☑ No (Go to 1e)	☐ Yes (Go to 1e)
1e.	Will there be flood damage potential to residence(s) or other buildings during a 100 yr. flood? ☑ Yes (Go to 1f) ☑ No (Go to 2)	
1f.	Could this flood damage occur even if the roadway crossing wasn't there? ☑ Yes (Go to 1g) ☐ No (Go to 1h)	
1g.	Could this flood damage be significantly increased by the backwater caused by the proposed crossing? ☐ Yes (Go to 1h) ☑ No (Go to 2)	
1h.	Could the stream crossing be designed in such a manner so as to minimize this potential flood damage? ☐ Yes (Go to 1i) ☐ No (Go to 2)	
1i.	Does the value of the building(s) and/or its contents have sufficient value to justify further evaluation of risk and potential flood damage? ☐ No (Go to 2)	☐ Yes (Go to 2)
2.	**TRAFFIC RELATED LOSSES**	
2a.	Is the overtopping flood greater than the "greatest" flood (500 yr. frequency)? ☐ Yes (Go to 3) ☑ No (Go to 2b)	
2b.	Does the ADT exceed 50 vehicles per day? ☑ Yes (Go to 2c) ☐ No (Go to 3)	
2c.	Would the (duration of road closure in days) multiplied by the (length of detour minus the length of normal route in miles) exceed 20? ☐ Yes (Go to 2d) ☑ No (Go to 3)	
2d.	Does the annual risk cost for traffic related costs exceed 10% of the annual capital costs? ☐ No (Go to 3) (See figures A and B – Appendix A(2) - for Assistance)	☐ Yes (Go to 3)

3. ROADWAY AND/OR STRUCTURE REPAIR COSTS

3a. Is the overtopping flood less than a 100 year frequency flood?

☐ Yes (Go to 3b) ☑ No (Go to 3i)

3b. Compare the Tailwater (TW) elevation with the roadway sag point elevation for the overtopping flood. Check the appropriate category.

☐ When TW is above the sag point (Go to 4)

☐ TW is between 0 and 0.5' below sag point (Go to 3c)

☐ TW is between 0.5' and 1.0' below sag point (Go to 3d)

☐ When TW is 1.0' and 2.0' below sag point (Go to 3e)

☐ When TW is more than 2.0' below sag point (Go to 3g)

3c. Does the embankment have a good erosion resistant vegetative cover?

☐ Yes (Go to 3i) ☐ No (Go to 3d)

3d. Is the shoulder constructed from erosion resistant material such as paved, coarse gravel, or clay type soil?

☐ Yes (Go to 3i) ☐ No (Go to 3e)

3e. Will the duration of overtopping for the 25-year flood exceed 1 hour?

☐ Yes (Go to 3f) ☐ No (Go to 3i)

3f. Is the embankment constructed from erosion resistant material such as a clay type soil?

☐ Yes (Go to 3i) ☐ No (Go to 3g)

3g. Is the overtopping flood less than a 25-year frequency flood?

☐ Yes (Go to 3h) ☐ No (Go to 3i)

3h. Will the cost of protecting the roadway and/or embankment from severe damage caused by overtopping exceed the cost of providing additional culvert or bridge capacity?

☐ No (Go to 3i); ☐ Yes (Go to 3i)

3i. Is there damage potential to the structure caused by scour, ice, debris or other means during the lesser of the overtopping flood or the 100 year flood?

☐ Yes (Go to 3j) ☑ No (Go to 4)

3j. Will the cost of protecting the structure from damage exceed the cost of providing additional culvert or bridge water capacity?

☐ No (Go to 4); protecting abutments from scour by riprap. ☐ Yes (Go to 4)

4. Will the capital cost of the structure exceed $1,000,000?

☑ No (Go to 5); ☐ Yes (Go to 5)

5. In your opinion, are there any other factors that you feel should require further study through a risk analysis?

☑ No (Go to 6); ☐ Yes (Indicate)

6. If there are no ✓'s in the LTEC Design column on the right, proceed with the design, selecting the lowest acceptable grade line and the smallest waterway opening consistent with the constraints imposed on the project. The risk assessment has demonstrated that potential flood damage costs, traffic related costs, roadway and/or structure repair costs are minor and therefore disregarded for this project.

One or more ✓'s in the LTEC Design column indicates further analysis in the category checked may be required utilizing the LTEC design process or justification (below) why it is not required.

JUSTIFICATION:

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

Signature: _____

License Number: 44235 Date: 3/15/17

G.6 – Floodplain Crossing H Risk Assessment

RISK ASSESSMENT FOR ENCROACHMENT DESIGN

Date: 1/27/17

District: Metro **County:** Scott **Vicinity of:** TH 169 and CSAH 14

DATA REQUIREMENTS

1. **Location of Crossing:** Driveway near TH 169 STA 547+50 **C.S.** **M.P.**

   Sec. 28 **T** 115N **R** 23W

2. **Name of Stream:** N/A **Bridge No. Old:** N/A **New:** N/A

3. **Current ADT:** N/A **Projected ADT:** N/A

4. **Practicable detour available** ☑ Yes ☐ No

If no is checked, please explain:

If there is no practicable detour available, then the use of the road must be analyzed. Considerations such as emergency vehicle access, emergency supply and evacuation route, and the need for school bus, milk and mail routes should be studied. Factors to consider for this analysis include design frequency, depth, duration, and frequency of inundation if appropriate, and available funding.

5. **Hydraulic Data: (Fill in as appropriate)**

   Elevation Datum: NAVD88

Q_2 =		cfs	HW_2 Elevation		ft
Q_5 =		cfs	HW_5 Elevation		ft
Q_{10} =	57.2	cfs	HW_{10} Elevation	774.7	ft
Q_{25} =	90.6	cfs	HW_{25} Elevation	775.2	ft
Q_{50} =	123.6	cfs	HW_{50} Elevation	776.0	ft
Q_{100} =	163.7	cfs	HW_{100} Elevation	777.0	ft
Q_{500} =	277.8	cfs	HW_{500} Elevation	777.7	ft

Approximate Flowline Elevation: 773.0 Ft

Design Frequency Event: ☐ 100-yr ☐ 50-yr ☐ 25-yr ☑ 10-yr

Reasons for selecting Design Frequency: MN State Statute 6115.0231

6. **Magnitude and Frequency of the smaller of "Overtopping" or "500 yr." (Greatest) flood:** 164 cfs, 100-year

7. **Low member elevation:** 775.5

8. **Minimum roadway overflow elevation if appropriate:** 777.0

9. **Elevation of high risk property, i.e. residences:** 832

   Other buildings 781 (warehouse)

10. **Horizontal location of overflow:**

    ☑ At Structure (See 12) ☐ Not At Structure:

11. **Type of proposed structure:**

    ☐ Bridge (See 12) ☑ Culvert(s)

12	If the proposed structure is a bridge with the sag point located on the bridge and there is ice and debris potential, strong consideration should be given to using Q_{50} as design discharge with 3' of clearance between the 50 year tailwater stage and low member.	
1.	**BACKWATER DAMAGE** - Major flood damage in this context refers to shopping centers, hospitals, chemical plants, power plants, housing developments, etc.	**LTEC Design**
1a.	Is the overtopping flood greater than the 100 yr. flood? ☐ Yes (Go to 1b) ☑ No (Go to 1e)	
1b.	Is the overtopping flood greater than the "greatest" flood (500 yr. Frequency)? ☐ Yes (Go to 1d) ☐ No (Go to 1c)	
1c.	Is there major flood damage potential for the overtopping flood? ☐ No (Go to 1e)	☐ Yes (Go to 1e)
1d.	Is there major flood damage potential for the greatest flood (500 year frequency)? ☐ No (Go to 1e)	☐ Yes (Go to 1e)
1e.	Will there be flood damage potential to residence(s) or other buildings during a 100 yr. flood? ☐ Yes (Go to 1f) ☑ No (Go to 2)	
1f.	Could this flood damage occur even if the roadway crossing wasn't there? ☐ Yes (Go to 1g) ☐ No (Go to 1h)	
1g.	Could this flood damage be significantly increased by the backwater caused by the proposed crossing? ☐ Yes (Go to 1h) ☐ No (Go to 2)	
1h.	Could the stream crossing be designed in such a manner so as to minimize this potential flood damage? ☐ Yes (Go to 1i) ☐ No (Go to 2)	
1i.	Does the value of the building(s) and/or its contents have sufficient value to justify further evaluation of risk and potential flood damage? ☐ No (Go to 2)	☐ Yes (Go to 2)
2.	**TRAFFIC RELATED LOSSES**	
2a.	Is the overtopping flood greater than the "greatest" flood (500 yr. frequency)? ☐ Yes (Go to 3) ☑ No (Go to 2b)	
2b.	Does the ADT exceed 50 vehicles per day? ☐ Yes (Go to 2c) ☑ No (Go to 3)	
2c.	Would the (duration of road closure in days) multiplied by the (length of detour minus the length of normal route in miles) exceed 20? ☐ Yes (Go to 2d) ☐ No (Go to 3)	
2d.	Does the annual risk cost for traffic related costs exceed 10% of the annual capital costs? ☐ No (Go to 3) (See figures A and B – Appendix A(2) - for Assistance)	☐ Yes (Go to 3)

3. ROADWAY AND/OR STRUCTURE REPAIR COSTS	
3a. Is the overtopping flood less than a 100 year frequency flood? ☐ Yes (Go to 3b) ☑ No (Go to 3i)	
3b. Compare the Tailwater (TW) elevation with the roadway sag point elevation for the overtopping flood. Check the appropriate category. ☐ When TW is above the sag point (Go to 4) ☐ TW is between 0 and 0.5' below sag point (Go to 3c) ☐ TW is between 0.5' and 1.0' below sag point (Go to 3d) ☐ When TW is 1.0' and 2.0' below sag point (Go to 3e) ☐ When TW is more than 2.0' below sag point (Go to 3g)	
3c. Does the embankment have a good erosion resistant vegetative cover? ☐ Yes (Go to 3i) ☐ No (Go to 3d)	
3d. Is the shoulder constructed from erosion resistant material such as paved, coarse gravel, or clay type soil? ☐ Yes (Go to 3i) ☐ No (Go to 3e)	
3e. Will the duration of overtopping for the 25-year flood exceed 1 hour? ☐ Yes (Go to 3f) ☐ No (Go to 3i)	
3f. Is the embankment constructed from erosion resistant material such as a clay type soil? ☐ Yes (Go to 3i) ☐ No (Go to 3g)	
3g. Is the overtopping flood less than a 25-year frequency flood? ☐ Yes (Go to 3h) ☐ No (Go to 3i)	
3h. Will the cost of protecting the roadway and/or embankment from severe damage caused by overtopping exceed the cost of providing additional culvert or bridge capacity? ☐ No (Go to 3i);	☐ Yes (Go to 3i)
3i. Is there damage potential to the structure caused by scour, ice, debris or other means during the lesser of the overtopping flood or the 100 year flood? ☐ Yes (Go to 3j) ☑ No (Go to 4)	
3j. Will the cost of protecting the structure from damage exceed the cost of providing additional culvert or bridge water capacity? ☐ No (Go to 4); protecting abutments from scour by riprap.	☐ Yes (Go to 4)
4. Will the capital cost of the structure exceed $1,000,000? ☑ No (Go to 5);	☐ Yes (Go to 5)
5. In your opinion, are there any other factors that you feel should require further study through a risk analysis? ☑ No (Go to 6);	☐ Yes (Indicate)

6. If there are no ✓'s in the LTEC Design column on the right, proceed with the design, selecting the lowest acceptable grade line and the smallest waterway opening consistent with the constraints imposed on the project. The risk assessment has demonstrated that potential flood damage costs, traffic related costs, roadway and/or structure repair costs are minor and therefore disregarded for this project.

One or more ✓'s in the LTEC Design column indicates further analysis in the category checked may be required utilizing the LTEC design process or justification (below) why it is not required.

JUSTIFICATION:

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

Signature: _____

License Number: 44235 Date: 1/27/17

G.7 – Floodplain Crossing I Risk Assessment

RISK ASSESSMENT FOR ENCROACHMENT DESIGN

Date: 1/27/17

District: Metro **County:** Scott **Vicinity of:** TH 169 and CSAH 14

DATA REQUIREMENTS

1. **Location of Crossing:** TH 169 STA 538+00 **C.S.** **M.P.**

   Sec. 28 **T** 115N **R** 23W

2. **Name of Stream:** N/A **Bridge No. Old:** N/A **New:** N/A

3. **Current ADT:** 29,000 **Projected ADT:** 48,500

4. **Practicable detour available** ☑ Yes ☐ No

If no is checked, please explain:

If there is no practicable detour available, then the use of the road must be analyzed. Considerations such as emergency vehicle access, emergency supply and evacuation route, and the need for school bus, milk and mail routes should be studied. Factors to consider for this analysis include design frequency, depth, duration, and frequency of inundation if appropriate, and available funding.

5. **Hydraulic Data: (Fill in as appropriate)**

   Elevation Datum: NAVD88

Q_2 =		cfs	HW_2 Elevation		ft
Q_5 =		cfs	HW_5 Elevation		ft
Q_{10} =	33.8	cfs	HW_{10} Elevation	745.6	ft
Q_{25} =	46.9	cfs	HW_{25} Elevation	746.0	ft
Q_{50} =	61.2	cfs	HW_{50} Elevation	746.4	ft
Q_{100} =	79.7	cfs	HW_{100} Elevation	746.8	ft
Q_{500} =	136.5	cfs	HW_{500} Elevation	748.1	ft

Approximate Flowline Elevation: 744.0 Ft

Design Frequency Event: ☐ 100-yr ☑ 50-yr ☐ 25-yr ☐ 10-yr

Reasons for selecting Design Frequency: MN State Statute 6115.0231

6. **Magnitude and Frequency of the smaller of "Overtopping" or "500 yr." (Greatest) flood:** 137 cfs, 500-year

7. **Low member elevation:** 747.8

8. **Minimum roadway overflow elevation if appropriate:** 758.6

9. **Elevation of high risk property, i.e. residences:** 769

   Other buildings 752 (warehouse)

10. **Horizontal location of overflow:**

    ☑ At Structure (See 12) ☐ Not At Structure:

11. **Type of proposed structure:**

    ☐ Bridge (See 12) ☑ Culvert(s)

12	If the proposed structure is a bridge with the sag point located on the bridge and there is ice and debris potential, strong consideration should be given to using Q_{50} as design discharge with 3' of clearance between the 50 year tailwater stage and low member.	
1.	**BACKWATER DAMAGE** - Major flood damage in this context refers to shopping centers, hospitals, chemical plants, power plants, housing developments, etc.	**LTEC Design**
1a.	Is the overtopping flood greater than the 100 yr. flood? ☑ Yes (Go to 1b) ☐ No (Go to 1e)	
1b.	Is the overtopping flood greater than the "greatest" flood (500 yr. Frequency)? ☑ Yes (Go to 1d) ☐ No (Go to 1c)	
1c.	Is there major flood damage potential for the overtopping flood? ☐ No (Go to 1e)	☐ Yes (Go to 1e)
1d.	Is there major flood damage potential for the greatest flood (500 year frequency)? ☑ No (Go to 1e)	☐ Yes (Go to 1e)
1e.	Will there be flood damage potential to residence(s) or other buildings during a 100 yr. flood? ☐ Yes (Go to 1f) ☑ No (Go to 2)	
1f.	Could this flood damage occur even if the roadway crossing wasn't there? ☐ Yes (Go to 1g) ☐ No (Go to 1h)	
1g.	Could this flood damage be significantly increased by the backwater caused by the proposed crossing? ☐ Yes (Go to 1h) ☐ No (Go to 2)	
1h.	Could the stream crossing be designed in such a manner so as to minimize this potential flood damage? ☐ Yes (Go to 1i) ☐ No (Go to 2)	
1i.	Does the value of the building(s) and/or its contents have sufficient value to justify further evaluation of risk and potential flood damage? ☐ No (Go to 2)	☐ Yes (Go to 2)
2.	**TRAFFIC RELATED LOSSES**	
2a.	Is the overtopping flood greater than the "greatest" flood (500 yr. frequency)? ☑ Yes (Go to 3) ☐ No (Go to 2b)	
2b.	Does the ADT exceed 50 vehicles per day? ☐ Yes (Go to 2c) ☐ No (Go to 3)	
2c.	Would the (duration of road closure in days) multiplied by the (length of detour minus the length of normal route in miles) exceed 20? ☐ Yes (Go to 2d) ☐ No (Go to 3)	
2d.	Does the annual risk cost for traffic related costs exceed 10% of the annual capital costs? ☐ No (Go to 3) (See figures A and B – Appendix A(2) - for Assistance)	☐ Yes (Go to 3)

3. ROADWAY AND/OR STRUCTURE REPAIR COSTS	
3a. Is the overtopping flood less than a 100 year frequency flood? ☐ Yes (Go to 3b) ☑ No (Go to 3i)	
3b. Compare the Tailwater (TW) elevation with the roadway sag point elevation for the overtopping flood. Check the appropriate category. ☐ When TW is above the sag point (Go to 4) ☐ TW is between 0 and 0.5' below sag point (Go to 3c) ☐ TW is between 0.5' and 1.0' below sag point (Go to 3d) ☐ When TW is 1.0' and 2.0' below sag point (Go to 3e) ☐ When TW is more than 2.0' below sag point (Go to 3g)	
3c. Does the embankment have a good erosion resistant vegetative cover? ☐ Yes (Go to 3i) ☐ No (Go to 3d)	
3d. Is the shoulder constructed from erosion resistant material such as paved, coarse gravel, or clay type soil? ☐ Yes (Go to 3i) ☐ No (Go to 3e)	
3e. Will the duration of overtopping for the 25-year flood exceed 1 hour? ☐ Yes (Go to 3f) ☐ No (Go to 3i)	
3f. Is the embankment constructed from erosion resistant material such as a clay type soil? ☐ Yes (Go to 3i) ☐ No (Go to 3g)	
3g. Is the overtopping flood less than a 25-year frequency flood? ☐ Yes (Go to 3h) ☐ No (Go to 3i)	
3h. Will the cost of protecting the roadway and/or embankment from severe damage caused by overtopping exceed the cost of providing additional culvert or bridge capacity? ☐ No (Go to 3i);	☐ Yes (Go to 3i)
3i. Is there damage potential to the structure caused by scour, ice, debris or other means during the lesser of the overtopping flood or the 100 year flood? ☐ Yes (Go to 3j) ☑ No (Go to 4)	
3j. Will the cost of protecting the structure from damage exceed the cost of providing additional culvert or bridge water capacity? ☐ No (Go to 4); protecting abutments from scour by riprap.	☐ Yes (Go to 4)
4. Will the capital cost of the structure exceed $1,000,000? ☑ No (Go to 5);	☐ Yes (Go to 5)
5. In your opinion, are there any other factors that you feel should require further study through a risk analysis? ☑ No (Go to 6);	☐ Yes (Indicate)

6. If there are no ✓'s in the LTEC Design column on the right, proceed with the design, selecting the lowest acceptable grade line and the smallest waterway opening consistent with the constraints imposed on the project. The risk assessment has demonstrated that potential flood damage costs, traffic related costs, roadway and/or structure repair costs are minor and therefore disregarded for this project.

One or more ✓'s in the LTEC Design column indicates further analysis in the category checked may be required utilizing the LTEC design process or justification (below) why it is not required.

JUSTIFICATION:

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

Signature: _____

License Number: 44235 Date: 1/27/17

G.8 – Floodplain Crossing J Risk Assessment

RISK ASSESSMENT FOR ENCROACHMENT DESIGN

Date: 1/27/17

District: Metro **County:** Scott **Vicinity of:** TH 169 and CSAH 14

DATA REQUIREMENTS

1. Location of Crossing: 150th St STA 73+00 **C.S.** **M.P.**

Sec. 28 **T** 115N **R** 23W

2. Name of Stream: N/A **Bridge No. Old:** N/A **New:** N/A

3. Current ADT: 1600 **Projected ADT:** 3700

4. Practicable detour available ☑ Yes ☐ No

If no is checked, please explain:

If there is no practicable detour available, then the use of the road must be analyzed. Considerations such as emergency vehicle access, emergency supply and evacuation route, and the need for school bus, milk and mail routes should be studied. Factors to consider for this analysis include design frequency, depth, duration, and frequency of inundation if appropriate, and available funding.

5. Hydraulic Data: (Fill in as appropriate)

Elevation Datum: NAVD88

Q_2 =		cfs	HW_2 Elevation		ft
Q_5 =		cfs	HW_5 Elevation		ft
Q_{10} =	120.4	cfs	HW_{10} Elevation	753.9	ft
Q_{25} =	191.3	cfs	HW_{25} Elevation	755.1	ft
Q_{50} =	257.9	cfs	HW_{50} Elevation	756.2	ft
Q_{100} =	332.9	cfs	HW_{100} Elevation	756.8	ft
Q_{500} =		cfs	HW_{500} Elevation		ft

Approximate Flowline Elevation: 751.0 Ft

Design Frequency Event: ☐ 100-yr ☑ 50-yr ☐ 25-yr ☐ 10-yr

Reasons for selecting Design Frequency: MN State Statute 6115.0231

6. Magnitude and Frequency of the smaller of "Overtopping" or "500 yr." (Greatest) flood: 258 cfs, 50-year

7. Low member elevation: 755.5

8. Minimum roadway overflow elevation if appropriate: 756.2, E Frontage Road

9. Elevation of high risk property, i.e. residences: 769

Other buildings 765 (garage)

10. Horizontal location of overflow:

☐ At Structure (See 12) ☑ Not At Structure:

11. Type of proposed structure:

☐ Bridge (See 12) ☑ Culvert(s)

12	If the proposed structure is a bridge with the sag point located on the bridge and there is ice and debris potential, strong consideration should be given to using Q_{50} as design discharge with 3' of clearance between the 50 year tailwater stage and low member.	
1.	**BACKWATER DAMAGE** - Major flood damage in this context refers to shopping centers, hospitals, chemical plants, power plants, housing developments, etc.	**LTEC Design**
1a.	Is the overtopping flood greater than the 100 yr. flood? ☐ Yes (Go to 1b) ☑ No (Go to 1e)	
1b.	Is the overtopping flood greater than the "greatest" flood (500 yr. Frequency)? ☐ Yes (Go to 1d) ☐ No (Go to 1c)	
1c.	Is there major flood damage potential for the overtopping flood? ☐ No (Go to 1e)	☐ Yes (Go to 1e)
1d.	Is there major flood damage potential for the greatest flood (500 year frequency)? ☐ No (Go to 1e)	☐ Yes (Go to 1e)
1e.	Will there be flood damage potential to residence(s) or other buildings during a 100 yr. flood? ☐ Yes (Go to 1f) ☑ No (Go to 2)	
1f.	Could this flood damage occur even if the roadway crossing wasn't there? ☐ Yes (Go to 1g) ☐ No (Go to 1h)	
1g.	Could this flood damage be significantly increased by the backwater caused by the proposed crossing? ☐ Yes (Go to 1h) ☐ No (Go to 2)	
1h.	Could the stream crossing be designed in such a manner so as to minimize this potential flood damage? ☐ Yes (Go to 1i) ☐ No (Go to 2)	
1i.	Does the value of the building(s) and/or its contents have sufficient value to justify further evaluation of risk and potential flood damage? ☐ No (Go to 2)	☐ Yes (Go to 2)
2.	**TRAFFIC RELATED LOSSES**	
2a.	Is the overtopping flood greater than the "greatest" flood (500 yr. frequency)? ☐ Yes (Go to 3) ☑ No (Go to 2b)	
2b.	Does the ADT exceed 50 vehicles per day? ☑ Yes (Go to 2c) ☐ No (Go to 3)	
2c.	Would the (duration of road closure in days) multiplied by the (length of detour minus the length of normal route in miles) exceed 20? ☐ Yes (Go to 2d) ☑ No (Go to 3)	
2d.	Does the annual risk cost for traffic related costs exceed 10% of the annual capital costs? ☐ No (Go to 3) (See figures A and B – Appendix A(2) - for Assistance)	☐ Yes (Go to 3)

3. ROADWAY AND/OR STRUCTURE REPAIR COSTS

3a. Is the overtopping flood less than a 100 year frequency flood?

☑ Yes (Go to 3b) ☐ No (Go to 3i)

3b. Compare the Tailwater (TW) elevation with the roadway sag point elevation for the overtopping flood. Check the appropriate category.

☐ When TW is above the sag point (Go to 4)

☑ TW is between 0 and 0.5' below sag point (Go to 3c)

☐ TW is between 0.5' and 1.0' below sag point (Go to 3d)

☐ When TW is 1.0' and 2.0' below sag point (Go to 3e)

☐ When TW is more than 2.0' below sag point (Go to 3g)

3c. Does the embankment have a good erosion resistant vegetative cover?

☑ Yes (Go to 3i) ☐ No (Go to 3d)

3d. Is the shoulder constructed from erosion resistant material such as paved, coarse gravel, or clay type soil?

☐ Yes (Go to 3i) ☐ No (Go to 3e)

3e. Will the duration of overtopping for the 25-year flood exceed 1 hour?

☐ Yes (Go to 3f) ☐ No (Go to 3i)

3f. Is the embankment constructed from erosion resistant material such as a clay type soil?

☐ Yes (Go to 3i) ☐ No (Go to 3g)

3g. Is the overtopping flood less than a 25-year frequency flood?

☐ Yes (Go to 3h) ☐ No (Go to 3i)

3h. Will the cost of protecting the roadway and/or embankment from severe damage caused by overtopping exceed the cost of providing additional culvert or bridge capacity?

☐ No (Go to 3i); ☐ Yes (Go to 3i)

3i. Is there damage potential to the structure caused by scour, ice, debris or other means during the lesser of the overtopping flood or the 100 year flood?

☐ Yes (Go to 3j) ☑ No (Go to 4)

3j. Will the cost of protecting the structure from damage exceed the cost of providing additional culvert or bridge water capacity?

☐ No (Go to 4); protecting abutments from scour by riprap. ☐ Yes (Go to 4)

4. Will the capital cost of the structure exceed $1,000,000?

☑ No (Go to 5); ☐ Yes (Go to 5)

5. In your opinion, are there any other factors that you feel should require further study through a risk analysis?

☑ No (Go to 6); ☐ Yes (Indicate)

6. If there are no ✓'s in the LTEC Design column on the right, proceed with the design, selecting the lowest acceptable grade line and the smallest waterway opening consistent with the constraints imposed on the project. The risk assessment has demonstrated that potential flood damage costs, traffic related costs, roadway and/or structure repair costs are minor and therefore disregarded for this project.

One or more ✓'s in the LTEC Design column indicates further analysis in the category checked may be required utilizing the LTEC design process or justification (below) why it is not required.

JUSTIFICATION:

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

Signature: _____

License Number: 44235 Date: 1/27/17

G.9 – Floodplain Crossing at Picha Creek (TH 169 Culvert; Bridge #8829) Risk Assessment

RISK ASSESSMENT FOR ENCROACHMENT DESIGN

Date: 2/6/17

District: Metro **County:** Scott **Vicinity of:** TH169/CSAH14

DATA REQUIREMENTS

1. **Location of Crossing:** TH 169 **C.S.** _____ **M.P.** _____

   Sec. 22 **T** 115N **R** 23W

2. **Name of Stream:** Picha Creek **Bridge No. Old:** 8829 **New:** _____

3. **Current ADT:** 29,000 **Projected ADT:** 49,800

4. **Practicable detour available** ☑ Yes ☐ No

If no is checked, please explain: _____

If there is no practicable detour available, then the use of the road must be analyzed. Considerations such as emergency vehicle access, emergency supply and evacuation route, and the need for school bus, milk and mail routes should be studied. Factors to consider for this analysis include design frequency, depth, duration, and frequency of inundation if appropriate, and available funding.

5. **Hydraulic Data: (Fill in as appropriate)**

   Elevation Datum: NAVD88

Q_2 =		cfs	HW_2 Elevation		ft
Q_5 =		cfs	HW_5 Elevation		ft
Q_{10} =	634	cfs	HW_{10} Elevation	745.25	ft
Q_{25} =		cfs	HW_{25} Elevation		ft
Q_{50} =	1150	cfs	HW_{50} Elevation	746.08	ft
Q_{100} =	1420	cfs	HW_{100} Elevation	747.73	ft
Q_{500} =		cfs	HW_{500} Elevation		ft

Approximate Flowline Elevation: 739.85 Ft

Design Frequency Event: ☐ 100-yr ☑ 50-yr ☐ 25-yr ☐ 10-yr

Reasons for selecting Design Frequency: MN State Statute 6115.0231

6. **Magnitude and Frequency of the smaller of "Overtopping" or "500 yr." (Greatest) flood:** 100-year

7. **Low member elevation:** 746.85

8. **Minimum roadway overflow elevation if appropriate:** 747.6 TH169 north of 150th Street

9. **Elevation of high risk property, i.e. residences:** 747.0

   Other buildings 747.0

10. **Horizontal location of overflow:**

    ☐ At Structure (See 12) ☑ Not At Structure:

11. **Type of proposed structure:**

    ☐ Bridge (See 12) ☑ Culvert(s)

12 If the proposed structure is a bridge with the sag point located on the bridge and there is ice and debris potential,

strong consideration should be given to using Q_{50} as design discharge with 3' of clearance between the 50 year tailwater stage and low member.

		LTEC Design
1.	**BACKWATER DAMAGE** - Major flood damage in this context refers to shopping centers, hospitals, chemical plants, power plants, housing developments, etc.	
1a.	Is the overtopping flood greater than the 100 yr. flood? ☐ Yes (Go to 1b) ☑ No (Go to 1e)	
1b.	Is the overtopping flood greater than the "greatest" flood (500 yr. Frequency)? ☐ Yes (Go to 1d) ☐ No (Go to 1c)	
1c.	Is there major flood damage potential for the overtopping flood? ☐ No (Go to 1e)	☐ Yes (Go to 1e)
1d.	Is there major flood damage potential for the greatest flood (500 year frequency)? ☐ No (Go to 1e)	☐ Yes (Go to 1e)
1e.	Will there be flood damage potential to residence(s) or other buildings during a 100 yr. flood? ☑ Yes (Go to 1f) ☐ No (Go to 2)	
1f.	Could this flood damage occur even if the roadway crossing wasn't there? ☑ Yes (Go to 1g) ☐ No (Go to 1h)	
1g.	Could this flood damage be significantly increased by the backwater caused by the proposed crossing? ☐ Yes (Go to 1h) ☑ No (Go to 2)	
1h.	Could the stream crossing be designed in such a manner so as to minimize this potential flood damage? ☐ Yes (Go to 1i) ☐ No (Go to 2)	
1i.	Does the value of the building(s) and/or its contents have sufficient value to justify further evaluation of risk and potential flood damage? ☐ No (Go to 2)	☐ Yes (Go to 2)
2.	**TRAFFIC RELATED LOSSES**	
2a.	Is the overtopping flood greater than the "greatest" flood (500 yr. frequency)? ☐ Yes (Go to 3) ☑ No (Go to 2b)	
2b.	Does the ADT exceed 50 vehicles per day? ☑ Yes (Go to 2c) ☐ No (Go to 3)	
2c.	Would the (duration of road closure in days) multiplied by the (length of detour minus the length of normal route in miles) exceed 20? ☐ Yes (Go to 2d) ☑ No (Go to 3)	
2d.	Does the annual risk cost for traffic related costs exceed 10% of the annual capital costs? ☐ No (Go to 3) (See figures A and B – Appendix A(2) - for Assistance)	☐ Yes (Go to 3)
3.	**ROADWAY AND/OR STRUCTURE REPAIR COSTS**	

3a.	Is the overtopping flood less than a 100 year frequency flood? ☐ Yes (Go to 3b) ☑ No (Go to 3i)	
3b.	Compare the Tailwater (TW) elevation with the roadway sag point elevation for the overtopping flood. Check the appropriate category. ☐ When TW is above the sag point (Go to 4) ☐ TW is between 0 and 0.5' below sag point (Go to 3c) ☐ TW is between 0.5' and 1.0' below sag point (Go to 3d) ☐ When TW is 1.0' and 2.0' below sag point (Go to 3e) ☐ When TW is more than 2.0' below sag point (Go to 3g)	
3c.	Does the embankment have a good erosion resistant vegetative cover? ☐ Yes (Go to 3i) ☐ No (Go to 3d)	
3d.	Is the shoulder constructed from erosion resistant material such as paved, coarse gravel, or clay type soil? ☐ Yes (Go to 3i) ☐ No (Go to 3e)	
3e.	Will the duration of overtopping for the 25-year flood exceed 1 hour? ☐ Yes (Go to 3f) ☐ No (Go to 3i)	
3f.	Is the embankment constructed from erosion resistant material such as a clay type soil? ☐ Yes (Go to 3i) ☐ No (Go to 3g)	
3g.	Is the overtopping flood less than a 25-year frequency flood? ☐ Yes (Go to 3h) ☐ No (Go to 3i)	
3h.	Will the cost of protecting the roadway and/or embankment from severe damage caused by overtopping exceed the cost of providing additional culvert or bridge capacity? ☐ No (Go to 3i);	☐ Yes (Go to 3i)
3i.	Is there damage potential to the structure caused by scour, ice, debris or other means during the lesser of the overtopping flood or the 100 year flood? ☐ Yes (Go to 3j) ☑ No (Go to 4)	
3j.	Will the cost of protecting the structure from damage exceed the cost of providing additional culvert or bridge water capacity? ☐ No (Go to 4); protecting abutments from scour by riprap.	☐ Yes (Go to 4)
4.	Will the capital cost of the structure exceed $1,000,000? ☑ No (Go to 5);	☐ Yes (Go to 5)
5.	In your opinion, are there any other factors that you feel should require further study through a risk analysis? ☑ No (Go to 6);	☐ Yes (Indicate)

6. If there are no ✓'s in the LTEC Design column on the right, proceed with the design, selecting the lowest acceptable grade line and the smallest waterway opening consistent

with the constraints imposed on the project. The risk assessment has demonstrated that potential flood damage costs, traffic related costs, roadway and/or structure repair costs are minor and therefore disregarded for this project.

One or more ✓'s in the LTEC Design column indicates further analysis in the category checked may be required utilizing the LTEC design process or justification (below) why it is not required.

JUSTIFICATION:

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

Signature: _____

License Number: 44235 Date: 2/7/17

G.10 – Floodplain Crossing at Picha Creek (Union Pacific Railroad Culvert) Risk Assessment

RISK ASSESSMENT FOR ENCROACHMENT DESIGN

Date: 2/6/17

District: Metro **County:** Scott **Vicinity of:** TH169/CSAH14

DATA REQUIREMENTS

1. **Location of Crossing:** Union Pacific RR Spur **C.S.** **M.P.**

   Sec. 22 **T** 115N **R** 23W

2. **Name of Stream:** Picha Creek **Bridge No. Old:** Unknown **New:**

3. **Current ADT:** N/A **Projected ADT:** N/A

4. **Practicable detour available** ☑ Yes ☐ No

If no is checked, please explain:

If there is no practicable detour available, then the use of the road must be analyzed. Considerations such as emergency vehicle access, emergency supply and evacuation route, and the need for school bus, milk and mail routes should be studied. Factors to consider for this analysis include design frequency, depth, duration, and frequency of inundation if appropriate, and available funding.

5. **Hydraulic Data: (Fill in as appropriate)**

   Elevation Datum: NAVD88

Q_2 =		cfs	HW_2 Elevation		ft
Q_5 =		cfs	HW_5 Elevation		ft
Q_{10} =	634	cfs	HW_{10} Elevation	742.25	ft
Q_{25} =		cfs	HW_{25} Elevation		ft
Q_{50} =	1150	cfs	HW_{50} Elevation	743.67	ft
Q_{100} =	1420	cfs	HW_{100} Elevation	744.2	ft
Q_{500} =		cfs	HW_{500} Elevation		ft

Approximate Flowline Elevation: 737.28 Ft

Design Frequency Event: ☐ 100-yr ☑ 50-yr ☐ 25-yr ☐ 10-yr

Reasons for selecting Design Frequency: Consistent with TH 169 Criteria per MN State Statute

6. **Magnitude and Frequency of the smaller of "Overtopping" or "500 yr." (Greatest) flood:** 100-year

7. **Low member elevation:** 744.28

8. **Minimum roadway overflow elevation if appropriate:** 747.6 Union Pacific Railroad Spur

9. **Elevation of high risk property, i.e. residences:** 747.0
   Other buildings 747.0

10. **Horizontal location of overflow:**
    ☐ At Structure (See 12) ☑ Not At Structure:

11. **Type of proposed structure:**
    ☐ Bridge (See 12) ☑ Culvert(s)

12	If the proposed structure is a bridge with the sag point located on the bridge and there is ice and debris potential, strong consideration should be given to using Q_{50} as design discharge with 3' of clearance between the 50 year tailwater stage and low member.	
1.	**BACKWATER DAMAGE** - Major flood damage in this context refers to shopping centers, hospitals, chemical plants, power plants, housing developments, etc.	**LTEC Design**
1a.	Is the overtopping flood greater than the 100 yr. flood? ☑ Yes (Go to 1b) ☐ No (Go to 1e)	
1b.	Is the overtopping flood greater than the "greatest" flood (500 yr. Frequency)? ☐ Yes (Go to 1d) ☑ No (Go to 1c)	
1c.	Is there major flood damage potential for the overtopping flood? ☐ No (Go to 1e)	☑ Yes (Go to 1e)
1d.	Is there major flood damage potential for the greatest flood (500 year frequency)? ☐ No (Go to 1e)	☐ Yes (Go to 1e)
1e.	Will there be flood damage potential to residence(s) or other buildings during a 100 yr. flood? ☑ Yes (Go to 1f) ☐ No (Go to 2)	
1f.	Could this flood damage occur even if the roadway crossing wasn't there? ☑ Yes (Go to 1g) ☐ No (Go to 1h)	
1g.	Could this flood damage be significantly increased by the backwater caused by the proposed crossing? ☐ Yes (Go to 1h) ☑ No (Go to 2)	
1h.	Could the stream crossing be designed in such a manner so as to minimize this potential flood damage? ☐ Yes (Go to 1i) ☐ No (Go to 2)	
1i.	Does the value of the building(s) and/or its contents have sufficient value to justify further evaluation of risk and potential flood damage? ☐ No (Go to 2)	☐ Yes (Go to 2)
2.	**TRAFFIC RELATED LOSSES**	
2a.	Is the overtopping flood greater than the "greatest" flood (500 yr. frequency)? ☐ Yes (Go to 3) ☑ No (Go to 2b)	
2b.	Does the ADT exceed 50 vehicles per day? ☑ Yes (Go to 2c) ☐ No (Go to 3)	
2c.	Would the (duration of road closure in days) multiplied by the (length of detour minus the length of normal route in miles) exceed 20? ☐ Yes (Go to 2d) ☑ No (Go to 3)	
2d.	Does the annual risk cost for traffic related costs exceed 10% of the annual capital costs? ☐ No (Go to 3) (See figures A and B – Appendix A(2) - for Assistance)	☐ Yes (Go to 3)

3. ROADWAY AND/OR STRUCTURE REPAIR COSTS	
3a. Is the overtopping flood less than a 100 year frequency flood? ☐ Yes (Go to 3b) ☑ No (Go to 3i)	
3b. Compare the Tailwater (TW) elevation with the roadway sag point elevation for the overtopping flood. Check the appropriate category. ☐ When TW is above the sag point (Go to 4) ☐ TW is between 0 and 0.5' below sag point (Go to 3c) ☐ TW is between 0.5' and 1.0' below sag point (Go to 3d) ☐ When TW is 1.0' and 2.0' below sag point (Go to 3e) ☐ When TW is more than 2.0' below sag point (Go to 3g)	
3c. Does the embankment have a good erosion resistant vegetative cover? ☐ Yes (Go to 3i) ☐ No (Go to 3d)	
3d. Is the shoulder constructed from erosion resistant material such as paved, coarse gravel, or clay type soil? ☐ Yes (Go to 3i) ☐ No (Go to 3e)	
3e. Will the duration of overtopping for the 25-year flood exceed 1 hour? ☐ Yes (Go to 3f) ☐ No (Go to 3i)	
3f. Is the embankment constructed from erosion resistant material such as a clay type soil? ☐ Yes (Go to 3i) ☐ No (Go to 3g)	
3g. Is the overtopping flood less than a 25-year frequency flood? ☐ Yes (Go to 3h) ☐ No (Go to 3i)	
3h. Will the cost of protecting the roadway and/or embankment from severe damage caused by overtopping exceed the cost of providing additional culvert or bridge capacity? ☐ No (Go to 3i);	☐ Yes (Go to 3i)
3i. Is there damage potential to the structure caused by scour, ice, debris or other means during the lesser of the overtopping flood or the 100 year flood? ☐ Yes (Go to 3j) ☑ No (Go to 4)	
3j. Will the cost of protecting the structure from damage exceed the cost of providing additional culvert or bridge water capacity? ☐ No (Go to 4); protecting abutments from scour by riprap.	☐ Yes (Go to 4)
4. Will the capital cost of the structure exceed $1,000,000? ☑ No (Go to 5);	☐ Yes (Go to 5)
5. In your opinion, are there any other factors that you feel should require further study through a risk analysis? ☑ No (Go to 6);	☐ Yes (Indicate)

6. If there are no ✓'s in the LTEC Design column on the right, proceed with the design, selecting the lowest acceptable grade line and the smallest waterway opening consistent with the constraints imposed on the project. The risk assessment has demonstrated that potential flood damage costs, traffic related costs, roadway and/or structure repair costs are minor and therefore disregarded for this project.

One or more ✓'s in the LTEC Design column indicates further analysis in the category checked may be required utilizing the LTEC design process or justification (below) why it is not required.

JUSTIFICATION:

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

Signature: _____

License Number: 44235 Date: 2/7/17

Attachment H – Soils Maps

UNIVERSITY OF MINNESOTA
MINNESOTA GEOLOGICAL SURVEY
Harvey Thorleifson, Director

Prepared and Published with the Support of
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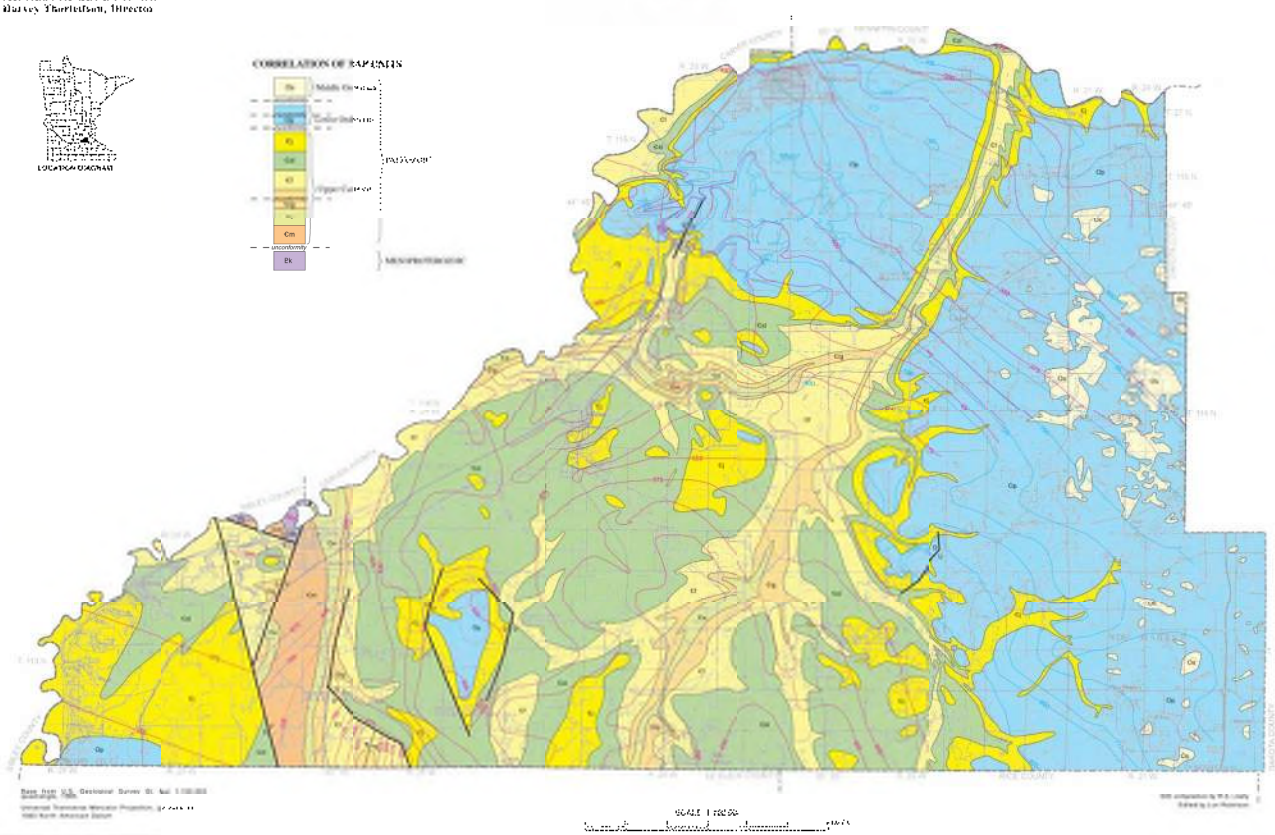
COUNTY ATLAS SERIES
ATLAS C-17
Plate 2—Bedrock Geology



BEDROCK GEOLOGY

By

Anthony C. Runkel and John H. Mossler

2006

DESCRIPTION OF MAP UNITS

Os St. Peter Sandstone (Middle Ordovician)— Fine- to medium-grained, white to tan, quartzose sandstone that has a maximum eroded thickness of 120 feet (37 meters). The lower 10 to 30 feet (3 to 9 meters) locally includes thin to thick beds of variegated siltstone and shale. The St. Peter Sandstone has a patchy distribution on the map, present largely as relatively thin (less than 50 feet [15 meters]) erosional remnants on top of the Prairie du Chien Group in the eastern part of Scott County.

Op Prairie du Chien Group, undivided (Lower Ordovician)—Finely crystalline dolostone, sandstone, and shale that subcrops as a relatively flat, buried plateau between the major buried bedrock valleys in the northern and eastern parts of Scott County. The unit is 140 to 190 feet (43 to 58 meters) thick. The lower 60 to 100 feet (18 to 30 meters) is dominated by thin to very thick, tabular beds of tan to gray dolostone, with negligible content of siliciclastic material except in the lowermost 10 to 20 feet (3 to 6 meters), which can contain substantial quantities of sandstone, siltstone, and shale. The upper 75 to 100 feet (23 to 30 meters) is composed of intercalated tan to gray dolostone and fine- to coarse-grained, quartzose sandstone. Oolites and chert nodules are common in this upper interval.

A large number of drilling records include intervals designated as Prairie du Chien Group that consist largely of variegated siltstone, clay, shale, and "soapstone." These intervals are a few feet to as much as a few tens of feet thick, and are interpreted to be in situ and remobilized weathering residuum that caps the Prairie du Chien Group in scattered locations, and also fills large (up to meter-scale), solution enlarged vertical joints and bedding-plane fractures.

Cj Jordan Sandstone (Upper Cambrian)—Dominantly light gray, white, and tan sandstone that includes coarsening-upward sequences consisting of two interlayered facies, which are not separated on the map. They are medium- to coarse-grained, well-rounded, generally friable quartzose sandstone; and very fine-grained, feldspathic sandstone with lenses of siltstone and shale. The Jordan Sandstone is 80 to 100 feet (24 to 30 meters) thick. The upper part of the formation has extensive silica cement. The Jordan Sandstone subcrops mostly along the upper part of buried bedrock valleys in Scott County, or as scattered patches on top of buried plateaus of St. Lawrence Formation.

Csl St. Lawrence Formation (Upper Cambrian)—Much of the St. Lawrence Formation is tan, white, or gray, dolomite-cemented, very fine-grained sandstone and siltstone. Laminated green shale and pink to red, finely to coarsely crystalline dolostone occur as interbeds, the latter being particularly abundant in the lower one-half of the formation. Glauconite content in the dolostone increases toward the base of the formation, and the contact of the St. Lawrence Formation with the underlying Franconia Formation is transitional. "Contact strata" are characterized by 5 to 20 feet (1.5 to 6 meters) of glauconitic, intraclastic dolostone similar to St. Lawrence Formation strata above, interbedded with generally friable, glauconitic sandstone typical of the underlying Franconia Formation. Unit is 55 to 80 feet (17 to 24 meters) thick.

The extensive distribution of the St. Lawrence Formation across flat subcrop areas in the southwestern part of the county may reflect the high dolomite content, which caused the formation to serve as a resistant unit forming extensive buried plateaus.

Cf Franconia Formation (Upper Cambrian)—Sandstone, siltstone, and shale, with subordinate beds of sandy dolostone. Sandstone occurs in thin to thick beds and is yellowish-gray to gray-yellow-green to light olive-gray, very fine- to fine-grained, silty, feldspathic, and glauconitic. It is generally poorly cemented. Interbedded, thin, grayish-green shale partings are common. Dolostone beds are thin to medium, pink to dark red, commonly intraclastic, and most abundant in the lower one-half of the formation. Sand content and grain size increase upward in the Franconia Formation. The lower one-half of the formation contains relatively abundant shale and very finely crystalline dolostone, which diminish upward as they are proportionally replaced by sandstone. The Franconia Formation is 120 to 140 feet (37 to 43 meters) thick.

The Franconia Formation subcrops across much of the western part of Scott County, and in buried bedrock valleys in other areas.

Cig Ironton and Galesville Sandstones, undivided (Upper Cambrian)—White to tan, fine- to coarse-grained, moderately to well rounded, friable, quartzose sandstone. White and pale green shale interbeds are common. Glauconite is rare in the upper part of this unit and absent in the remainder; the unit is 50 to 65 feet (15 to 20 meters) thick. Contacts with formations above and below are transitional. Regional stratigraphic information indicates that an unconformity is present within this map unit, approximating the Ironton Sandstone–Galesville Sandstone contact. However, these two formations cannot be distinguished from one another using the subsurface data available for Scott County.

The Ironton–Galesville Sandstones subcrops in the deep parts of buried bedrock valleys and in areas of fault-bounded, uplifted blocks, largely in the extreme southwestern part of Scott County.

Ce Eau Claire Formation (Upper Cambrian)—Variegated shale, siltstone, and very fine-grained sandstone. Shale is dominantly green to maroon, and most abundant in the middle approximately one-third of the formation. Glauconite and phosphatic fossil shell fragments are variably abundant throughout the formation. The Eau Claire Formation is 75 feet (23 meters) thick.

Cm Mt. Simon Sandstone (Upper Cambrian)—Fine- to coarse-grained, quartzose sandstone and siltstone. Red and green shale are a subordinate part of the formation, occurring most commonly in the upper one-half of the formation. The Mt. Simon Sandstone is fully penetrated in only a handful of wells in Scott County, so its range in thickness across the area is not precisely known. It probably varies substantially in thickness because it lies on a highly irregular surface developed on Precambrian rocks, but is estimated to be 200 to 300 feet (61 to 91 meters) thick.

Ek Keweenawan Supergroup, undivided (Mesoproterozoic)—Intercalated units of red, maroon, and brown shale; fine- to coarse-grained quartz-rich and feldspathic sandstone; siltstone; and basalt. Keweenawan formations that directly underlie Paleozoic bedrock in Scott County for thousands of feet probably include the Solar Church, Fond du Lac, and perhaps Hinckley Formations, as well as volcanic rocks of the Chengwatana Volcanic Group. Limited subsurface data do not allow the distribution of these individual units to be shown with confidence on maps or cross-sections.

REFERENCE

Palmer, A.R., and Geissman, J., comps., 1999, Geologic time scale: Geological Society of America, 1 p.

MAP SYMBOLS

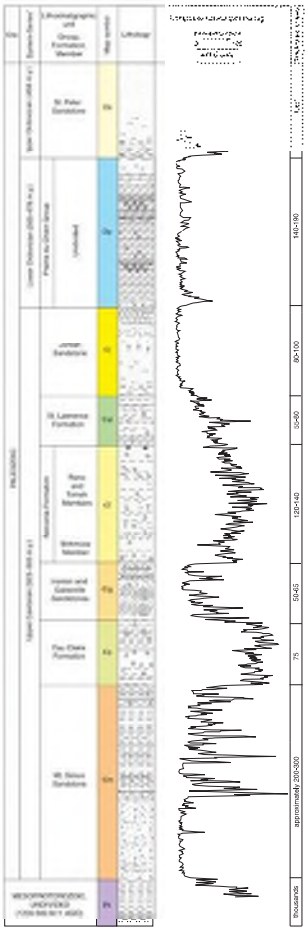
Geologic contact—Approximately located.

Fault—U, upthrown side; D, downthrown side.

Line of equal elevation of the top surface of the Ironton–Galesville (red) and Jordan (blue) Sandstones—Contour interval is 25 feet (8 meters). Contour lines are dashed where they have been extrapolated across areas where these units are partly eroded or absent, but inferred to have originally been a continuous layer. The contours show the manner in which bedrock layers are tilted and faulted in Scott County.

Anticline

Line of equal elevation of the bedrock surface (shown only on Fig. 2)—In feet above sea level; contour interval is 50 feet (15 meters).



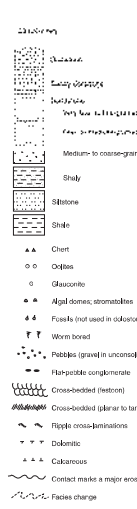


Figure 1. Stratigraphic column depicting the lithology, thickness, and vertical succession of bedrock units shown on the map.
[1]Numerical ages are from Palmer and Geissman (1999).
[2]Maximum eroded thickness; the St. Peter Sandstone is eroded everywhere in Scott County.

INTRODUCTION

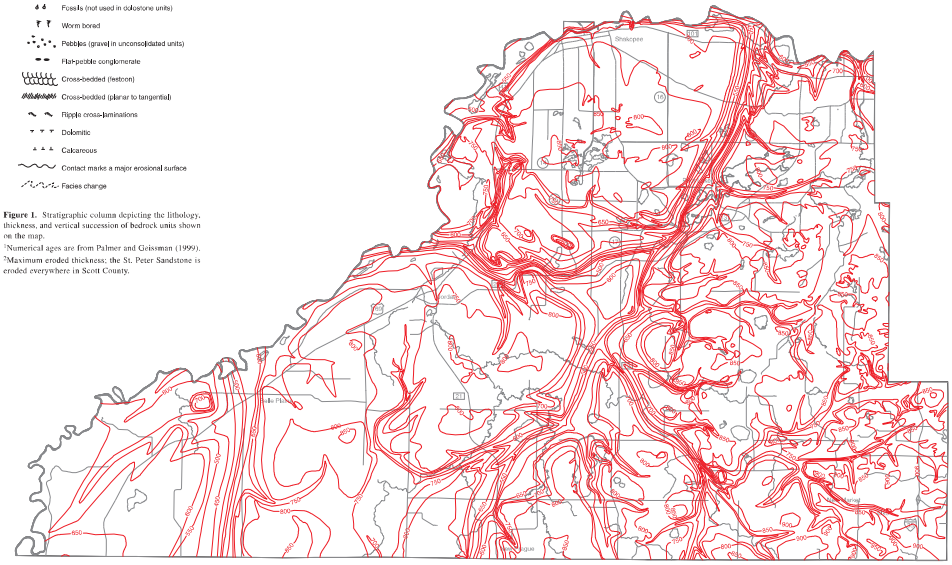
[illegible]

The bedrock shown on this map is mostly sedimentary rock of Paleozoic age, and some of Mesoproterozoic age. The Paleozoic rocks are characterized by relatively thin (less than 200 feet [61 meters]) but widespread layers dominated by sandstone, shale, or dolostone (Fig. 1). These individual bedrock layers are designated as formations or groups (Fig. 1), such as the Mt. Simon Sandstone and Prairie du Chien Group. The oldest Paleozoic (Cambrian) bedrock is dominated by siliciclastic sedimentary rock—sandstone, siltstone, and shale; carbonate rock occurs only as relatively thin intervals in the lower parts of the Franconia and St. Lawrence Formations. Younger Paleozoic bedrock of Ordovician age is in contrast dominated by a thick layer of carbonate rock—the dolostone of the Prairie du Chien Group—locally capped by relatively thin patches of the St. Peter Sandstone.

Paleozoic bedrock lies on top of a thick pile (thousands of feet) of Mesoproterozoic rocks of the Keweenawan Supergroup, related to the Midcontinent rift. This bedrock includes red to brown shale, siltstone, and sandstone of the Solar Church and Fond du Lac Formations, as well as volcanic rocks [illegible] Group. Mesoproterozoic rocks may also include but not limited, undivided, the Hinckley Sandstone, present in [illegible] to Cretaceous fossils (Schwartz, [illegible]) beneath the Paleozoic Mt. Simon Sandstone.

[illegible] generally less than 2° in northeastern and [illegible] southwestern margin of a shallow [illegible] subcrop from northeastern to southwestern Scott County. This general trend is locally interrupted by deep, buried valleys into relatively old formations (Fig. 2), and by faults, which are especially common in the southwestern part of the county. The faults have displacement that ranges from a few tens of feet to nearly 300 feet (91 meters), sufficient to juxtapose two different formations alongside one another at the fault contact. Blocks of bedrock that have dropped down alongside faults preserve outlying remnants of relatively young layers, such as the Prairie du Chien Group, in the southwestern part of the county. Uplifted blocks locally have bedrock as old as Mesoproterozoic age lying directly beneath unconsolidated Quaternary deposits.

The bedrock geologic map is based chiefly on subsurface geologic data, which include water well drillers' logs, geologists' descriptions of water-well cuttings, wireline geophysical logs, and engineering boring records. The data base map (Plate 1) shows the distribution of data used for constructing this map. For site-specific studies in Scott County, it is best to consult current data at the Minnesota Geological Survey, because acquisition of subsurface data is a continuing process and new data may have become available after publication of this map.


Shakopee
169
101
Bloomington
Eden Prairie
Chaska
Chanhassen
Carver
Minnetonka
Excelsior
Deephaven
Tonka Bay
Shorewood
Greenwood
Minnetonka Beach
Mound
Orono
Spring Park
Wayzata
Long Lake
Medicine Lake
Plymouth
Hopkins
Minnetonka Mills
Golden Valley
Crystal
Robbinsdale
Brooklyn Center
Brooklyn Park
Osseo
Maple Grove
Dayton
Rogers
Corcoran
Hanover
Independence
Loretto
Medina
Greenfield
Minnetrista

UNIVERSITY OF MINNESOTA
MINNESOTA GEOLOGICAL SURVEY
Harvey Thorleifson, Director

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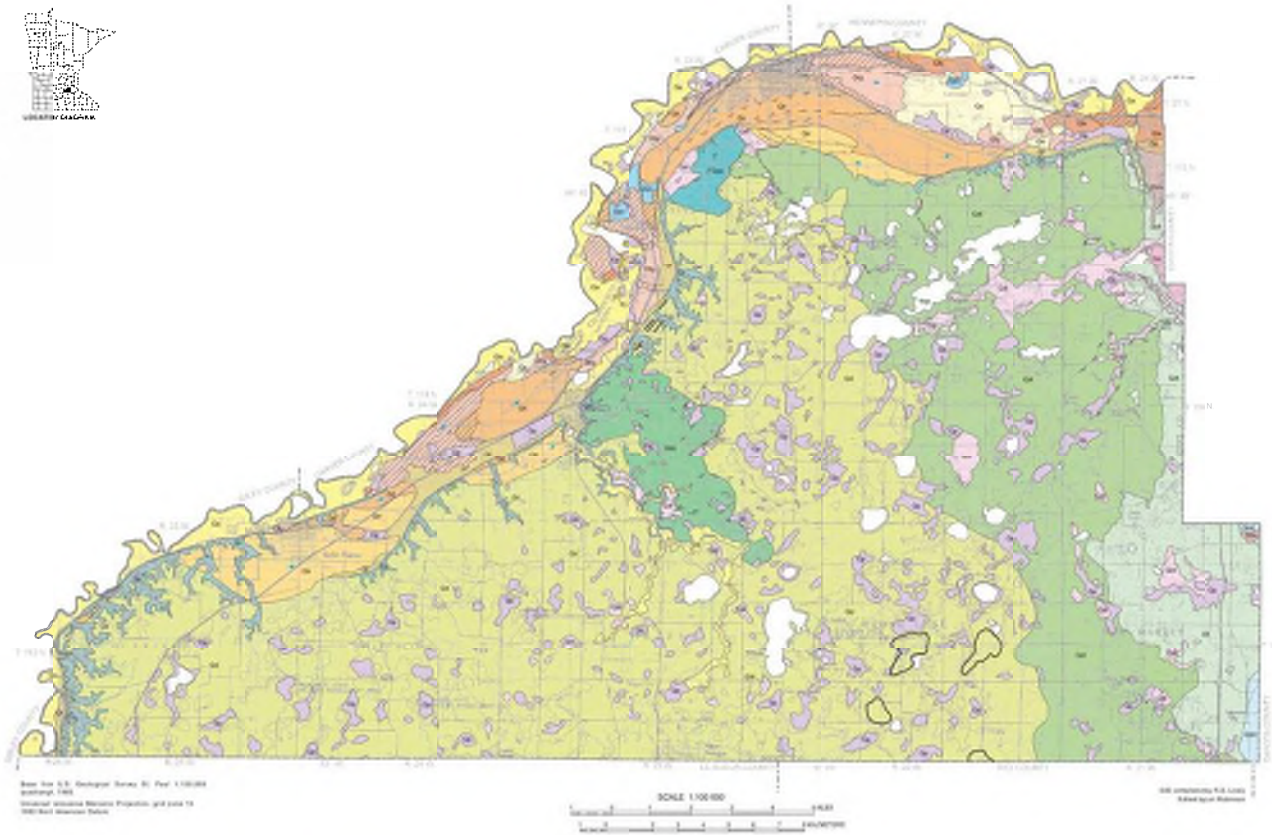
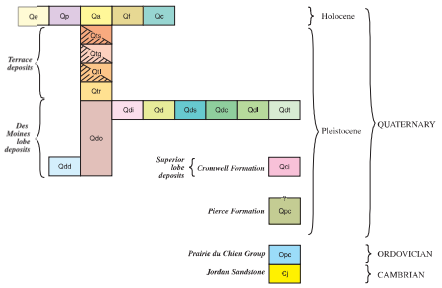
COUNTY ATLAS SERIES
ATLAS C-17
Plate 3—Surficial Geology



SURFICIAL GEOLOGY

Compiled by
Barbara A. Lusardi
2006

CORRELATION OF MAP UNITS



MAP SYMBOLS

Geologic contact—Approximately located.

General flow direction—Arrow points in the direction glacial meltwater once flowed.

Stream-cut scarp—Hachures are on the downslope side; dashed where discontinuous or obscure. Marks the flanks of a former fluvial channel. Boundaries of terrace units and alluvium are commonly at scarps, so are not shown by a scarp symbol. Where paired, scarps bound stream-scoured areas. Till deposits downslope of scarps are fluvially scoured, and mantled in places by sand and gravel too thin and discontinuous to map separately.

Broad, indistinct, irregular trough—Hachures point downslope; identified by the alignment of depressions and lakes. May mark a collapsed and filled channel.

Elongate ridge—Sinuous ridge of sediment interpreted to have been deposited in an ice-walled channel of a glacial meltwater stream flowing at the base of the ice (esker). The fluvial sediment may be covered by 10 feet (3 meters) or more of till.

Plateau—Broad, relatively level area in a zone of hummocky topography. Plateaus range from 40 to over 640 acres (0.16 to 2.59 square kilometers). Predominately till capped in places by 5 to 17 feet (1 to 5 meters) of lake sediment. The plateaus are interpreted to represent substantial debris that was deposited in lows on stagnant ice; the deposits now stand as topographic highs on the landscape. Sorted sediment in the center of the plateau was deposited in standing water.

Linear feature—Identified from aerial photographs. Symbol schematically represents ridge and valley topography interpreted to be transverse dump-blocks within unit Qd. Features have 10 to 30 feet (3 to 9 meters) of relief.

DESCRIPTION OF MAP UNITS

This map emphasizes the distribution and origin of surficial materials in Scott County. It was compiled from a variety of sources shown on the Index to Mapping and listed in the references below.

Most of the sediments in this area were deposited by ice from the northeast and the northwest, primarily the latter (Fig. 1). About 20,000 years ago, the Superior lobe advanced from the northeast, through Lake Superior, carrying characteristic red sandstone, among other rock types. About 14,000 years ago, ice advanced from the northwest carrying sediment from the Riding Mountain uplands in southwestern Manitoba and from west of the Pembina escarpment in North Dakota. These sediments include abundant, distinctive, gray siliceous shale fragments (Table 1). As the Des Moines lobe crossed the easternmost portion of the county, it incorporated debris left by the Superior lobe. Thus, the till in places is a blend of the northwest and northeast source material; in other places, the till is stratified with distinct brown and red layers, reflecting the two source regions. It is likely that ice from the Superior lobe advance was still melting when the Des Moines lobe moved into the region. Thus, the landscape records the most recent glacial events in the sediments described above, but also reflects the history of earlier glacial events in the landforms and sediments just beneath the surface.

QUATERNARY

Qe — **Sand**—Very fine- to medium-grained; more than 3 feet (1 meter) thick; unit forms low-lying dunes. *Windblown sand.*

Qp — **Clay, silt, and organic debris**—Partially decomposed plant matter and fine-grained organic matter deposited in marshes and ponded water, as well as marl (calcareous clay). Includes minor alluvial deposits along streams, as well as beach deposits. *Peat and bog sediment.*

Qa — **Silty clay loam to sandy loam**—Interbedded with layers of fine-grained sand and gravel. Organic debris may be disseminated in the sediments and/or form discrete peat beds. Sediment in the Minnesota River valley is generally finer-grained and consists of a mixture of silt and clay with variable amounts of very fine-grained sand and organic matter. Coarser-grained sediment may be present within the river channel. *Floodplain alluvium.*

Qf — **Loam to loamy fine-grained sand**—Includes beds of silt loam, silty clay loam, fine-grained sand, and gravel. Variable amounts of disseminated organic debris are present. Unit forms coalescing fan-shaped deposits at the base of steep slopes and at the mouths of deep gullies. *Alluvial fan sediment.*

Qc — **Clay to boulders**—Friable mixture reworked from glacial or fluvial sediment and deposited on steep slopes. May contain disseminated organic debris. Includes till outcrops, small alluvial fans, and narrow bodies of alluvium. *Colluvium.*

Sand and gravelly sand—Coarsens to cobbly gravel locally. These sediments are mapped at four major levels. A diagonal line pattern indicates areas where bedrock is within approximately 10 feet (3 meters) of the surface. Boulder lags are common at the contact with bedrock. *Alluvial terrace deposits.*

St. Mary's terrace—The terrace is 10 to 20 feet (3 to 6 meters) above the present floodplain level at an elevation of about 725 feet (221 meters). Upstream from Belle Plaine the terrace merges with, and is buried by, the modern floodplain.

Grey Cloud terrace—The terrace is about 50 feet (15 meters) above the present floodplain level. It ranges in elevation from about 750 feet (229 meters) at Savage to about 770 feet (235 meters) at Belle Plaine.

Langdon terrace—The main terrace level is about 125 feet (38 meters) above the present floodplain level at an elevation of about 820 feet (250 meters). Locally this terrace is cut by prominent channels.

Qtr — *Richfield terrace*—The terrace is about 160 feet (49 meters) above the present floodplain, and ranges in elevation from about 850 feet (259 meters) at Shakopee to about 880 feet (268 meters) at Belle Plaine.

Sediment associated with the northwest-source Des Moines lobe—Deposits contain abundant gray siliceous shale fragments. The color of till is variable but is typically yellow-brown where oxidized and dark gray where unoxidized.

Qdo — **Sand, gravelly sand, and cobble gravel**—Moderately to poorly sorted; crossbedded to flatbedded; interbedded in places with unsorted sediments (till, cobbles, boulders). *Outwash.*

Qdl — **Sand, gravelly sand, and cobble gravel**—Stratified, collapsed, typically faulted and folded, and commonly interbedded with, or capped by, sandy to loamy diamicton (mudflow sediment) and silt (lake sediment). Boulders may be present. The proportion of northeast provenance clasts increases from west to east. *Ice contact deposits.*

Qd — **Loam to clay loam**—Pebbly, unsorted, with scattered cobbles and rare boulders. Shale clasts generally compose from 25 to 40 percent of the very coarse (1 to 2 millimeter) sand fraction; includes rare lenses of stratified sediment. Overlain in some low-lying areas by 3 feet (1 meter) or more of loamy to clayey, organic-bearing colluvium. *Glacial till.*

Qds — **Loam to sandy loam**—Pebbly, unsorted, with cobbles and boulders; commonly capped by, or interbedded with, thin deposits of silty to gravelly stratified sediment. Shale clasts generally compose 25 to 40 percent of the very coarse (1 to 2 millimeter) sand fraction. *Glacial till.*

Qdc — **Clay loam**—Pebbly, unsorted, with scattered cobbles and rare boulders. Shale clasts generally compose more than 50 percent of the very coarse (1 to 2 millimeter) sand fraction. Pockets of silt, sand, and gravel are present in places. *Glacial till.*

Qdf — **Loam**—Pebbly, unsorted, with cobbles and boulders; generally less than 25 percent shale in the very coarse (1 to 2 millimeter) sand fraction. Inclusions of reddish-brown sediment indicate mixing with Superior provenance sediment when advancing ice incorporated material from the underlying sediments. *Glacial till.*

Qdt — **Sandy loam**—Complexly intermixed loam- to sandy loam-textured, unsorted sediment ranging from yellowish-brown to gray and reddish-brown to reddish-gray. Pebbly, with cobbles and boulders; generally less than 20 percent shale in the very coarse (1 to 2 millimeter) sand fraction. Small lenses of stratified sediment are common. *Glacial till.*

Qdd — **Loam to sandy loam**—Pebbly, unsorted, with pebbles and scattered cobbles and boulders; generally less than 10 percent shale in the very coarse (1 to 2 millimeter) sand fraction. Generally less than 20 feet (6 meters) thick. May be underlain in places by sand and gravel close to the surface. *Glacial till.*

Sediment associated with the northeast-source Superior lobe—These deposits contain abundant crystalline rocks (basalt and granite) and many red rocks (sandstone and rhyolite). Till color is variable but is typically brown with a red tint (7.5 YR).

Cromwell Formation (Wright and others 1970)—Glacial and fluvial sediment of northeast provenance (Table 1). Sediments are commonly reworked at the top and mantled by as much as 10 feet (3 meters) of the loamy till associated with the Des Moines lobe.

Qcl — *Sand, gravelly sand, and cobble gravel*—Stratified; interbedded with, or capped by, sandy to loamy diamicton (mudflow sediment) and silt (lake sediment), and may contain boulders. *Ice contact deposits.*

Sediment associated with an earlier ice advance from the northwest

Pierre Formation (Mickelson and others, 1984)—Glacial and glaciofluvial deposits of northwest provenance (Table 1). Likely represents deposits of more than one glacial advance.

Qpc — *Loam*—Pebbly, unsorted, with cobbles and rare boulders. Includes lenses of sorted sand and gravel in places. Mantled in places by colluvium (unit Qc). *Glacial till and colluvium.*

ORDOVICIAN

Opc — **Prairie du Chien Group**—Oolitic sandy dolostone and sandstone of the Shakopee Formation overlies massive dolostone of the Oneota Dolomite. Most of the areas shown in the major river valleys are quarries.

CAMBRIAN

Ꞓj — **Jordan Sandstone**—Medium- to coarse-grained sandstone, friable, crossbedded. Mapped in a few small areas north of Jordan.

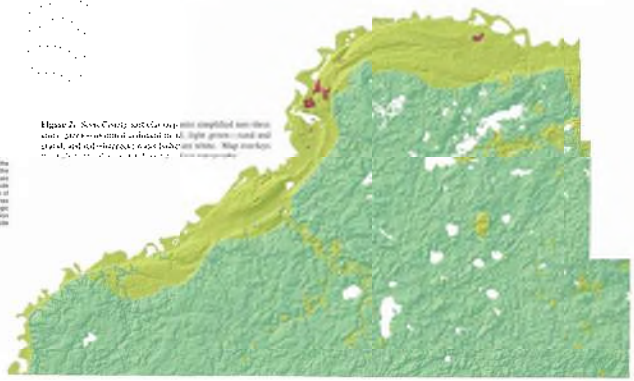
Table 1. [illegible]

[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

Figure 3. Location diagram showing the location of Scott County in relation to the boundaries of the Des Moines lobe.

INDEX TO MAPPING
1. Meyer and Lusardi (2006)
2. Meeker and Figging (2006)
3. Lusardi (1998a)
4. Lusardi (1999)
5. Lusardi (1998b)
6. Meyer and Hobbs (1982)

Figure 2. Scott County [illegible] simplified non-glacial, light green-tan and pink, and red-brown bedrock. Map overlays [illegible] topography.



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Wright, H.E., Jr., Mattson, L.A., and Thomas, J.A., 1970, Geology of the Cloquet quadrangle, Carlton County, Minnesota: Minnesota Geological Survey Geologic Map GM-3, 30 p.

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COUNTY ATLAS SERIES
ATLAS C-17
Plate 5—Bedrock Topography, Depth to Bedrock, Bedrock Models

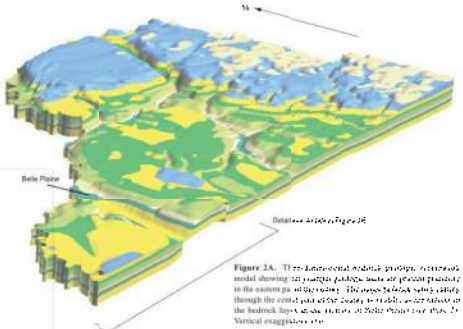


Figure 2A. [illegible] model showing [illegible] in the eastern [illegible] through the central part of the county to [illegible] the bedrock layers [illegible] Vertical exaggeration [illegible]

St. Peter Sandstone

Prairie du Chien Group

Jordan Sandstone

St. Lawrence Formation

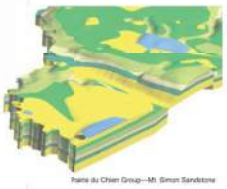
Franconia Formation

Ironton–Galesville Sandstones

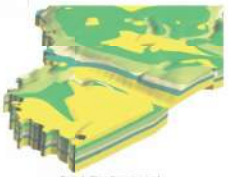
Eau Claire Formation

Mt. Simon Sandstone

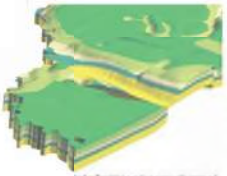
Figure 1. Close-scale images of individual bedrock unit top digital elevation models, shown in sequence from youngest to oldest. In contrast to the older bedrock units, portions of younger units have been progressively eroded away. Darker shades indicating lower elevations offset tops to the northeast show the dip of all bedrock units toward the axis of the Twin Cities basin.



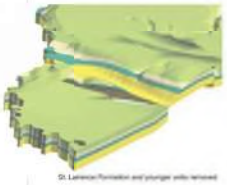
Prairie du Chien Group—Mt. Simon Sandstone



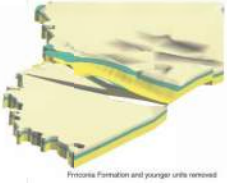
Prairie du Chien Group removed



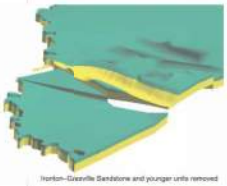
Jordan Sandstone and younger units removed



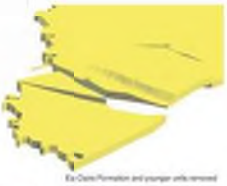
St. Lawrence Formation and younger units removed



Franconia Formation and younger units removed



Ironton–Galesville Sandstone and younger units removed



Eau Claire Formation and younger units removed

Figure 2B. Illustrations of the bedrock geologic framework model for the western part of Scott County, near Belle Plaine. Younger bedrock units are successively removed. Offsets due to faults, unit thicknesses, and extent of the bedrock units are shown. Vertical exaggeration x10.

BEDROCK TOPOGRAPHY, DEPTH TO BEDROCK, AND BEDROCK GEOLOGY MODELS

By

Anthony C. Runkel and Robert G. Tipping

2006

INTRODUCTION

[illegible]

BEDROCK GEOLOGY MODELS

ELEVATION OF INDIVIDUAL BEDROCK SURFACES

Digital elevation models of individual bedrock layers as shown in Figure 1. The pieces used to construct the three-dimensional bedrock surface included combined bedrock topography and structural contours of uneroded tops of the Jordan Sandstone and Ironton–Galesville Sandstones. The Jordan and the Ironton–Galesville Sandstones tops were chosen because their contact with overlying bedrock is easily recognized by well drillers, and as a consequence, is recorded in the driller's record. Similarly, these contacts are prominent in borehole gamma logs, which provide a clear record of the elevations of unit tops (see Plate 1). Structure contours of the Ironton–Galesville Sandstones provide structural information in the western part of the county, where the full thickness of the Jordan Sandstone is largely absent.

Together, contours of the Ironton–Galesville and Jordan Sandstones' uneroded tops define the bedrock structure of the county, including the presence of anticlines, synclines, or faults. Additional bedrock surfaces were calculated based on estimated unit thicknesses, and then adjusted based on gamma logs, drillers' logs, or bedrock outcrop. Improvements in modeling techniques applied as part of this county allow a more accurate depiction of offsets in elevations due to faulting than previous modeling efforts (Mossler and Tipping, 1996).

BEDROCK GEOLOGIC FRAMEWORK MODEL

The digital surfaces can be combined into a complete bedrock geologic framework model (Fig. 2). The model is generally similar to the bedrock map (Plate 2). Differences in the shapes and sizes of subcrop areas, particularly for the St. Peter and Jordan Sandstones, are due to methods used in analyzing the model and restrictions in the level of detail the model can provide. For example, the bedrock map is closely linked to information from the water well database, and slight changes in the elevation of bedrock units or changes in unit thickness indicated by drillers' logs may reflect minor structural variations that are beyond the resolution of the bedrock model. As a result, the model is ranked for accuracy in mapping bedrock structure and unit thicknesses, but should not be used for analyzing the uppermost bedrock. Instead, the bedrock geology map (Plate 2) should be used for this purpose because it provides a better representation of subsurface conditions as reported by drillers.

Digital files for these products along with the rest of the Scott County geologic atlas are available at the Minnesota Geological Survey web site <http://www.mn[illegible]n.edu/mgs/>.

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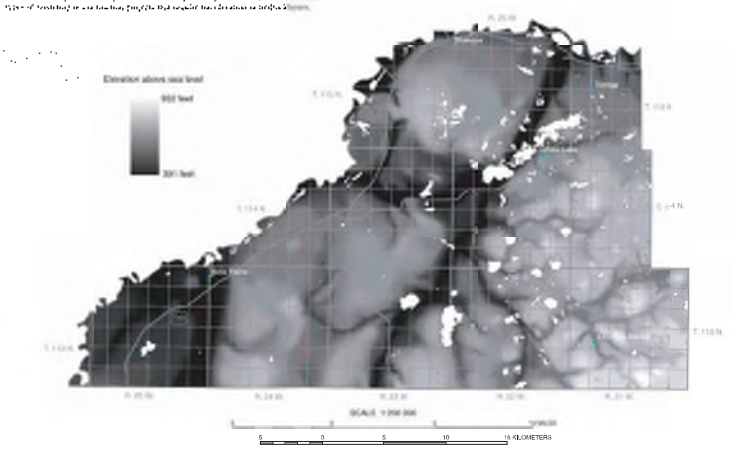
Mossler, J.H., and Tipping, R.G., 1996, Digital elevation models for the tops of the St. Peter Sandstone, Prairie du Chien Group, Jordan Sandstone and St. Lawrence/St. Lawrence-Franconia Formations within the seven-county metropolitan area, *in* Minnesota Pollution Control Agency, Metropolitan area groundwater model—The metro model: St. Paul, Minn., <http://www.pca.state.mn.us/water/groundwater/metromodel.html>, scale 1:100,000.

U.S. Geological Survey, 2006, National elevation dataset, factsheet 148-99: Reston, Va., <http://erg.usgs.gov/isb/pubs/factsheets/fs14899.html>.

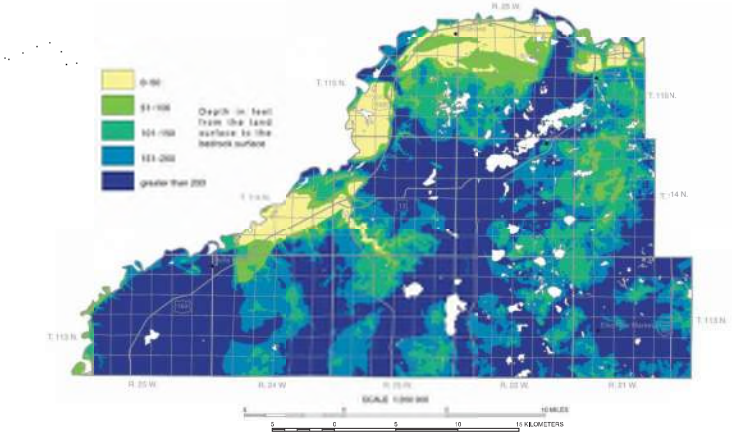


BEDROCK TOPOGRAPHY

The bedrock topography map portrays the elevation of the upper surface of the bedrock of Scott County. It shows the land surface as it would appear if viewed from above and all the overlying unconsolidated materials were stripped away. Higher elevations are shown as lighter shades of gray.

The eroded surface of bedrock in Scott County is characterized by relatively flat plateaus of significant geographic extent, cut by narrow, sinuous valleys. The plateaus are at elevations generally restricted to about 750 to 850 feet (229 to 259 meters) and are capped by relatively resistant carbonate-rich rock of the Prairie du Chien Group and St. Lawrence Formation. The base of the valleys are locally more than 300 feet (91 meters) lower than the plateau surfaces, typically exposing the Franconia Formation and older rock units.

Bedrock topography was mapped by compiling and contouring elevations of the bedrock surface in boreholes (mostly water wells) and bedrock outcrops. Contours were converted into a digital elevation model, referred to here as the bedrock elevation model, in order to provide a continuous digital surface of bedrock elevation over the entire county.



DEPTH TO BEDROCK

The depth to bedrock map portrays the thickness of unconsolidated material overlying the bedrock surface. It appears in many places to be a negative image of the bedrock topographic surface. The thickest deposits, shown in dark blue, occur within bedrock valleys, except where the sediment in these buried valleys was thinned by the erosion of modern rivers. In addition, the abrupt drop in bedrock elevation and resulting increase in depth to bedrock is shown west of the Belle Plaine fault system in the westernmost part of the county (Plate 2). The depth to bedrock in Scott County ranges from 0 to greater than 550 feet (168 meters).

This map was constructed by calculating the difference in elevation between the land surface and the bedrock surface. In a GIS environment, this is calculated by subtracting the bedrock elevation model from the land surface elevation model. In this case, the land surface elevation model used was the U.S. Geological Survey National Elevation 30-meter Dataset (U.S. Geological Survey, 2006).

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Every reasonable effort has been made to ensure the accuracy of the factual data on which this map/interpretation is based; however, the Minnesota Geological Survey does not warrant or guarantee that there are no errors. Users may wish to verify critical information; sources include both the references listed here and information on file at the offices of the Minnesota Geological Survey in St. Paul. In addition, other has been made to ensure that the interpretation conforms to sound geological and cartographic principles. No claim is made that the interpretation shown is rigorously correct, however, and it should not be used to guide engineering-scale decisions without site-specific verification.

Edited by Lori Robinson

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COUNTY ATLAS SERIES
ATLAS C-17
Plate 6—Subsurface Recharge and
Surface Infiltration

SUBSURFACE RECHARGE AND SURFACE INFILTRATION

By

Robert G. Tipping

2006

Figure 1. Estimated rate of recharge for buried sand 3. Mix rapid recharge is estimated for the eastern, unconsolidated part of the county, where sand 3 is close to or directly connected to surficial sand and gravel deposits. Sand units higher in the stratigraphic sequence are shown by a pattern.

Figure 2. Estimated rate of recharge for buried sand 3. Rapid recharge to sand 3 is limited to the northeastern part of the county, where it is close to or in direct contact with overlying sand 2 or surficial sand and gravel deposits. Sand units higher in the stratigraphic sequence are shown by a pattern.

Figure 3. Estimated rate of recharge for buried sand 4. Rapid recharge to sand 4 is limited to areas where it is close to or in direct contact with overlying sand 2 or surficial sand and gravel deposits. Sand units higher in the stratigraphic sequence are shown by a pattern.

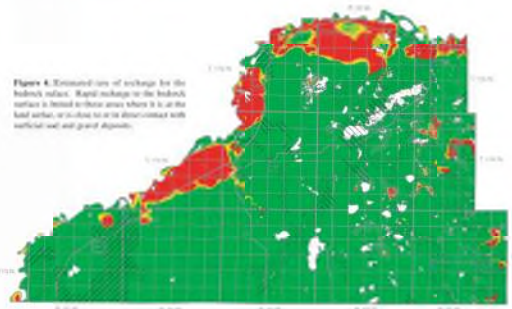


Figure 4. Estimated rate of recharge for the bedrock surface. Rapid recharge to the bedrock surface is limited to those areas where it is at the land surface, or is close to or in direct contact with surficial sand and gravel deposits.

EXPLANATION

Sand and gravel units

- Sand and gravel units
- Buried sand and gravel associated with undefined units at considerable depth

Recharge ratings—Estimated vertical travel time for water to move from the land surface to a buried aquifer

- Very fast—Hours to months
- Fast—Weeks to years
- Moderate—Years to decades
- Slow—Decades to a century or more
- Very slow—A century or more

INTRODUCTION

These maps show the land-surface water infiltration and potential rate of recharge to buried glacial aquifers. Infiltration, recharge, and runoff are complex phenomena involving depth to water, permeability of soil and subsurface material, degree of saturation, topography, land use, and other factors (Allison and others, 1987). This plate provides a qualitative analysis of vertical infiltration and recharge that is largely materials based. Soil types, surficial geologic materials, and the mapped sequence of buried glacial deposits are used to estimate relative rates of infiltration and recharge. The term "infiltration" is used to describe the downward movement of water through the unsaturated (vadose) zone. The term "recharge" is used to describe downward movement of water through the saturated (phreatic) zone. The methods used here are based on vertical movement of water only, and does not consider lateral (horizontal) flow, which may dominate in many settings (Geologic Sensitivity Workgroup, 1991). The recharge maps deal primarily with the larger, mappable units of buried sand and gravel. There are many other smaller units that may impact recharge rates locally.

SUBSURFACE RECHARGE

METHODS

Maps shown in Figures 1 through 4 are based on methods developed by Berg (2006). A vertical succession of sand and gravel aquifers, sometimes intersecting buried aquifers are thought to provide a complex pathway for water to move downward through unconsolidated deposits. Using Berg's approach of a hydrologic system, such buried aquifer receives focused vertical recharge from the base of the overlying aquifer if an intervening confining layer is thin or absent. This conceptual approach is illustrated in Figure 5.

Calculations used to construct these maps were done using the digital surfaces constructed as part of the three-dimensional geologic framework model (Plate 4). Recent infiltration from precipitation that reaches the water table moves downward through sand and gravel deposits until it intersects a confining unit (buried till) or reaches the bottom of a surficial sand deposit (recharge surface 1). In places where the intersected till layer is less than 10 feet (3 meters) thick or absent, water moves downward into the underlying sand and gravel and becomes recharge surface 2. The process is repeated until either the bedrock surface is reached or there are no longer any less-than-10-foot till layers. It should be noted that the unit "undefined" below till 3 and sand 4 is arbitrarily treated as a confining layer, although the composition of this unit is unknown (Plate 4).

Areas of buried aquifers with faster recharge rates are shown in red or orange. These are portions of the buried aquifer that are either overlain by a combination of sand and gravel deposits and/or thin till units that connect back to the land surface. The rates of recharge are adapted from previous mapping efforts and are inversely proportional to the thickness of the overlying confining layer (Fig. 6, for example). Geologic Sensitivity Workgroup, 1991). Using this approach, those areas where the thickness of the confining layer between the top of a buried aquifer and the next overlying recharge surface is less than 3 feet (3 meters) receive a "very fast" rating; where the thickness is greater than 40 feet (12 meters) the area receives a "very slow" rating. Intermediate ratings and associated thicknesses are shown in Figure 5.

RESULTS AND DISCUSSION

In southwestern Scott County, a series of overlapping and intersecting sand and gravel deposits extends from the land surface down to the bedrock surface (see Plate 4). These deposits provide a pathway for more rapid recharge to move vertically to deeper buried sand and gravel and to the bedrock surface, as illustrated in Figures 1 through 4. In series, the maps also show a decrease in recharge potential with depth.

Chemistry and isotopic data support the conceptual model of enhanced vertical recharge in part of the county. Burman (1995) found evidence of recent recharge (water younger than 50 years) in such bedrock (the Prairie du Chien Group) wells and wells completed in the buried sand and gravel in the vicinity of Prior Lake. Chloride levels from Burman (1995), commonly used as a chemical tracer of recharge, were also elevated in this part of the county. Minnesota Department of Health nitrate data also indicate recent recharge in the northeastern part of the county (S. Robertson, unpub. data). Additional recent recharge was detected in wells along the Minnesota River. Similar patterns of elevated nitrate, indicative of recharge to the northeast and along the Minnesota River were found in nitrate data provided by the Scott County Environmental Health Department (P. Schmit* written data).

SURFACE INFILTRATION

METHODS

The map shown in Figure 7 combines Natural Resources Conservation Service hydrologic group ratings (Natural Resources Conservation Service, 2006a) from a digitized version of the Scott County soils atlas (Metropolitan Council, 1998), with textures derived from the surficial geology map (Plate 3). This approach has been successfully applied to analyze surface water-related issues elsewhere in the metro area, and provides an important component to ground-water recharge (Berg and Mohanty, 2002; Barr, 2005). The map units are used to represent surficial deposits. Much of Scott County is covered with clay-rich glacial till. As a result, perched water table conditions are pervasive, and are expected to exist countywide.

Because of the lack of an integrated countywide water table, infiltration was calculated using a hypothetical water depth (vadose zone thickness) of 10 feet (3 meters). Infiltration rate from Natural Resources Conservation Service publications (Natural Resources Conservation Service, 2006b), were applied to textures from the soils map and the surficial geology map (Table 2). The process is illustrated in Figure 8. If no hydrologic group rating was available for a soil, or if the soil was not shown on the soil map, then the surficial geology map was used to estimate infiltration rate. In the absence of any soil or surficial geology map texture, a fine estimate was made using the infiltration rate assigned to the underlying glacial till map unit. Peat in the surficial geology map was assigned an intermediate infiltration rate of 0.3 inch per hour (0.8 millimeter) per hour. These ratings provide an estimated rate of infiltration through the top 3 feet (1 meter) of soil and the top 7 feet (2 meters) of underlying parent material, assuming that the total soil horizon thickness is unknown. This method follows the approach applied to Natural Resources Conservation Service hydrologic group ratings, where ratings such as A/D, B/D, and C/D, shown in Table 2, are given for certain soils that can be adequately drained; the first letter applies to drained conditions, and the second to undrained condition (Natural Resources Conservation Service, 2006a). In the map, the infiltration map, like the recharge map, is based primarily on geologic materials and does not account for temporal hydrologic conditions.

RESULTS AND DISCUSSION

Textures of Quaternary deposits in the eastern and northeastern parts of the county are generally finer than those of the county. Superior provenance till and Des Moines lobe till based with Superior provenance till to the east have greater sand content than other surficial deposits. As a result, infiltration ratings are higher in the eastern and northeastern parts of the county, where till is present at the land surface.

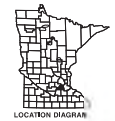
Hydrologic group ratings for hydric soils result in fast infiltration ratings in areas that are mapped as peat on the surficial map (Plate 3). As discussed above, due to hydrologic ratings result in high infiltration ratings, even in areas where water is near or at the land surface as indicated by hydric soils and the presence of peat. This is to account for areas where water table conditions could change due to drainage modifications, pumping, or natural changes in the hydraulic gradient.

Ratings do not take into account secondary conditions, such as oxidation and fracturing, that can affect till permeability. Oxidation in tills commonly extends downwards as much as 40 feet (15 meters), increasing permeability of the till by as much as three orders of magnitude (Stichling and Tessier-Surine, 2006). In Scott County, areas rated slow may experience infiltration at greater rates than mapped due to secondary porosity and permeability in surficial tills. Other secondary conditions not included in the rating method are the presence of drain tiles, which also would result in greater infiltration rates than are shown here. In Scott County, tiling occurs primarily west of Minneapolis (Highway 35 & Bowlen, Scott County Soil and Water Conservation District, unpub. data).

SUMMARY AND CONCLUSIONS

The recharge maps show buried aquifers and infiltration maps on this plate provide a qualitative assessment of how quickly water moves vertically downward into the subsurface. The estimates are considered qualitative because they have not been field verified, do not consider heterogeneities in the soils or subsurface, and do not account for actual water table conditions or lateral water movement. The geologic model of unconsolidated deposits, based on our current understanding of glacial stratigraphy within the county, agrees fairly well with existing water chemistry and isotope data. Specifically, enhanced vertical recharge occurs in the northeastern part of the county and along the Minnesota River, where sequences of buried sand bodies provide pathways for water to move more quickly to bedrock aquifers. There is less vertical recharge in the central and western parts of the county, where thick till sequences and lack of well-connected buried sand bodies restrict the downward movement of water.

The maps do not account for all water wells in unconsolidated deposits; many wells were completed in sands that are not shown as buried sands 1, 2, 3, or 4 (see discussion of building the three-dimensional model – Plate 4). Instead, the maps provide guidance for where more rapid downward vertical movement of water is expected to occur, and where recharge to buried aquifers is restricted due to the presence of thick overlying glacial tills.



LOCATION DIAGRAM

Table 1. Recharge rate conceptual model matrix. One of the variables that determines the rate of recharge is the thickness of the confining layer between the top of the aquifer and the overlying recharge surface as defined in Figure 5. These estimates are qualitative and based on comparable travel time estimates from previous studies for similar geologic materials (Berg, 2006).

Figure 5. Generalized cross section of northwestern Scott County showing conceptual recharge for buried sand and gravel and bedrock aquifers. Recent infiltration from precipitation that reaches the water table moves downward through sand and gravel deposits until it intersects a confining unit (buried till) or reaches the bottom of a surficial sand deposit (recharge surface 1). In places where the intersected till layer is less than 10 feet (3 meters) thick or absent, water moves downward into the underlying sand body and becomes recharge surface 2. The process is repeated until either the bedrock surface is reached or there are no longer any less-than-10-foot till layers. It should be noted that the unit "undefined" below till 3 and sand 4 is arbitrarily treated as a confining layer, although the composition of this unit is unknown (Plate 4).

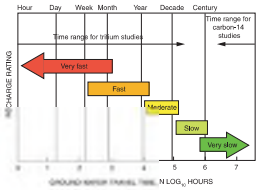


Figure 6. Recharge ratings for Figures 1 through 4 as defined by vertical travel time. This rating comes from earlier geologic sensitivity ratings (Geologic Sensitivity Workgroup, 1991). Ratings are based on the time range required for water at or near the surface to travel vertically downward to an aquifer. Tritium and carbon-14 studies indicate the relative ages of ground water. Ground-water age data were not collected as part of this study; these estimates are qualitative and based on comparable travel time estimates from previous studies for similar geologic materials (Berg, 2006).

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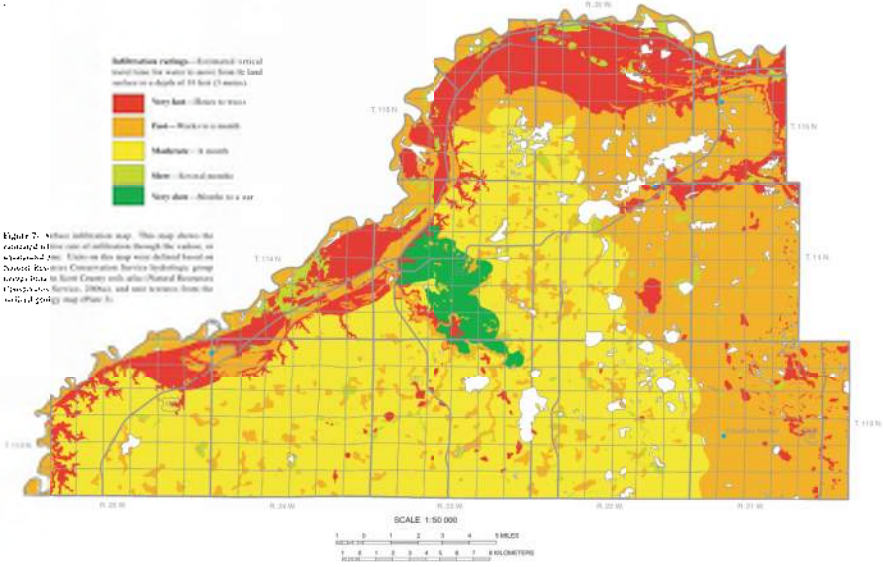

Figure 7. Infiltration map. This map shows the estimated relative rate of infiltration through the vadose zone, based on Natural Resources Conservation Service hydrologic group ratings (Table 2) and soil textures from the surficial geology map (Plate 3).

NRCS (2006b) hydrologic group rating	Texture	Minimum transmission rate (inches/hour)	Surficial map unit (Plate 3)	Texture	Minimum transmission rate (inches/hour)
Group A, A/D	sand, loamy sand, sandy loam	0.3	Cj, Cpc, Qc, Qci, Qd, Qds, Qe, Qfg, Qff, Qfr, Qiw	sand, sand and gravel, bedrock	0.5
Group B, B/D	silt loam or loam	0.15	Qdd, Qds, Qdf, Qf	loamy fine-grained sand to sandy loam	0.3
Group C, C/D	sandy clay loam	0.05	Qa, Qdf, Qpc, Qp	loam to silty clay loam	0.15
Group D	clay loam, silty clay loam, sandy clay, silty clay, clay	0.01	Qd	loam to clay loam	0.05
			Qdc	clay loam	0.01

Table 2. Infiltration rates for Figure 7 for soil hydrologic groups and surficial geology map textures. The rate of infiltration through the vadose zone is estimated using Natural Resources Conservation Service soils atlas hydrologic group ratings (Natural Resources Conservation Service, 2006a) and textures from the surficial geology map (Plate 3) as a model for materials below the soil layer to the water table.

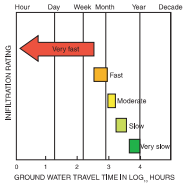

Figure 8. Infiltration ratings as defined by vertical travel time. Ratings are calculated from minimum estimated transmission rates for soil hydrologic groups (Natural Resources Conservation Service, 2006b) applied over a distance of 10 feet (3 meters).

Every reasonable effort has been made to ensure the accuracy of the factual data on which this map interpretation is based; however, the Minnesota Geological Survey does not warrant or guarantee that there are no errors. Users may wish to verify critical information; sources include both the references listed here and information on file at the offices of the Minnesota Geological Survey in St. Paul. In addition, effort has been made to ensure that the interpretation conforms to sound geologic and cartographic principles. No claim is made that the interpretation shown is rigorously correct; however, and it should not be used to guide engineering-scale decisions without site-specific verification.

Edited by Lori Robinson

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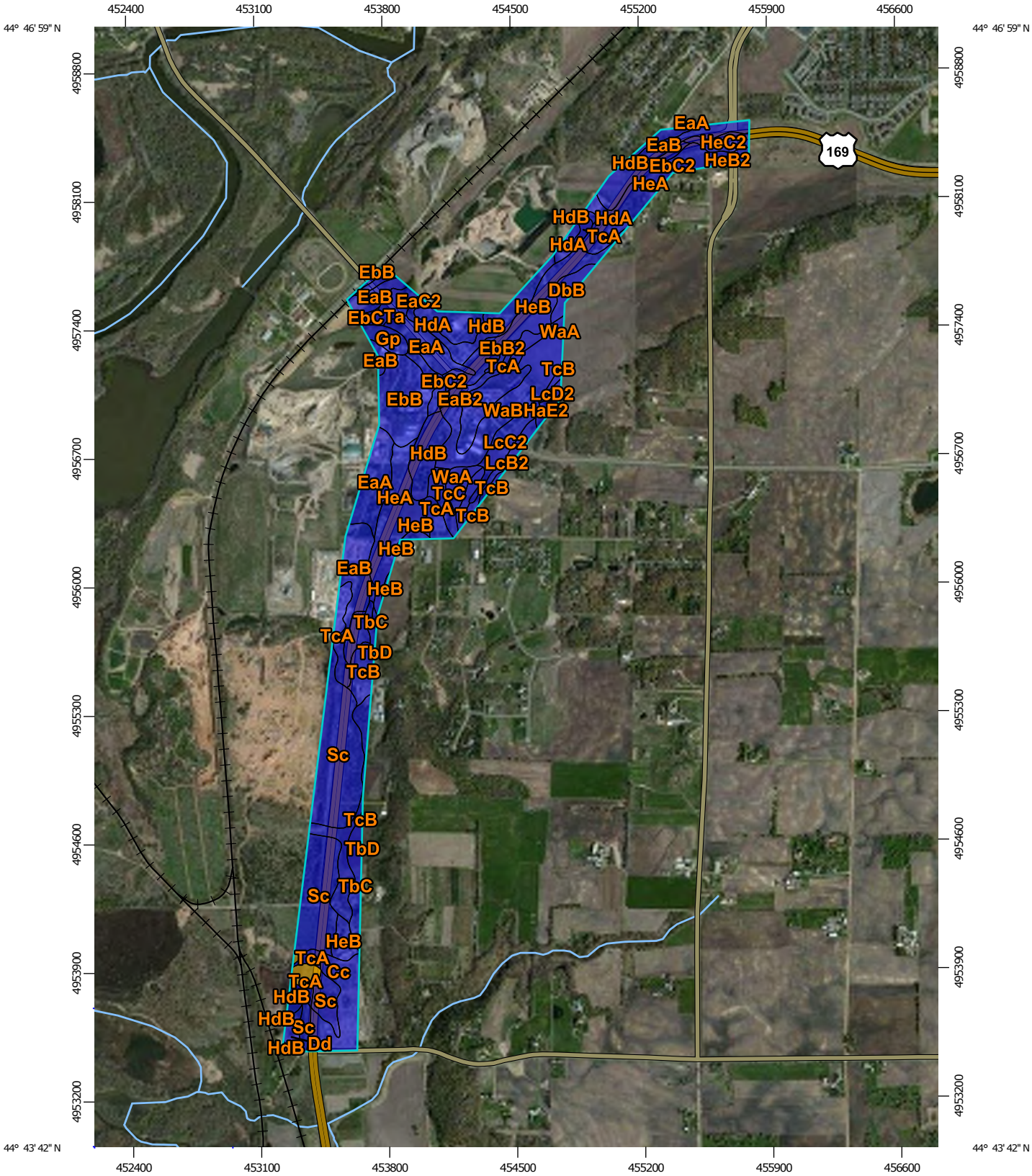
Depth to Any Soil Restrictive Layer—Scott County, Minnesota
(Scott County Soil Survey Depth to Restrictive Layer)



Map Scale: 1:29,700 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 400 800 1600 2400

Feet: 0 1000 2000 4000 6000

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

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

- 0 - 25
- 25 - 50
- 50 - 100
- 100 - 150
- 150 - 200
- > 200
- Not rated or not available

Soil Rating Lines

- 0 - 25
- 25 - 50
- 50 - 100
- 100 - 150
- 150 - 200
- > 200
- Not rated or not available

Soil Rating Points

- 0 - 25
- 25 - 50
- 50 - 100
- 100 - 150
- 150 - 200
- > 200
- Not rated or not available

Water Features

- Streams and Canals

Transportation

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

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Scott County, Minnesota
Survey Area Data: Version 11, Sep 22, 2015

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

Date(s) aerial images were photographed: Mar 16, 2012—Apr 6, 2012

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

Depth to Any Soil Restrictive Layer

Depth to Any Soil Restrictive Layer— Summary by Map Unit — Scott County, Minnesota (MN139)				
Map unit symbol	**Map unit name**	**Rating (centimeters)**	**Acres in AOI**	**Percent of AOI**
Cc	Comfrey silty clay loam	>200	23.1	4.0%
CdA	Copaston silt loam, 0 to 2 percent slopes	40	4.6	0.8%
DbB	Dickman sandy loam, 2 to 6 percent slopes	>200	6.3	1.1%
Dd	Dorchester silty clay loam	>200	2.4	0.4%
EaA	Estherville loam and sandy loam, 0 to 2 percent slopes	>200	41.4	7.1%
EaB	Estherville sandy loam, 2 to 6 percent slopes	>200	33.9	5.8%
EaB2	Estherville loam and sandy loam, 2 to 6 percent slopes, moderately eroded	>200	17.8	3.1%
EaC2	Estherville loam and sandy loam, 6 to 12 percent slopes ,moderately eroded	>200	0.6	0.1%
EbB	Salida gravelly sandy loam, 0 to 6 percent slopes	>200	30.0	5.1%
EbB2	Salida gravelly sandy loam, 0 to 6 percent slopes, moderately eroded	>200	1.5	0.3%
EbC	Salida gravelly sandy loam, 6 to 12 percent slopes	>200	1.3	0.2%
EbC2	Salida gravelly sandy loam, 6 to 12 percent slopes, moderately eroded	>200	7.3	1.3%
Gp	Pits, gravel	>200	6.1	1.0%
HaE2	Hayden loam, 18 to 25 percent slopes	>200	2.8	0.5%
HdA	Sparta fine sand, 0 to 2 percent slopes	>200	31.7	5.4%
HdB	Sparta fine sand, 2 to 6 percent slopes	>200	36.6	6.3%
HdC2	Sparta fine sand, 6 to 12 percent slopes	>200	1.9	0.3%

Depth to Any Soil Restrictive Layer— Summary by Map Unit — Scott County, Minnesota (MN139)				
Map unit symbol	**Map unit name**	**Rating (centimeters)**	**Acres in AOI**	**Percent of AOI**
HeA	Sparta loamy fine sand, 0 to 2 percent slopes	>200	59.0	10.1%
HeB	Sparta loamy fine sand, 2 to 6 percent slopes	>200	37.4	6.4%
HeB2	Sparta loamy fine sand, 2 to 6 percent slopes	>200	1.9	0.3%
HeC2	Sparta loamy fine sand, 6 to 12 percent slopes	>200	6.1	1.0%
LcB2	Lester loam, 2 to 6 percent slopes, moderately eroded	>200	6.2	1.1%
LcC2	Lester loam, 6 to 10 percent slopes, moderately eroded	>200	11.7	2.0%
LcD2	Lester loam, 10 to 16 percent slopes, moderately eroded	>200	1.8	0.3%
Sc	Stony land	>200	89.4	15.3%
Ta	Terrace escarpments	>200	7.9	1.4%
TbC	Terril loam, 6 to 12 percent slopes	>200	11.5	2.0%
TbD	Terril loam, 12 to 18 percent slopes	>200	0.0	0.0%
TcA	Terril loam, 0 to 2 percent slopes	>200	43.4	7.4%
TcB	Terril loam, 2 to 6 percent slopes	>200	11.2	1.9%
TcC	Terril loam, 6 to 12 percent slopes	>200	3.9	0.7%
WaA	Waukegan silt loam, 0 to 2 percent slopes	>200	6.7	1.1%
WaB	Waukegan silt loam, 2 to 6 percent slopes	>200	36.3	6.2%
Totals for Area of Interest			**583.7**	**100.0%**

Description

A "restrictive layer" is a nearly continuous layer that has one or more physical, chemical, or thermal properties that significantly impede the movement of water and air through the soil or that restrict roots or otherwise provide an unfavorable root environment. Examples are bedrock, cemented layers, dense layers, and frozen layers.

This theme presents the depth to any type of restrictive layer that is described for each map unit. If more than one type of restrictive layer is described for an individual soil type, the depth to the shallowest one is presented. If no restrictive layer is described in a map unit, it is represented by the "> 200" depth class.

This attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

Rating Options

Units of Measure: centimeters

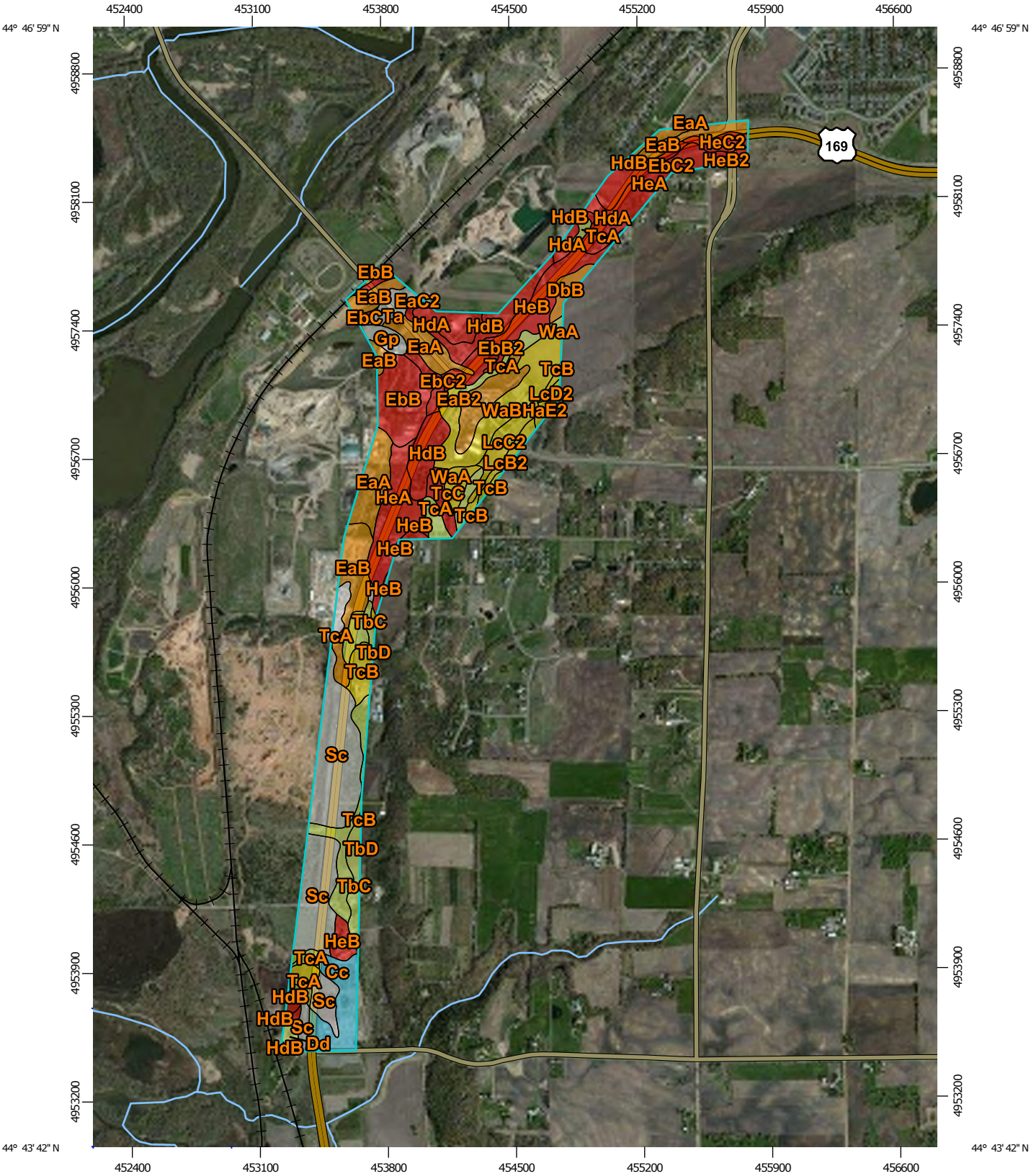
Aggregation Method: Dominant Component

Component Percent Cutoff: *None Specified*

Tie-break Rule: Lower

Interpret Nulls as Zero: No

Drainage Class—Scott County, Minnesota
(Scott County Soil Survey Drainage Class)



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Meters: 0 400 800 1600 2400

Feet: 0 1000 2000 4000 6000

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

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

- Excessively drained
- Somewhat excessively drained
- Well drained
- Moderately well drained
- Somewhat poorly drained
- Poorly drained
- Very poorly drained
- Subaqueous
- Not rated or not available

Soil Rating Lines

- Excessively drained
- Somewhat excessively drained
- Well drained
- Moderately well drained
- Somewhat poorly drained
- Poorly drained
- Very poorly drained
- Subaqueous
- Not rated or not available

Soil Rating Points

- Excessively drained
- Somewhat excessively drained
- Well drained
- Moderately well drained
- Somewhat poorly drained
- Poorly drained
- Very poorly drained
- Subaqueous
- Not rated or not available

Water Features

- Streams and Canals

Transportation

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

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

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

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Soil Survey Area: Scott County, Minnesota
Survey Area Data: Version 11, Sep 22, 2015

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

Date(s) aerial images were photographed: Mar 16, 2012—Apr 6, 2012

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

Drainage Class

Drainage Class— Summary by Map Unit — Scott County, Minnesota (MN139)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
Cc	Comfrey silty clay loam	Poorly drained	23.1	4.0%
CdA	Copaston silt loam, 0 to 2 percent slopes	Well drained	4.6	0.8%
DbB	Dickman sandy loam, 2 to 6 percent slopes	Somewhat excessively drained	6.3	1.1%
Dd	Dorchester silty clay loam	Moderately well drained	2.4	0.4%
EaA	Estherville loam and sandy loam, 0 to 2 percent slopes	Somewhat excessively drained	41.4	7.1%
EaB	Estherville sandy loam, 2 to 6 percent slopes	Somewhat excessively drained	33.9	5.8%
EaB2	Estherville loam and sandy loam, 2 to 6 percent slopes, moderately eroded	Somewhat excessively drained	17.8	3.1%
EaC2	Estherville loam and sandy loam, 6 to 12 percent slopes ,moderately eroded	Somewhat excessively drained	0.6	0.1%
EbB	Salida gravelly sandy loam, 0 to 6 percent slopes	Excessively drained	30.0	5.1%
EbB2	Salida gravelly sandy loam, 0 to 6 percent slopes, moderately eroded	Excessively drained	1.5	0.3%
EbC	Salida gravelly sandy loam, 6 to 12 percent slopes	Excessively drained	1.3	0.2%
EbC2	Salida gravelly sandy loam, 6 to 12 percent slopes, moderately eroded	Excessively drained	7.3	1.3%
Gp	Pits, gravel		6.1	1.0%
HaE2	Hayden loam, 18 to 25 percent slopes	Well drained	2.8	0.5%
HdA	Sparta fine sand, 0 to 2 percent slopes	Excessively drained	31.7	5.4%
HdB	Sparta fine sand, 2 to 6 percent slopes	Excessively drained	36.6	6.3%
HdC2	Sparta fine sand, 6 to 12 percent slopes	Excessively drained	1.9	0.3%

Drainage Class— Summary by Map Unit — Scott County, Minnesota (MN139)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
HeA	Sparta loamy fine sand, 0 to 2 percent slopes	Excessively drained	59.0	10.1%
HeB	Sparta loamy fine sand, 2 to 6 percent slopes	Excessively drained	37.4	6.4%
HeB2	Sparta loamy fine sand, 2 to 6 percent slopes	Excessively drained	1.9	0.3%
HeC2	Sparta loamy fine sand, 6 to 12 percent slopes	Excessively drained	6.1	1.0%
LcB2	Lester loam, 2 to 6 percent slopes, moderately eroded	Well drained	6.2	1.1%
LcC2	Lester loam, 6 to 10 percent slopes, moderately eroded	Well drained	11.7	2.0%
LcD2	Lester loam, 10 to 16 percent slopes, moderately eroded	Well drained	1.8	0.3%
Sc	Stony land		89.4	15.3%
Ta	Terrace escarpments		7.9	1.4%
TbC	Terril loam, 6 to 12 percent slopes	Moderately well drained	11.5	2.0%
TbD	Terril loam, 12 to 18 percent slopes	Moderately well drained	0.0	0.0%
TcA	Terril loam, 0 to 2 percent slopes	Moderately well drained	43.4	7.4%
TcB	Terril loam, 2 to 6 percent slopes	Well drained	11.2	1.9%
TcC	Terril loam, 6 to 12 percent slopes	Moderately well drained	3.9	0.7%
WaA	Waukegan silt loam, 0 to 2 percent slopes	Well drained	6.7	1.1%
WaB	Waukegan silt loam, 2 to 6 percent slopes	Well drained	36.3	6.2%
Totals for Area of Interest			**583.7**	**100.0%**

Description

"Drainage class (natural)" refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized-excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained, and very poorly drained. These classes are defined in the "Soil Survey Manual."

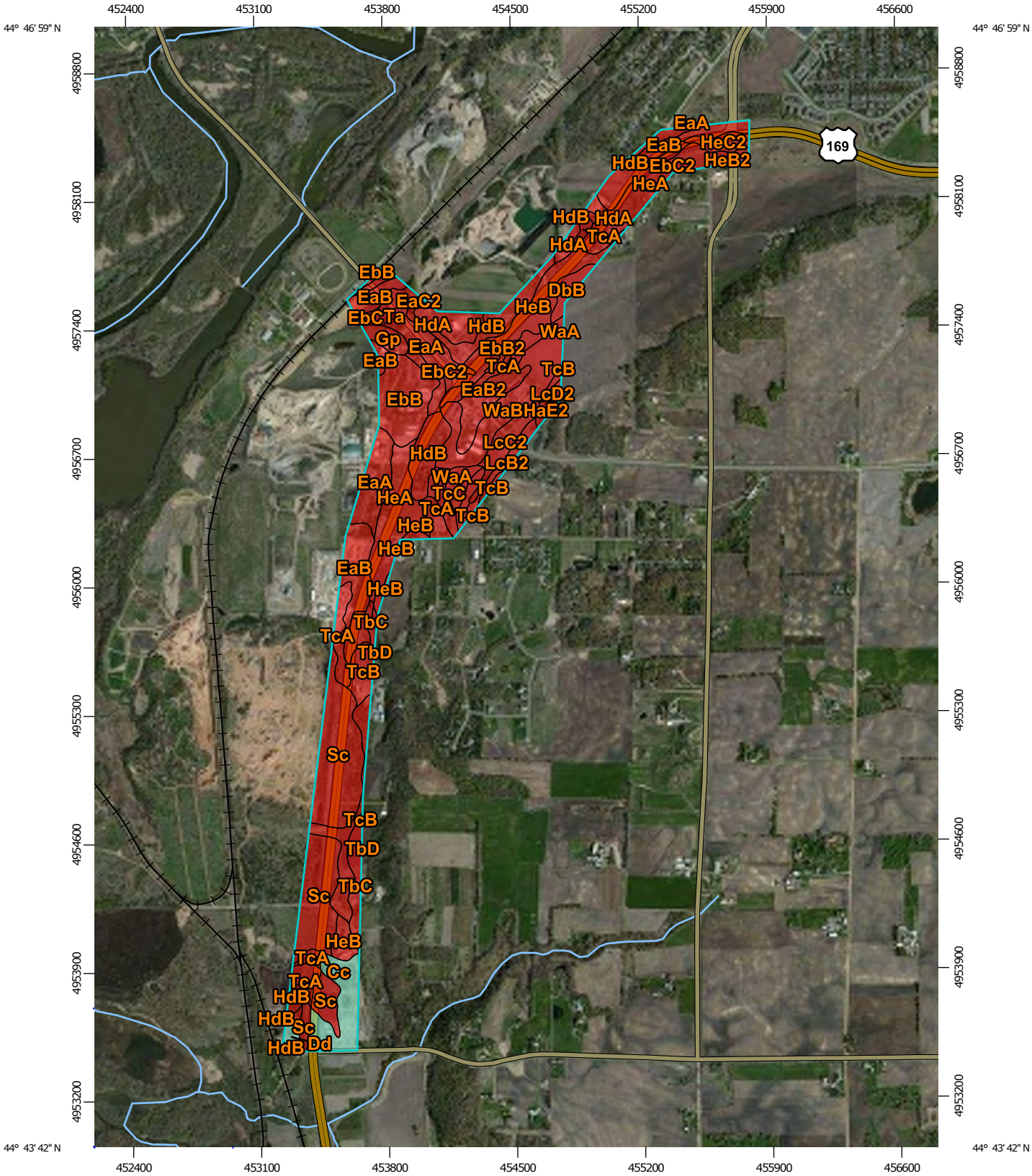
Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: *None Specified*

Tie-break Rule: Higher

Flooding Frequency Class—Scott County, Minnesota
(Converted_Graphics_2)



Map Scale: 1:29,700 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 400 800 1600 2400

Feet: 0 1000 2000 4000 6000

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

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

- None
- Very Rare
- Rare
- Occasional
- Frequent
- Very Frequent
- Not rated or not available

Soil Rating Lines

- None
- Very Rare
- Rare
- Occasional
- Frequent
- Very Frequent
- Not rated or not available

Soil Rating Points

- None
- Very Rare
- Rare
- Occasional
- Frequent
- Very Frequent
- Not rated or not available

Water Features

- Streams and Canals

Transportation

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

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

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

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

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Survey Area Data: Version 11, Sep 22, 2015

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

Date(s) aerial images were photographed: Mar 16, 2012—Apr 6, 2012

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

Flooding Frequency Class

Flooding Frequency Class— Summary by Map Unit — Scott County, Minnesota (MN139)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
Cc	Comfrey silty clay loam	Occasional	23.1	4.0%
CdA	Copaston silt loam, 0 to 2 percent slopes	None	4.6	0.8%
DbB	Dickman sandy loam, 2 to 6 percent slopes	None	6.3	1.1%
Dd	Dorchester silty clay loam	Occasional	2.4	0.4%
EaA	Estherville loam and sandy loam, 0 to 2 percent slopes	None	41.4	7.1%
EaB	Estherville sandy loam, 2 to 6 percent slopes	None	33.9	5.8%
EaB2	Estherville loam and sandy loam, 2 to 6 percent slopes, moderately eroded	None	17.8	3.1%
EaC2	Estherville loam and sandy loam, 6 to 12 percent slopes ,moderately eroded	None	0.6	0.1%
EbB	Salida gravelly sandy loam, 0 to 6 percent slopes	None	30.0	5.1%
EbB2	Salida gravelly sandy loam, 0 to 6 percent slopes, moderately eroded	None	1.5	0.3%
EbC	Salida gravelly sandy loam, 6 to 12 percent slopes	None	1.3	0.2%
EbC2	Salida gravelly sandy loam, 6 to 12 percent slopes, moderately eroded	None	7.3	1.3%
Gp	Pits, gravel	None	6.1	1.0%
HaE2	Hayden loam, 18 to 25 percent slopes	None	2.8	0.5%
HdA	Sparta fine sand, 0 to 2 percent slopes	None	31.7	5.4%
HdB	Sparta fine sand, 2 to 6 percent slopes	None	36.6	6.3%
HdC2	Sparta fine sand, 6 to 12 percent slopes	None	1.9	0.3%

Flooding Frequency Class— Summary by Map Unit — Scott County, Minnesota (MN139)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
HeA	Sparta loamy fine sand, 0 to 2 percent slopes	None	59.0	10.1%
HeB	Sparta loamy fine sand, 2 to 6 percent slopes	None	37.4	6.4%
HeB2	Sparta loamy fine sand, 2 to 6 percent slopes	None	1.9	0.3%
HeC2	Sparta loamy fine sand, 6 to 12 percent slopes	None	6.1	1.0%
LcB2	Lester loam, 2 to 6 percent slopes, moderately eroded	None	6.2	1.1%
LcC2	Lester loam, 6 to 10 percent slopes, moderately eroded	None	11.7	2.0%
LcD2	Lester loam, 10 to 16 percent slopes, moderately eroded	None	1.8	0.3%
Sc	Stony land	None	89.4	15.3%
Ta	Terrace escarpments	None	7.9	1.4%
TbC	Terril loam, 6 to 12 percent slopes	None	11.5	2.0%
TbD	Terril loam, 12 to 18 percent slopes	None	0.0	0.0%
TcA	Terril loam, 0 to 2 percent slopes	None	43.4	7.4%
TcB	Terril loam, 2 to 6 percent slopes	None	11.2	1.9%
TcC	Terril loam, 6 to 12 percent slopes	None	3.9	0.7%
WaA	Waukegan silt loam, 0 to 2 percent slopes	None	6.7	1.1%
WaB	Waukegan silt loam, 2 to 6 percent slopes	None	36.3	6.2%
Totals for Area of Interest			**583.7**	**100.0%**

Description

Flooding is the temporary inundation of an area caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding.

Frequency is expressed as none, very rare, rare, occasional, frequent, and very frequent.

"None" means that flooding is not probable. The chance of flooding is nearly 0 percent in any year. Flooding occurs less than once in 500 years.

"Very rare" means that flooding is very unlikely but possible under extremely unusual weather conditions. The chance of flooding is less than 1 percent in any year.

"Rare" means that flooding is unlikely but possible under unusual weather conditions. The chance of flooding is 1 to 5 percent in any year.

"Occasional" means that flooding occurs infrequently under normal weather conditions. The chance of flooding is 5 to 50 percent in any year.

"Frequent" means that flooding is likely to occur often under normal weather conditions. The chance of flooding is more than 50 percent in any year but is less than 50 percent in all months in any year.

"Very frequent" means that flooding is likely to occur very often under normal weather conditions. The chance of flooding is more than 50 percent in all months of any year.

Rating Options

Aggregation Method: Dominant Condition

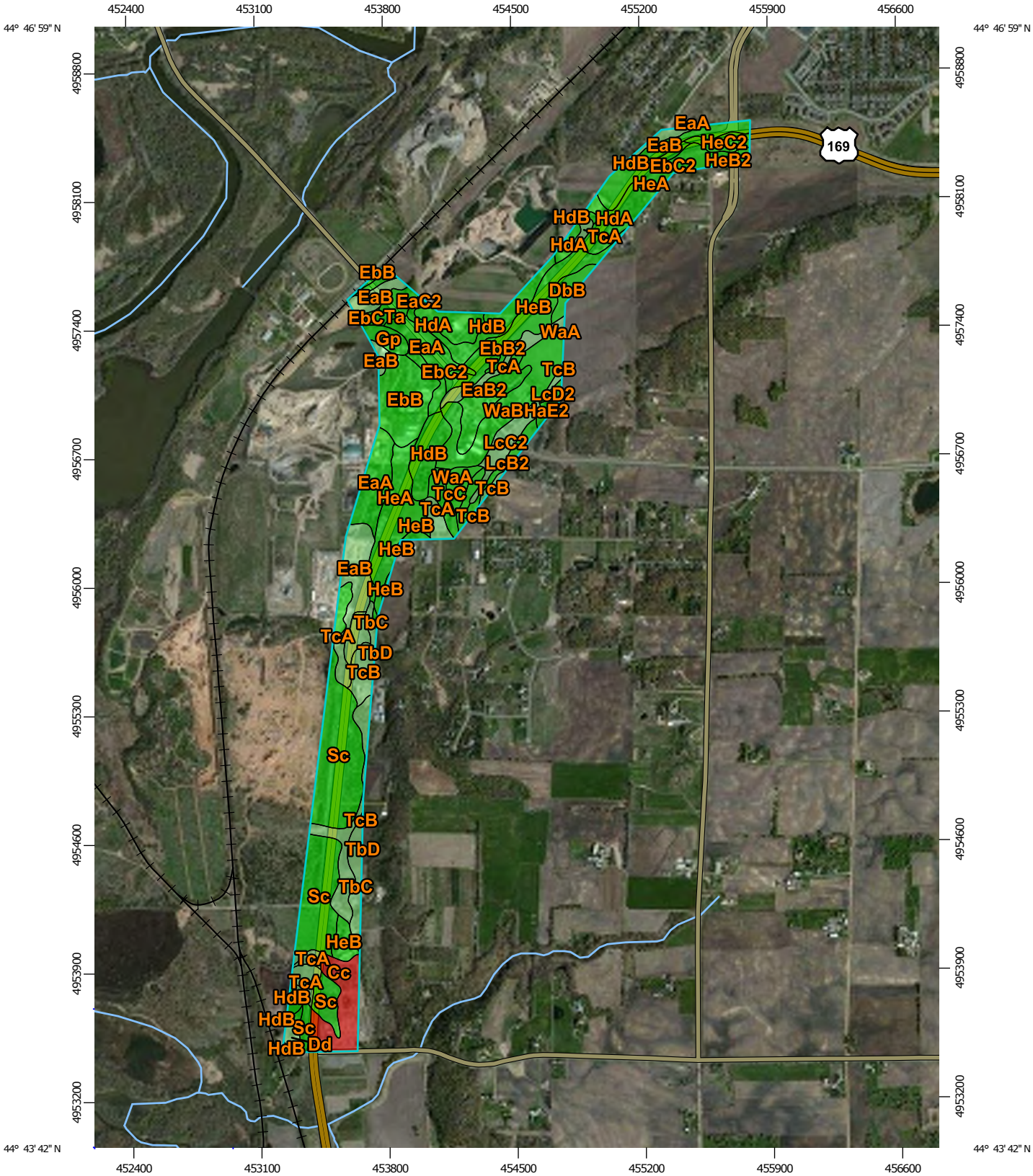
Component Percent Cutoff: *None Specified*

Tie-break Rule: More Frequent

Beginning Month: January

Ending Month: December

Hydric Rating by Map Unit—Scott County, Minnesota
(Converted_Graphics_2)



Map Scale: 1:29,700 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 400 800 1600 2400

Feet: 0 1000 2000 4000 6000

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

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

- Hydric (100%)
- Hydric (66 to 99%)
- Hydric (33 to 65%)
- Hydric (1 to 32%)
- Not Hydric (0%)
- Not rated or not available

Soil Rating Lines

- Hydric (100%)
- Hydric (66 to 99%)
- Hydric (33 to 65%)
- Hydric (1 to 32%)
- Not Hydric (0%)
- Not rated or not available

Soil Rating Points

- Hydric (100%)
- Hydric (66 to 99%)
- Hydric (33 to 65%)
- Hydric (1 to 32%)
- Not Hydric (0%)
- Not rated or not available

Water Features

Streams and Canals

Transportation

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

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Scott County, Minnesota
Survey Area Data: Version 11, Sep 22, 2015

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

Date(s) aerial images were photographed: Mar 16, 2012—Apr 6, 2012

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

Hydric Rating by Map Unit

Hydric Rating by Map Unit— Summary by Map Unit — Scott County, Minnesota (MN139)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
Cc	Comfrey silty clay loam	100	23.1	4.0%
CdA	Copaston silt loam, 0 to 2 percent slopes	15	4.6	0.8%
DbB	Dickman sandy loam, 2 to 6 percent slopes	0	6.3	1.1%
Dd	Dorchester silty clay loam	8	2.4	0.4%
EaA	Estherville loam and sandy loam, 0 to 2 percent slopes	0	41.4	7.1%
EaB	Estherville sandy loam, 2 to 6 percent slopes	1	33.9	5.8%
EaB2	Estherville loam and sandy loam, 2 to 6 percent slopes, moderately eroded	0	17.8	3.1%
EaC2	Estherville loam and sandy loam, 6 to 12 percent slopes ,moderately eroded	0	0.6	0.1%
EbB	Salida gravelly sandy loam, 0 to 6 percent slopes	0	30.0	5.1%
EbB2	Salida gravelly sandy loam, 0 to 6 percent slopes, moderately eroded	0	1.5	0.3%
EbC	Salida gravelly sandy loam, 6 to 12 percent slopes	0	1.3	0.2%
EbC2	Salida gravelly sandy loam, 6 to 12 percent slopes, moderately eroded	0	7.3	1.3%
Gp	Pits, gravel	0	6.1	1.0%
HaE2	Hayden loam, 18 to 25 percent slopes	0	2.8	0.5%
HdA	Sparta fine sand, 0 to 2 percent slopes	0	31.7	5.4%
HdB	Sparta fine sand, 2 to 6 percent slopes	0	36.6	6.3%
HdC2	Sparta fine sand, 6 to 12 percent slopes	0	1.9	0.3%

Hydric Rating by Map Unit— Summary by Map Unit — Scott County, Minnesota (MN139)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
HeA	Sparta loamy fine sand, 0 to 2 percent slopes	0	59.0	10.1%
HeB	Sparta loamy fine sand, 2 to 6 percent slopes	0	37.4	6.4%
HeB2	Sparta loamy fine sand, 2 to 6 percent slopes	0	1.9	0.3%
HeC2	Sparta loamy fine sand, 6 to 12 percent slopes	0	6.1	1.0%
LcB2	Lester loam, 2 to 6 percent slopes, moderately eroded	0	6.2	1.1%
LcC2	Lester loam, 6 to 10 percent slopes, moderately eroded	2	11.7	2.0%
LcD2	Lester loam, 10 to 16 percent slopes, moderately eroded	0	1.8	0.3%
Sc	Stony land	0	89.4	15.3%
Ta	Terrace escarpments	0	7.9	1.4%
TbC	Terril loam, 6 to 12 percent slopes	5	11.5	2.0%
TbD	Terril loam, 12 to 18 percent slopes	0	0.0	0.0%
TcA	Terril loam, 0 to 2 percent slopes	7	43.4	7.4%
TcB	Terril loam, 2 to 6 percent slopes	8	11.2	1.9%
TcC	Terril loam, 6 to 12 percent slopes	0	3.9	0.7%
WaA	Waukegan silt loam, 0 to 2 percent slopes	0	6.7	1.1%
WaB	Waukegan silt loam, 2 to 6 percent slopes	0	36.3	6.2%
Totals for Area of Interest			**583.7**	**100.0%**

Description

This rating indicates the percentage of map units that meets the criteria for hydric soils. Map units are composed of one or more map unit components or soil types, each of which is rated as hydric soil or not hydric. Map units that are made up dominantly of hydric soils may have small areas of minor nonhydric components in the higher positions on the landform, and map units that are made up dominantly of nonhydric soils may have small areas of minor hydric components in the lower positions on the landform. Each map unit is rated based on its respective components and the percentage of each component within the map unit.

The thematic map is color coded based on the composition of hydric components. The five color classes are separated as 100 percent hydric components, 66 to 99 percent hydric components, 33 to 65 percent hydric components, 1 to 32 percent hydric components, and less than one percent hydric components.

In Web Soil Survey, the Summary by Map Unit table that is displayed below the map pane contains a column named 'Rating'. In this column the percentage of each map unit that is classified as hydric is displayed.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (Federal Register, 1994). Under natural conditions, these soils are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

The NTCHS definition identifies general soil properties that are associated with wetness. In order to determine whether a specific soil is a hydric soil or nonhydric soil, however, more specific information, such as information about the depth and duration of the water table, is needed. Thus, criteria that identify those estimated soil properties unique to hydric soils have been established (Federal Register, 2002). These criteria are used to identify map unit components that normally are associated with wetlands. The criteria used are selected estimated soil properties that are described in "Soil Taxonomy" (Soil Survey Staff, 1999) and "Keys to Soil Taxonomy" (Soil Survey Staff, 2006) and in the "Soil Survey Manual" (Soil Survey Division Staff, 1993).

If soils are wet enough for a long enough period of time to be considered hydric, they should exhibit certain properties that can be easily observed in the field. These visible properties are indicators of hydric soils. The indicators used to make onsite determinations of hydric soils are specified in "Field Indicators of Hydric Soils in the United States" (Hurt and Vasilas, 2006).

References:

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18.

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service. U.S. Department of Agriculture Handbook 436.

Soil Survey Staff. 2006. Keys to soil taxonomy. 10th edition. U.S. Department of Agriculture, Natural Resources Conservation Service.

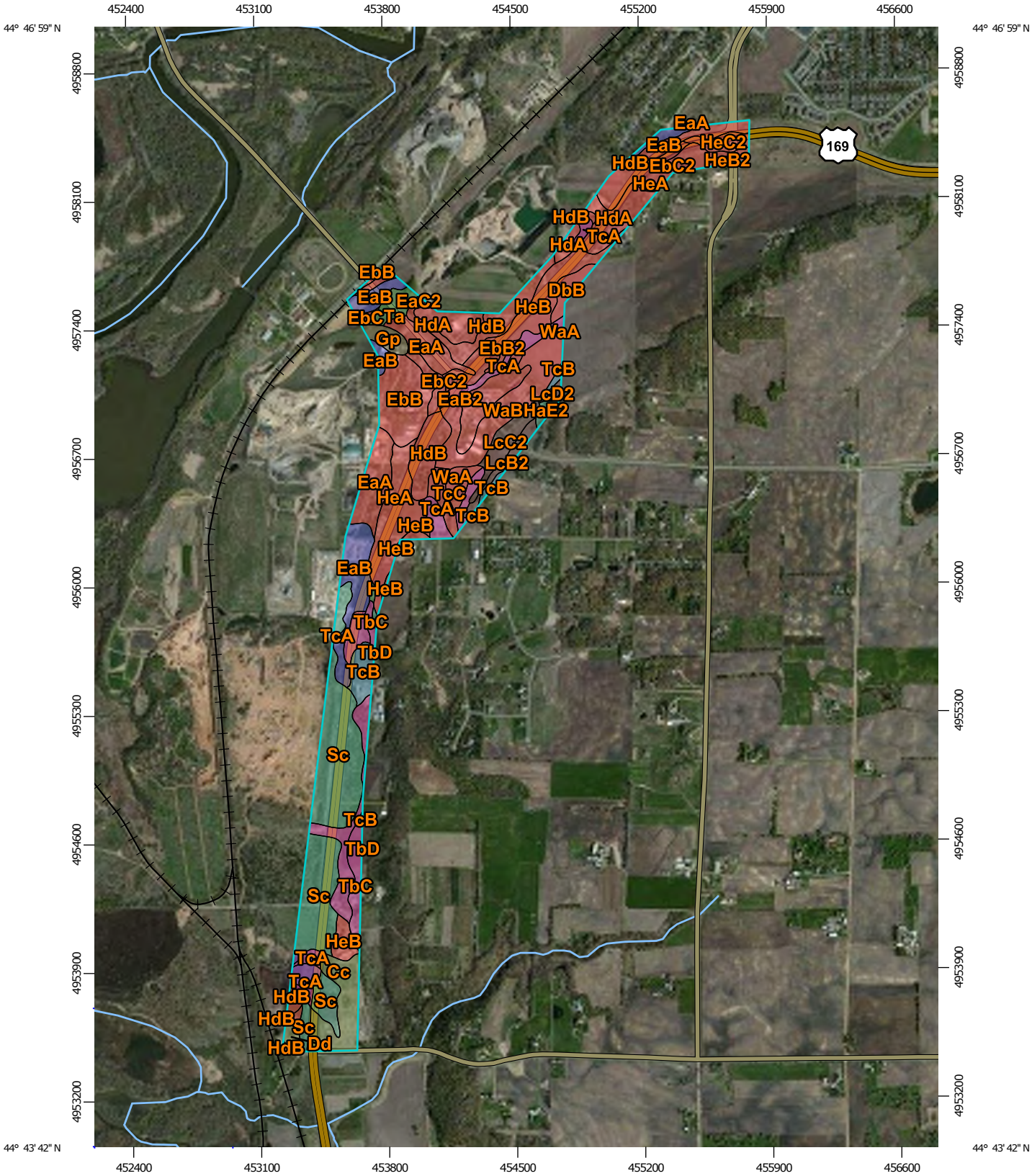
Rating Options

Aggregation Method: Percent Present

Component Percent Cutoff: *None Specified*

Tie-break Rule: Lower

Parent Material Name—Scott County, Minnesota
(Scott County Soil Survey Parent Material)



Map Scale: 1:29,700 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 400 800 1600 2400

Feet: 0 1000 2000 4000 6000

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

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

- Alluvial Sediment over Bedrock
- Alluvium
- Colluvium over Till
- fine-loamy colluvium
- fine-loamy till
- loamy glaciofluvial deposits over sandy and gravelly outwash
- Outwash
- Sandy and gravelly outwash
- Till
- Variable Glacial Sediments
- Not rated or not available

Soil Rating Lines

- Alluvial Sediment over Bedrock
- Alluvium
- Colluvium over Till
- fine-loamy colluvium
- fine-loamy till
- loamy glaciofluvial deposits over sandy and gravelly outwash
- Outwash
- Sandy and gravelly outwash
- Till
- Variable Glacial Sediments
- Not rated or not available

Soil Rating Points

- Alluvial Sediment over Bedrock
- Alluvium
- Colluvium over Till
- fine-loamy colluvium
- fine-loamy till
- loamy glaciofluvial deposits over sandy and gravelly outwash
- Outwash
- Sandy and gravelly outwash
- Till
- Variable Glacial Sediments
- Not rated or not available

Water Features

- Streams and Canals

Transportation

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

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Scott County, Minnesota
Survey Area Data: Version 11, Sep 22, 2015

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

Date(s) aerial images were photographed: Mar 16, 2012—Apr 6, 2012

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

Parent Material Name

Parent Material Name— Summary by Map Unit — Scott County, Minnesota (MN139)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
Cc	Comfrey silty clay loam	Alluvium	23.1	4.0%
CdA	Copaston silt loam, 0 to 2 percent slopes	Alluvial Sediment over Bedrock	4.6	0.8%
DbB	Dickman sandy loam, 2 to 6 percent slopes	Outwash	6.3	1.1%
Dd	Dorchester silty clay loam	Alluvium	2.4	0.4%
EaA	Estherville loam and sandy loam, 0 to 2 percent slopes	Outwash	41.4	7.1%
EaB	Estherville sandy loam, 2 to 6 percent slopes	loamy glaciofluvial deposits over sandy and gravelly outwash	33.9	5.8%
EaB2	Estherville loam and sandy loam, 2 to 6 percent slopes, moderately eroded	Outwash	17.8	3.1%
EaC2	Estherville loam and sandy loam, 6 to 12 percent slopes ,moderately eroded	Outwash	0.6	0.1%
EbB	Salida gravelly sandy loam, 0 to 6 percent slopes	Outwash	30.0	5.1%
EbB2	Salida gravelly sandy loam, 0 to 6 percent slopes, moderately eroded	Outwash	1.5	0.3%
EbC	Salida gravelly sandy loam, 6 to 12 percent slopes	Outwash	1.3	0.2%
EbC2	Salida gravelly sandy loam, 6 to 12 percent slopes, moderately eroded	Outwash	7.3	1.3%
Gp	Pits, gravel	Sandy and gravelly outwash	6.1	1.0%
HaE2	Hayden loam, 18 to 25 percent slopes	Till	2.8	0.5%
HdA	Sparta fine sand, 0 to 2 percent slopes	Outwash	31.7	5.4%
HdB	Sparta fine sand, 2 to 6 percent slopes	Outwash	36.6	6.3%

Parent Material Name— Summary by Map Unit — Scott County, Minnesota (MN139)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
HdC2	Sparta fine sand, 6 to 12 percent slopes	Outwash	1.9	0.3%
HeA	Sparta loamy fine sand, 0 to 2 percent slopes	Outwash	59.0	10.1%
HeB	Sparta loamy fine sand, 2 to 6 percent slopes	Outwash	37.4	6.4%
HeB2	Sparta loamy fine sand, 2 to 6 percent slopes	Outwash	1.9	0.3%
HeC2	Sparta loamy fine sand, 6 to 12 percent slopes	Outwash	6.1	1.0%
LcB2	Lester loam, 2 to 6 percent slopes, moderately eroded	fine-loamy till	6.2	1.1%
LcC2	Lester loam, 6 to 10 percent slopes, moderately eroded	fine-loamy till	11.7	2.0%
LcD2	Lester loam, 10 to 16 percent slopes, moderately eroded	fine-loamy till	1.8	0.3%
Sc	Stony land	Till	89.4	15.3%
Ta	Terrace escarpments	Variable Glacial Sediments	7.9	1.4%
TbC	Terril loam, 6 to 12 percent slopes	Colluvium over Till	11.5	2.0%
TbD	Terril loam, 12 to 18 percent slopes	Colluvium over Till	0.0	0.0%
TcA	Terril loam, 0 to 2 percent slopes	Colluvium over Till	43.4	7.4%
TcB	Terril loam, 2 to 6 percent slopes	fine-loamy colluvium	11.2	1.9%
TcC	Terril loam, 6 to 12 percent slopes	Colluvium over Till	3.9	0.7%
WaA	Waukegan silt loam, 0 to 2 percent slopes	Outwash	6.7	1.1%
WaB	Waukegan silt loam, 2 to 6 percent slopes	Outwash	36.3	6.2%
Totals for Area of Interest			**583.7**	**100.0%**

Description

Parent material name is a term for the general physical, chemical, and mineralogical composition of the unconsolidated material, mineral or organic, in which the soil forms. Mode of deposition and/or weathering may be implied by the name.

The soil surveyor uses parent material to develop a model used for soil mapping. Soil scientists and specialists in other disciplines use parent material to help interpret soil boundaries and project performance of the material below the soil. Many soil properties relate to parent material. Among these properties are proportions of sand, silt, and clay; chemical content; bulk density; structure; and the kinds and amounts of rock fragments. These properties affect interpretations and may be criteria used to separate soil series. Soil properties and landscape information may imply the kind of parent material.

For each soil in the database, one or more parent materials may be identified. One is marked as the representative or most commonly occurring. The representative parent material name is presented here.

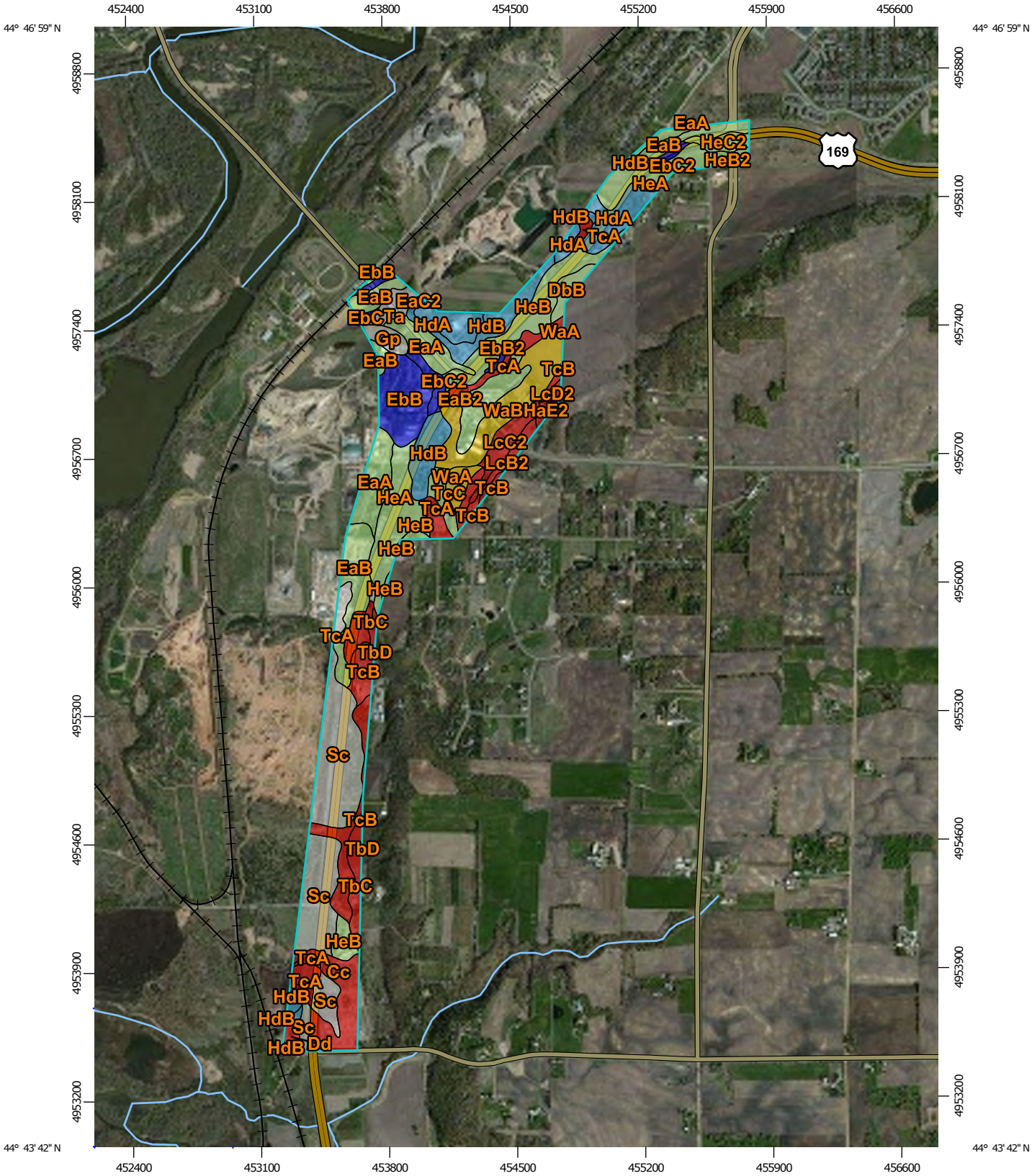
Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: *None Specified*

Tie-break Rule: Lower

Saturated Hydraulic Conductivity (Ksat)—Scott County, Minnesota
(Scott County Soil Survey Permeability)



Map Scale: 1:29,700 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 400 800 1600 2400

Feet: 0 1000 2000 4000 6000

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

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

- <= 14.5165
- > 14.5165 and <= 48.8618
- > 48.8618 and <= 81.4737
- > 81.4737 and <= 92.0000
- > 92.0000 and <= 123.9013
- Not rated or not available

Soil Rating Lines

- <= 14.5165
- > 14.5165 and <= 48.8618
- > 48.8618 and <= 81.4737
- > 81.4737 and <= 92.0000
- > 92.0000 and <= 123.9013
- Not rated or not available

Soil Rating Points

- <= 14.5165
- > 14.5165 and <= 48.8618
- > 48.8618 and <= 81.4737
- > 81.4737 and <= 92.0000
- > 92.0000 and <= 123.9013
- Not rated or not available

Water Features

Streams and Canals

Transportation

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

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Scott County, Minnesota
Survey Area Data: Version 11, Sep 22, 2015

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

Date(s) aerial images were photographed: Mar 16, 2012—Apr 6, 2012

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

Saturated Hydraulic Conductivity (Ksat)

Saturated Hydraulic Conductivity (Ksat)— Summary by Map Unit — Scott County, Minnesota (MN139)				
Map unit symbol	**Map unit name**	**Rating (micrometers per second)**	**Acres in AOI**	**Percent of AOI**
Cc	Comfrey silty clay loam	9.0000	23.1	4.0%
CdA	Copaston silt loam, 0 to 2 percent slopes	14.5165	4.6	0.8%
DbB	Dickman sandy loam, 2 to 6 percent slopes	70.5263	6.3	1.1%
Dd	Dorchester silty clay loam	9.0000	2.4	0.4%
EaA	Estherville loam and sandy loam, 0 to 2 percent slopes	68.4210	41.4	7.1%
EaB	Estherville sandy loam, 2 to 6 percent slopes	76.4976	33.9	5.8%
EaB2	Estherville loam and sandy loam, 2 to 6 percent slopes, moderately eroded	72.6316	17.8	3.1%
EaC2	Estherville loam and sandy loam, 6 to 12 percent slopes ,moderately eroded	74.7368	0.6	0.1%
EbB	Salida gravelly sandy loam, 0 to 6 percent slopes	122.4145	30.0	5.1%
EbB2	Salida gravelly sandy loam, 0 to 6 percent slopes, moderately eroded	123.9013	1.5	0.3%
EbC	Salida gravelly sandy loam, 6 to 12 percent slopes	123.9013	1.3	0.2%
EbC2	Salida gravelly sandy loam, 6 to 12 percent slopes, moderately eroded	123.9013	7.3	1.3%
Gp	Pits, gravel		6.1	1.0%
HaE2	Hayden loam, 18 to 25 percent slopes	9.0000	2.8	0.5%
HdA	Sparta fine sand, 0 to 2 percent slopes	92.0000	31.7	5.4%
HdB	Sparta fine sand, 2 to 6 percent slopes	92.0000	36.6	6.3%
HdC2	Sparta fine sand, 6 to 12 percent slopes	92.0000	1.9	0.3%

Saturated Hydraulic Conductivity (Ksat)— Summary by Map Unit — Scott County, Minnesota (MN139)				
Map unit symbol	**Map unit name**	**Rating (micrometers per second)**	**Acres in AOI**	**Percent of AOI**
HeA	Sparta loamy fine sand, 0 to 2 percent slopes	81.4737	59.0	10.1%
HeB	Sparta loamy fine sand, 2 to 6 percent slopes	81.4737	37.4	6.4%
HeB2	Sparta loamy fine sand, 2 to 6 percent slopes	81.4737	1.9	0.3%
HeC2	Sparta loamy fine sand, 6 to 12 percent slopes	81.4737	6.1	1.0%
LcB2	Lester loam, 2 to 6 percent slopes, moderately eroded	6.8205	6.2	1.1%
LcC2	Lester loam, 6 to 10 percent slopes, moderately eroded	6.5665	11.7	2.0%
LcD2	Lester loam, 10 to 16 percent slopes, moderately eroded	6.5665	1.8	0.3%
Sc	Stony land		89.4	15.3%
Ta	Terrace escarpments		7.9	1.4%
TbC	Terril loam, 6 to 12 percent slopes	9.0000	11.5	2.0%
TbD	Terril loam, 12 to 18 percent slopes	9.0000	0.0	0.0%
TcA	Terril loam, 0 to 2 percent slopes	9.0000	43.4	7.4%
TcB	Terril loam, 2 to 6 percent slopes	9.1700	11.2	1.9%
TcC	Terril loam, 6 to 12 percent slopes	9.0000	3.9	0.7%
WaA	Waukegan silt loam, 0 to 2 percent slopes	48.8618	6.7	1.1%
WaB	Waukegan silt loam, 2 to 6 percent slopes	48.8618	36.3	6.2%
Totals for Area of Interest			**583.7**	**100.0%**

Description

Saturated hydraulic conductivity (Ksat) refers to the ease with which pores in a saturated soil transmit water. The estimates are expressed in terms of micrometers per second. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Saturated hydraulic conductivity is considered in the design of soil drainage systems and septic tank absorption fields.

For each soil layer, this attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

The numeric Ksat values have been grouped according to standard Ksat class limits.

Rating Options

Units of Measure: micrometers per second

Aggregation Method: Dominant Component

Component Percent Cutoff: *None Specified*

Tie-break Rule: Fastest

Interpret Nulls as Zero: No

Layer Options (Horizon Aggregation Method): All Layers (Weighted Average)

Attachment I – Well Logs

Minnesota Unique Well Number

206807

County Scott
Quad Shakopee
Quad ID 105D

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 02/23/1989
Update Date 06/02/2014
Received Date

Well Name	Township	Range	Dir	Section	Subsection
THIES, ROGER	115	23	W	15	ACABB

Elevation 820 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

C/W 2175 COLBURN DR SHAKOPEE MN 55379

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
SAND-FINE	0	14	BROWN	
SAND & GRAVEL	14	18	BROWN	
SAND-FINE	18	38	BROWN	
LIMESTONE	38	141	BROWN	
SANDSTONE	141	166	WHITE	

Remarks

190-B-7

Well Depth 166 ft. **Depth Completed** 166 ft. **Date Well Completed** 07/12/1973

Drill Method **Drill Fluid**

Use domestic **Status** Active

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

Casing Type Single casing **Joint**

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

Casing Diameter **Weight**

4 in. To 149 ft. lbs./ft.

Open Hole From 149 ft. To 166 ft.

Screen? ☐ **Type** **Make**

Static Water Level

108 ft. land surface Measure 07/12/1973

Pumping Level (below land surface)

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

Wellhead Completion

Pitless adapter manufacturer Model

☐ Casing Protection ☐ 12 in. above grade

☐ At-grade (Environmental Wells and Borings ONLY)

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

Nearest Known Source of Contamination

feet Direction Type

Well disinfected upon completion? ☐ Yes ☐ No

Pump ☐ Not Installed Date Installed

Manufacturer's name AEROMOTOR

Model Number HP 0.75 Volt

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

Abandoned

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

Variance

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

Miscellaneous

First Bedrock Prairie Du Chien Group Aquifer Jordan

Last Strat Jordan Sandstone Depth to Bedrock 38 ft

Located by Minnesota Geological Survey

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

System UTM - Mad83, Zone 15, Meters X 454995 Y 4957829

Unique Number Verification Inpute Date 03/25/1996

Angled Drill Hole

Well Contractor

Leuthner Well Co. 10125

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

Minnesota Unique Well Number

211863

County Scott
Quad Jordan East
Quad ID 90A

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 06/15/1990
Update Date 06/02/2014
Received Date

Well Name	Township	Range	Dir	Section	Subsection
MINN. VALLEY	115	23	W	28	DCDDAB

Elevation 747 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

C/W 3232 150TH ST W SHAKOPEE MN 55379

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
DRIFT-CLAY	0	5		
SAND SOME ROCKS	5	9		
SANDROCK	9	123	WHT/YEL	
SANDROCK &	123	127		
SANDROCK &	127	147		HARD

Remarks

Well Depth 147 ft. **Depth Completed** 147 ft. **Date Well Completed** 04/10/1972

Drill Method **Drill Fluid**

Use commercial **Status** Active

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

Casing Type Single casing **Joint**
Drive Shoe? **Yes** ☐ **No** ☐ **Above/Below** 0 ft.

Casing Diameter **Weight**
6 in. To 82 ft. lbs./ft.

Open Hole From 82 ft. To 147 ft.

Screen? ☐ **Type** **Make**

Static Water Level
27 ft. land surface Measure 04/10/1972

Pumping Level (below land surface)

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

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

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

Pump ☐ Not Installed Date Installed
Manufacturer's name
Model Number HP 5 Volt
Length of drop pipe ft Capacity g.p. Typ Submersible

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

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

Miscellaneous
First Bedrock Jordan Sandstone Aquifer Jordan-St.
Last Strat St.Lawrence Formation Depth to Bedrock 9 ft
Located by Minnesota Geological Survey
Locate Method Digitized - scale 1:24,000 or larger (Digitizing Table)
System UTM - Mad83, Zone 15, Meters X 453495 Y 4953568
Unique Number Verification Inpute Date 01/01/1990

Angled Drill Hole

Well Contractor
Hartmann Well Co. 40174
Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well Number

211864

County Scott
Quad Jordan East
Quad ID 90A

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 02/23/1989
Update Date 02/12/1996
Received Date

Well Name	Township	Range	Dir	Section	Subsection
LINDSTROM,	115	23	W	28	DDDDBC

Elevation 766 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

C/W 3036 150TH ST W SHAKOPEE MN 55379

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
CLAY	0	10		
SAND	10	20		
CLAY	20	58		
SANDROCK-LIME	58	63		HARD
SANDROCK	63	127		

Remarks

237-B-8

Well Depth 127 ft. **Depth Completed** 127 ft. **Date Well Completed** 09/09/1974

Drill Method **Drill Fluid**

Use domestic **Status** Active

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

Casing Type Single casing **Joint**

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

Casing Diameter **Weight**

5 in. To 76 ft. lbs./ft.

Open Hole From 76 ft. To 127 ft.

Screen? ☐ **Type** **Make**

Static Water Level

Pumping Level (below land surface)

Wellhead Completion

Pitless adapter manufacturer Model

☐ Casing Protection ☐ 12 in. above grade

☐ At-grade (Environmental Wells and Borings ONLY)

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

Nearest Known Source of Contamination

feet Direction Type

Well disinfected upon completion? ☐ Yes ☐ No

Pump ☐ Not Installed Date Installed

Manufacturer's name

Model Number HP 0 Volt

Length of drop pipe ft Capacity g.p. Typ

Abandoned

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

Variance

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

Miscellaneous

First Bedrock Jordan Sandstone Aquifer Jordan

Last Strat Jordan Sandstone Depth to Bedrock 58 ft

Located by Minnesota Geological Survey

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

System UTM - Mad83, Zone 15, Meters X 453813 Y 4953563

Unique Number Verification Inpute Date 01/01/1990

Angled Drill Hole

Well Contractor

Hartmann Well Co. 40174

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

Minnesota Unique Well Number

211865

County Scott
Quad Jordan East
Quad ID 90A

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 02/23/1989
Update Date 02/14/2014
Received Date

Well Name	Township	Range	Dir	Section	Subsection
MINN. VALLEY	115	23	W	28	DDCCBA

Elevation 748 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

C/W 3232 150TH ST W SHAKOPEE MN 55379

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
CLAY	0	10		
ROCKS	10	12		
SANDROCK	12	110		
LIMESTONE	110	132		V.HARD

Remarks

Well Depth 132 ft. **Depth Completed** 132 ft. **Date Well Completed** 06/26/1976

Drill Method **Drill Fluid**

Use commercial **Status** Active

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

Casing Type Single casing **Joint**
Drive Shoe? **Yes** ☐ **No** ☐ **Above/Below** 0 ft.

Casing Diameter **Weight**
8 in. To 76 ft. lbs./ft.

Open Hole From 76 ft. To 132 ft.

Screen? ☐ **Type** **Make**

Static Water Level
29 ft. land surface Measure 06/00/1976

Pumping Level (below land surface)
39 ft. hrs. Pumping at 300 g.p.m.

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

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

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

Pump ☐ Not Installed Date Installed
Manufacturer's name
Model Number HP 0 Volt
Length of drop pipe ft Capacity g.p. Typ

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

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

Miscellaneous
First Bedrock Jordan Sandstone Aquifer Jordan-St.
Last Strat St.Lawrence Formation Depth to Bedrock 12 ft
Located by Minnesota Geological Survey
Locate Method Digitized - scale 1:24,000 or larger (Digitizing Table)
System UTM - Mad83, Zone 15, Meters X 453574 Y 4953567
Unique Number Verification Inpute Date 01/01/1990

Angled Drill Hole

Well Contractor
Hartmann Well Co. 40174
Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well Number

215710

County Scott
Quad Jordan East
Quad ID 90A

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 02/23/1989
Update Date 08/18/2014
Received Date

Well Name	Township	Range	Dir	Section	Subsection
CHIC-ST. PAUL	115	23	W	28	BDDCAC

Elevation 754 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

C/W 3606 145TH ST W SHAKOPEE MN 55379

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
DRIFT	0	33		
DRIFT	33	39		
SANDSTONE	39	145		
SANDSTONE	145	146		
SHALE	146	161	GRAY	
LIMESTONE	161	185		
SHALE	185	205	GREEN	
SHALE	205	321	GREEN	
SHALE	321	330	GREEN	
SANDSTONE	330	389		
SANDSTONE	389	390		
SHALE	390	400	GRAY	
SHALE	400	418	BROWN	
SHALE	418	440	GREEN	
SHALE	440	458	BROWN	
SHALE	458	470	BROWN	
SAND	470	485	GRAY	
SAND	485	605	WHITE	
SAND	605	630	LT. BRN	
SAND	630	650	PINK	
SHALE	650	663	RED	

Remarks

GAMMA LOGGED6-18-1980.
WELL ALSO CALLED MERRIAM JUNCTION.
WELL IS AN OB WELL UNIQUE NO. 244438 FOR CJDN, CIGL, AND CMTS.
MNDNR OB WELL 70023.

Well Depth 663 ft. **Depth Completed** 663 ft. **Date Well Completed**

Drill Method **Drill Fluid**

Use industrial **Status** Active

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

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

Casing Diameter	Weight	Hole Diameter
14 in. To 75 ft.	lbs./ft.	16 in. To 663 ft.

Open Hole From 75 ft. To 663 ft.

Screen? ☐ **Type** **Make**

Static Water Level

Pumping Level (below land surface)

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

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

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

Pump ☐ Not Installed Date Installed
Manufacturer's name
Model Number HP Volt
Length of drop pipe ft Capacity g.p. Typ

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

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

Miscellaneous
First Bedrock Jordan Sandstone Aquifer Multiple
Last Strat Solor Church Formation Depth to Bedrock 33 ft
Located by Minnesota Geological Survey
Locate Method Digitized - scale 1:24,000 or larger (Digitizing Table)
System UTM - Mad83, Zone 15, Meters X 452959 Y 4954307
Unique Number Verification Information from Inpute Date 01/01/1990

Angled Drill Hole

Well Contractor
Minnesota Geological Survey MGS
Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well Number

221364

County Scott
Quad Shakopee
Quad ID 105D

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 02/23/1989
Update Date 08/18/2014
Received Date

Well Name	Township	Range	Dir	Section	Subsection
JOHNSON &	115	23	W	21	DBAABD

Elevation 801 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

C/W 13450 JOHNSON MEMORIAL DR SHAKOPEE MN 55379

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
GRAVEL	0	58		
LIMESTONE	58	85		
SANDSTONE	85	190		
LIMESTONE &	190	360		
SANDSTONE	360	402		

Remarks

WELL#2

SEALED 2-7-2009 BY 1431; PREVIOUS USE: PN

Well Depth 402 ft. **Depth Completed** 402 ft. **Date Well Completed** 09/26/1974

Drill Method **Drill Fluid**

Use abandoned **Status** Sealed

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

Casing Type Single casing **Joint**

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

Casing Diameter **Weight**

4 in. To 223 ft. lbs./ft.

Open Hole From 223 ft. To 402 ft.

Screen? ☐ **Type** **Make**

Static Water Level

65 ft. land surface Measure 09/26/1974

Pumping Level (below land surface)

Wellhead Completion

Pitless adapter manufacturer Model

☐ Casing Protection ☐ 12 in. above grade

☐ At-grade (Environmental Wells and Borings ONLY)

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

Material	Amount	From	To
	0	0 ft.	360 ft.

Nearest Known Source of Contamination

feet Direction Type

Well disinfected upon completion? ☐ Yes ☐ No

Pump ☐ Not Installed Date Installed

Manufacturer's name

Model Number HP 0 Volt

Length of drop pipe ft Capacity g.p. Typ

Abandoned

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

Variance

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

Miscellaneous

First Bedrock Prairie Du Chien Group Aquifer Multiple

Last Strat Wonewoc Sandstone Depth to Bedrock 58 ft

Located by Minnesota Department of Health

Locate Method GPS SA Off (averaged)

System UTM - Mad83, Zone 15, Meters X 453474 Y 4955823

Unique Number Verification Inpute Date 01/01/1990

Angled Drill Hole

Well Contractor

Ryan Well Co. 19063

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

Minnesota Unique Well Number

244436

County Scott
Quad Jordan East
Quad ID 90A

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 01/16/1992
Update Date 06/02/2016
Received Date

Well Name	Township	Range	Dir	Section	Subsection
MERRIAM JUNC.	115	23	W	28	BDDCDB

Elevation 758.1 **Elev. Method** LiDAR 1m DEM (MNDNR)

Address

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
NO RECORD	0	140		

Remarks

1930 WELL RECONSTRUCTED AS AN OBWELL IN 1981. NESTED WELL 244436, 244437, AND 244438. DNR OBWELL 70021.
SEALED 05-27-2009 BY 2022

Well Depth 140 ft. **Depth Completed** 140 ft. **Date Well Completed** 09/29/1981

Drill Method **Drill Fluid**

Use observation well **Status** Sealed

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

Casing Type **Joint**
Drive Shoe? **Yes** ☐ **No** ☐ **Above/Below** 0.9 ft.

Casing Diameter **Weight**
16 in. To 75 ft. lbs./ft.

Open Hole From 75 ft. To 140 ft.

Screen? ☐ **Type** **Make**

Static Water Level

Pumping Level (below land surface)

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

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

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

Pump ☐ Not Installed Date Installed
Manufacturer's name
Model Number HP 0 Volt
Length of drop pipe ft Capacity g.p. Typ

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

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

Miscellaneous
First Bedrock Aquifer Jordan
Last Strat Depth to Bedrock ft
Located by Minnesota Geological Survey
Locate Method Digitization (Screen) - Map (1:24,000)
System UTM - Mad83, Zone 15, Meters X 452959 Y 4954307
Unique Number Verification Information from Inpute Date 12/16/2013

Angled Drill Hole

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

Minnesota Unique Well Number

244437

County Scott
Quad Jordan East
Quad ID 90A

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 01/16/1992
Update Date 06/02/2016
Received Date

Well Name	Township	Range	Dir	Section	Subsection
MERIAM JUNC.	115	23	W	28	BDDCDB

Elevation 758.1 **Elev. Method** LiDAR 1m DEM (MNDNR)

Address

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
NO RECORD	0	360		

Remarks

1930 WELL REBUILT AS OBWELL IN '81. NESTED WELLS. OBWELL 70022
SEALED 05-28-2009 BY 2022

Well Depth 360 ft. **Depth Completed** 355 ft. **Date Well Completed** 09/29/1981

Drill Method **Drill Fluid**

Use observation well **Status** Sealed

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

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

Casing Diameter **Weight**
4 in. To 350 ft. lbs./ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** **Make**
Diameter Slot/Gauze Length Set
4 in. 5 ft. 350 ft. 355 ft.

Static Water Level

Pumping Level (below land surface)

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

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

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

Pump ☐ Not Installed Date Installed
Manufacturer's name
Model Number HP 0 Volt
Length of drop pipe ft Capacity g.p. Typ

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

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

Miscellaneous
First Bedrock Aquifer Wonewoc
Last Strat Depth to Bedrock ft
Located by Minnesota Geological Survey
Locate Method Digitization (Screen) - Map (1:24,000)
System UTM - Mad83, Zone 15, Meters X 452959 Y 4954307
Unique Number Verification Information from Inpute Date 12/16/2013

Angled Drill Hole

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

Minnesota Unique Well Number

244438

County Scott
Quad Jordan East
Quad ID 90A

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 01/16/1992
Update Date 10/09/2014
Received Date

Well Name	Township	Range	Dir	Section	Subsection
MERRIAM JUNC.	115	23	W	28	BDDCDB

Elevation 758.1 **Elev. Method** LiDAR 1m DEM (MNDNR)

Address

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
NO RECORD	0	530		

Remarks

1930 WELL REBUILT AS OBWELL IN '81. NESTED WELLS. OBWELL 70023
SEALED 05-29-2009 BY 2022; PREVIOUS USE: OB

Well Depth 530 ft. **Depth Completed** 525 ft. **Date Well Completed** 09/29/1981

Drill Method **Drill Fluid**

Use abandoned **Status** Sealed

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

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

Casing Diameter **Weight**
4 in. To 520 ft. lbs./ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** **Make**

Diameter	Slot/Gauze	Length	Set	
4 in.		5 ft.	520 ft.	525 ft.

Static Water Level

Pumping Level (below land surface)

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

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

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

Pump ☐ Not Installed Date Installed
Manufacturer's name
Model Number HP 0 Volt
Length of drop pipe ft Capacity g.p. Typ

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

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

Miscellaneous
First Bedrock Aquifer Mt.Simon
Last Strat Depth to Bedrock ft
Located by Minnesota Geological Survey
Locate Method Digitization (Screen) - Map (1:24,000)
System UTM - Mad83, Zone 15, Meters X 452959 Y 4954307
Unique Number Verification Information from Inpute Date 12/16/2013

Angled Drill Hole

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

Minnesota Unique Well Number

272748

County Scott
Quad Shakopee
Quad ID 105D

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 05/22/2013
Update Date 10/09/2014
Received Date

Well Name	Township	Range	Dir	Section	Subsection
	115	23	W	21	AACDBA

Elevation 815 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

Well 13162 JOHNSON MEMORIAL HY SHAKOPEE MN 55379

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
GLACIAL DRIFT	0	123		
PRAIRIE DU CHIEN	123	140		
JORDAN SANDSTONE	140	185		

Remarks

MULTI TOOL LOGGED 5-22-2013. LOGGED FOR STRAT.
OBSTRUCTION AT 160 FT.
WELL SEALED BY BOHN 6/19/13 (H309286).
SEALED 06-19-2013 BY 1445; PREVIOUS USE: IR

Well Depth 185 ft. **Depth Completed** 185 ft. **Date Well Completed**

Drill Method **Drill Fluid**

Use abandoned **Status** Sealed

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

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

Casing Diameter **Weight**
8 in. To 145 ft. lbs./ft.

Open Hole From 154 ft. To 185 ft.

Screen? ☐ **Type** **Make**

Static Water Level
91 ft. land surface Measure 05/22/2012

Pumping Level (below land surface)

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

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

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

Pump ☐ Not Installed Date Installed
Manufacturer's name
Model Number HP Volt
Length of drop pipe ft Capacity g.p. Typ

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

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

Miscellaneous
First Bedrock Prairie Du Chien Group Aquifer Jordan
Last Strat Jordan Sandstone Depth to Bedrock 123 ft
Located by Minnesota Geological Survey
Locate Method Digitization (Screen) - Map (1:24,000)
System UTM - Mad83, Zone 15, Meters X 453696 Y 4956350
Unique Number Verification Information from Inpute Date 05/22/2013

Angled Drill Hole

Well Contractor
Minnesota Geological Survey MGS
Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well Number

272749

County Scott
Quad Shakopee
Quad ID 105D

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 05/22/2013
Update Date 10/09/2014
Received Date

Well Name	Township	Range	Dir	Section	Subsection
	115	23	W	21	AADBCB

Elevation 818 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

Well 13162 JOHNSON MEMORIAL HY SHAKOPEE MN 55379

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
GLACIAL DRIFT	0	166		
PRAIRIE DU CHIEN	166	170		
JORDAN SANDSTONE	170	197		

Remarks

MULTI TOOL LOGGED 5-22-2013. LOGGED FOR STRAT.
WELL WAS IN A WELL PIT WITH A MAN HOLE COVER.
WELL SEALED BY BOHN 5/31/13 (H309285).
SEALED 05-31-2013 BY 1445; PREVIOUS USE: DO

Well Depth 197 ft. **Depth Completed** 197 ft. **Date Well Completed**

Drill Method **Drill Fluid**

Use abandoned **Status** Sealed

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

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

Casing Diameter **Weight**
4.5 in. To 187 ft. lbs./ft.

Open Hole From 187 ft. To 197 ft.

Screen? ☐ **Type** **Make**

Static Water Level
96 ft. land surface Measure 05/22/2013

Pumping Level (below land surface)

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

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

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

Pump ☐ Not Installed Date Installed
Manufacturer's name
Model Number HP Volt
Length of drop pipe ft Capacity g.p. Typ

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

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

Miscellaneous
First Bedrock Jordan Sandstone Aquifer Jordan
Last Strat Jordan Sandstone Depth to Bedrock 170 ft
Located by Minnesota Geological Survey
Locate Method Digitization (Screen) - Map (1:24,000)
System UTM - Mad83, Zone 15, Meters X 453778 Y 4956405
Unique Number Verification Information from Inpute Date 05/22/2013

Angled Drill Hole

Well Contractor
Minnesota Geological Survey MGS
Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well Number

404371

County Scott
Quad Shakopee
Quad ID 105D

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 02/16/1991
Update Date 02/14/2014
Received Date

Well Name	Township	Range	Dir	Section	Subsection
JONES, GUS	115	23	W	22	BAAACB

Elevation 879 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

C/W 2612 133RD ST W SHAKOPEE MN

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
GRAVEL & SAND	0	105		
SHALE & ROCK	105	110		
SHAKOPEE ROCK	110	185		
SANDSTONE JORDAN	185	280	WHITE	

Remarks

Well Depth 280 ft. **Depth Completed** 280 ft. **Date Well Completed** 07/07/1983

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

Use domestic **Status** Active

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

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

Casing Diameter	Weight	Hole Diameter
8 in. To 110 ft.	lbs./ft.	4 in. To 248 ft.

Open Hole From 248 ft. To 280 ft.

Screen? ☐ **Type** **Make**

Static Water Level
150 ft. land surface Measure 07/07/1983

Pumping Level (below land surface)
150 ft. 3 hrs. Pumping at 40 g.p.m.

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

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

Material	Amount	From	To
neat cement		ft.	ft.

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

Pump ☐ Not Installed Date Installed 07/10/1983
Manufacturer's name PIONEER
Model Number HP 1.5 Volt 230
Length of drop pipe 189 ft Capacity 15 g.p. Typ Submersible

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

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

Miscellaneous
First Bedrock Prairie Du Chien Group Aquifer Jordan
Last Strat Jordan Sandstone Depth to Bedrock 105 ft
Located by Minnesota Geological Survey
Locate Method Digitization (Screen) - Map (1:24,000)
System UTM - Mad83, Zone 15, Meters X 454688 Y 4956585
Unique Number Verification Information from Inpute Date 07/26/2005

Angled Drill Hole

Well Contractor

Associated Well Co.	27259	SCHULTZ, M
Licensee Business	Lic. or Reg. No.	Name of Driller

Minnesota Unique Well Number

405973

County Scott
Quad Shakopee
Quad ID 105D

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 02/23/1989
Update Date 02/14/2014
Received Date

Well Name	Township	Range	Dir	Section	Subsection
HALLORAN,	115	23	W	21	AAACDA

Elevation 822 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

C/W 13122 JOHNSON MEMORIAL DR SHAKOPEE MN 55379

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
SAND & GRAVEL	0	17	BROWN	SOFT
ROCKS, GRAVEL &	17	42	BROWN	HARD
CLAY & ROCKS	42	87	BROWN	SOFT
ROCKS & CLAY	87	139	BROWN	HARD
SAND (FINE)	139	155	BROWN	SOFT
SAND & GRAVEL	155	174	BROWN	SOFT

Remarks

Well Depth 174 ft. **Depth Completed** 174 ft. **Date Well Completed** 07/27/1984

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

Use domestic **Status** Active

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

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

Casing Diameter **Weight**
4 in. To 169 ft. lbs./ft.

Open Hole From ft. To ft.

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

Diameter	Slot/Gauze	Length	Set
2 in.	12	5 ft.	169 ft. 174 ft.

Static Water Level
120 ft. land surface Measure 07/27/1984

Pumping Level (below land surface)
ft. hrs. Pumping at 35 g.p.m.

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

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

Material	Amount	From	To
bentonite		ft.	ft.

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

Pump ☐ Not Installed Date Installed
Manufacturer's name PIONEER
Model Number HP 0.75 Volt 220
Length of drop pipe 147 ft Capacity 10 g.p. Typ Submersible

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

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

Miscellaneous
First Bedrock Aquifer Quat. buried
Last Strat sand +larger-brown Depth to Bedrock ft
Located by Minnesota Geological Survey
Locate Method Digitization (Screen) - Map (1:24,000)
System UTM - Mad83, Zone 15, Meters X 453836 Y 4956499
Unique Number Verification Address verification Inpute Date 07/26/2005

Angled Drill Hole

Well Contractor

Licensee Business	Lic. or Reg. No.	Name of Driller
Leuthner Well Co.	10125	SCHMIEG, K.

Minnesota Unique Well Number

432854

County Scott
Quad Shakopee
Quad ID 105D

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 04/18/1991
Update Date 05/22/2014
Received Date

Well Name	Township	Range	Dir	Section	Subsection
MN DEPT OF	115	23	W	15	CBDBAD

Elevation 808 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

C/W 12550 CHESTNUT BL SHAKOPEE MN 55379

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
SAND	0	201	BROWN	SOFT
LIMESTONE MIXED	201	262	RED	

Remarks

Well Depth 262 ft. **Depth Completed** 262 ft. **Date Well Completed** 10/00/1987

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

Use domestic **Status** Active

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

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

Casing Diameter	Weight	Hole Diameter
in. To 201 ft.	lbs./ft.	4 in. To 262 ft.

Open Hole From 201 ft. To 262 ft.

Screen? ☐ **Type** **Make**

Static Water Level
86 ft. land surface Measure 03/00/1987

Pumping Level (below land surface)
87 ft. 4 hrs. Pumping at 59.5 g.p.m.

Wellhead Completion
Pitless adapter manufacturer MONITOR Model 5
☐ Casing Protection ☒ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

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

Material	Amount	From	To
bentonite		ft.	ft.

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

Pump ☐ Not Installed Date Installed 03/00/1987
Manufacturer's name GRUNDFOSS
Model Number SP14 HP 3 Volt 208
Length of drop pipe ft Capacity 60 g.p. Typ Submersible

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

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

Miscellaneous
First Bedrock Jordan-St.Lawrence Aquifer Jordan-St.
Last Strat Jordan-St.Lawrence Depth to Bedrock 201 ft
Located by Minnesota Geological Survey
Locate Method Digitization (Screen) - Map (1:24,000)
System UTM - Mad83, Zone 15, Meters X 454249 Y 4957213
Unique Number Verification Inpute Date 07/26/2005

Angled Drill Hole

Well Contractor

Licensee Business	Lic. or Reg. No.	Name of Driller
Kaderlik Well Co.	66105	CHIDELL, G

Minnesota Unique Well Number

551318

County Scott
Quad Shakopee
Quad ID 105D

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 04/11/1995
Update Date 08/18/2014
Received Date

Well Name	Township	Range	Dir	Section	Subsection
C.H.	115	23	W	21	DDABAB

Elevation 830 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

C/W 13731 JOHNSON MEMORIAL DR SHAKOPEE MN

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
CLAY, GRAVEL	0	5	YEL/BRN	
GRAVEL CLAY	5	25	BRN/GRN	
SAND GRAVEL	25	105	BROWN	
CLAY	105	135	GRAY	
SHALE	135	158	GRN/GRY	
SHALE ROCK	158	160	VARIED	
LIMESTONE SHALE	160	180	RED/BRN	
SANDSTONE, ROCK	180	220	VARIED	SOFT

Remarks

Well Depth 220 ft. **Depth Completed** 220 ft. **Date Well Completed** 10/24/1994

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

Use domestic **Status** Active

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

Casing Type Step down **Joint** Welded

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

Casing Diameter			Weight		Hole Diameter		
4 in. To	204 ft.		11 lbs./ft.		12. in. To	160 ft.	
8 in. To	160 ft.		lbs./ft.		7.8 in. To	204 ft.	

Open Hole From 204 ft. To 220 ft.

Screen? ☐ **Type** **Make**

Static Water Level
80 ft. land surface Measure 10/24/1994

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

Wellhead Completion
Pitless adapter manufacturer WHITEWATER Model S44-5.5
☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

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

Material	Amount	From	To
neat cement		10 ft.	204 ft.

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

Pump ☐ Not Installed Date Installed 11/00/1994
Manufacturer's name FLINT & WALLING
Model Number HP 0.5 Volt 220
Length of drop pipe 100 ft Capacity g.p. Typ Submersible

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

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

Miscellaneous
First Bedrock Aquifer
Last Strat Depth to Bedrock 135 ft
Located by Minnesota Geological Survey
Locate Method Digitization (Screen) - Map (1:24,000)
System UTM - Mad83, Zone 15, Meters X 453798 Y 4955461
Unique Number Verification Information from Inpute Date 07/13/2005

Angled Drill Hole

Well Contractor

Licensee Business	Lic. or Reg. No.	Name of Driller
Bohn Well Co.	70350	VON BANK, B

Minnesota Unique Well Number

560332

County Scott
Quad Shakopee
Quad ID 105D

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 06/13/1996
Update Date 02/14/2014
Received Date

Well Name	Township	Range	Dir	Section	Subsection
WETTERLIN,	115	23	W	15	CCDBDA

Elevation 818 ft. **Elev. Method** CALC FROM 2-FOOT COUNTY DEM

Address

Contact BOX 260 CHASKA MN 55318
Well 12900 VENTURA CT SHAKOPEE MN 55379

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
GRAVEL & BOULDERS	0	84	BLK/BRN	HARD
LIMESTONE	84	128	BRN/RED	HARD
SANDROCK	128	180	WHT/YEL	MEDIUM

Remarks

Well Depth 180 ft. **Depth Completed** 180 ft. **Date Well Completed** 05/01/1995

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

Use industrial **Status** Active

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

Casing Type Step down **Joint** Welded
Drive Shoe? **Yes** ☒ **No** ☐ **Above/Below**

Casing Diameter			Weight		Hole Diameter		
4 in.	To	146 ft.	11	lbs./ft.	11 in.	To	65 ft.
8 in.	To	84 ft.	13	lbs./ft.	8 in.	To	140 ft.
					4 in.	To	180 ft.

Open Hole From 146 ft. To 180 ft.

Screen? ☐ **Type** **Make**

Static Water Level
95 ft. land surface Measure 04/28/1995

Pumping Level (below land surface)

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

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

Material	Amount		From	To
neat cement	4	Cubic yards	10 ft.	146 ft.

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

Pump ☐ Not Installed Date Installed 05/01/1995
Manufacturer's name FLINT & WALLING
Model Number 4F10B07 HP 0.75 Volt 220
Length of drop pipe 111 ft Capacity 10 g.p. Typ Submersible

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

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

Miscellaneous
First Bedrock Prairie Du Chien Group Aquifer Jordan
Last Strat Jordan Sandstone Depth to Bedrock 84 ft
Located by Minnesota Geological Survey
Locate Method Digitization (Screen) - Map (1:24,000)
System UTM - Mad83, Zone 15, Meters X 454249 Y 4956792
Unique Number Verification Address verification Inpute Date 11/10/2004

Angled Drill Hole

Well Contractor

Hartmann Well Co.	40174	JAECKELS, R.
Licensee Business	Lic. or Reg. No.	Name of Driller

Minnesota Unique Well Number

563892

County Scott
Quad Shakopee
Quad ID 105D

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 06/13/1996
Update Date 03/10/2014
Received Date

Well Name	Township	Range	Dir	Section	Subsection
SUPER	115	23	W	15	CCABCA

Elevation 805 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

C/W 12835 VENTURA CT SHAKOPEE MN 55379

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
GRAVEL	0	13	BROWN	
CLAY & GRAVEL	13	55	BRN/GRY	
CLAY, SOME GRAVEL	55	64	BROWN	
LIMESTONE	64	115	BRN/RED	
SANDSTONE	115	220	WHT/YEL	

Remarks

DRILLING FLUID: BENTONITE, WATER AND FOAM.
WELL NO.1.
WELL SEALED 04-05-2001 BY 70350
ORIGINAL USE IN - INDUSTRIAL

Well Depth 220 ft. **Depth Completed** 220 ft. **Date Well Completed** 11/06/1995

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

Use abandoned **Status** Sealed

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

Casing Type Step down **Joint** Welded
Drive Shoe? **Yes** ☒ **No** ☐ **Above/Below**

Casing Diameter			Weight	Hole Diameter		
4 in.	To	135 ft.	11 lbs./ft.	12. in.	To	65 ft.
8 in.	To	65 ft.	lbs./ft.	8 in.	To	135 ft.
				4 in.	To	220 ft.

Open Hole From 135 ft. To 220 ft.

Screen? ☐ **Type** **Make**

Static Water Level
85 ft. land surface Measure 11/06/1995

Pumping Level (below land surface)

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

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

Material	Amount	From	To
neat cement	Sacks	10 ft.	135 ft.

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

Pump ☐ Not Installed Date Installed 11/28/1995
Manufacturer's name FLINT & WALLING
Model Number 4F35B30 HP 3 Volt 208
Length of drop pipe 126 ft Capacity 35 g.p. Typ Submersible

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

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

Miscellaneous
First Bedrock Prairie Du Chien Group Aquifer Jordan
Last Strat Jordan Sandstone Depth to Bedrock 64 ft
Located by Minnesota Department of Health
Locate Method Digitization (Screen) - Map (1:24,000)
System UTM - Mad83, Zone 15, Meters X 454197 Y 4956993
Unique Number Verification Inpute Date 03/03/1999

Angled Drill Hole

Well Contractor

Licensee Business	Lic. or Reg. No.	Name of Driller
Bohn Well Co.	70350	VANBANK, B.

Minnesota Unique Well Number

569344

County Scott
Quad Jordan East
Quad ID 90A

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 07/29/1998
Update Date 02/14/2014
Received Date

Well Name	Township	Range	Dir	Section	Subsection
NRG	115	23	W	28	DCCDBA

Elevation 738 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

Well 14800 JOHNSON MEMORIAL DR SHAKOPEE MN

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
CLAY WITH ROCKS	0	17	GRAY	
SAND ROCK/GRAVEL	17	36		
SHAKOPEE ROCK	36	45		HARD
SAND ROCK/SHALE	45	90	YELLOW	SOFT
ROCK/SHALE	90	162	GREEN	HARD

Remarks

Well Depth 162 ft. **Depth Completed** 162 ft. **Date Well Completed** 05/08/1996

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

Use domestic **Status** Active

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

Casing Type Single casing **Joint**

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

Casing Diameter	Weight	Hole Diameter
6 in. To 99.8 ft.	lbs./ft.	12 in. To 86 ft.
		7.5 in. To 99 ft.
		4.5 in. To 162 ft.

Open Hole From 99.7 ft. To 162 ft.

Screen? ☐ **Type** **Make**

Static Water Level

30 ft. land surface Measure 04/19/1996

Pumping Level (below land surface)

ft. hrs. Pumping at 200 g.p.m.

Wellhead Completion

Pitless adapter manufacturer Model

☐ Casing Protection ☐ 12 in. above grade

☐ At-grade (Environmental Wells and Borings ONLY)

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

Material	Amount	From	To
neat cement		ft. 99.7	ft.

Nearest Known Source of Contamination

60 feet North Direction Body of water Type

Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 05/08/1996

Manufacturer's name FLINT AND WALLING

Model Number HP 5 Volt

Length of drop pipe 63.2 ft Capacity g.p. Typ Submersible

Abandoned

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

Variance

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

Miscellaneous

First Bedrock Jordan Sandstone Aquifer Jordan-St.

Last Strat Jordan-St.Lawrence Depth to Bedrock 36 ft

Located by Minnesota Geological Survey

Locate Method Digitization (Screen) - Map (1:24,000)

System UTM - Mad83, Zone 15, Meters X 453221 Y 4953544

Unique Number Verification Tag on well Inpute Date 07/13/2005

Angled Drill Hole

Well Contractor

Licensee Business	Lic. or Reg. No.	Name of Driller
Torgerson Well Co.	27056	TORGERSON, R.

Minnesota Unique Well Number

570155

County Scott
Quad Shakopee
Quad ID 105D

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 07/29/1998
Update Date 02/14/2014
Received Date

Well Name	Township	Range	Dir	Section	Subsection
JONES, JOE &	115	23	W	22	BAAACB

Elevation 886 ft. **Elev. Method** CALC FROM 2-FOOT COUNTY DEM

Address

C/W 2612 133RD ST W SHAKOPEE MN 55379

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
DIRT	0	20	BLACK	SOFT
SANDY CLAY	20	55	BROWN	MEDIUM
SAND, ROCKS	55	90	BLK/BRN	HARD
SHAKOPEE ROCK	90	193	YEL/BRN	HARD
JORDAN	193	280	BRN/WHT	SFT-MED

Remarks

Well Depth 280 ft. **Depth Completed** 280 ft. **Date Well Completed** 12/12/1997

Drill Method Non-specified Rotary **Drill Fluid** Additive (+ Bentonite)

Use domestic **Status** Active

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

Casing Type Step down **Joint** Welded

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

Casing Diameter			Weight	Hole Diameter		
4 in.	To	236 ft.	11 lbs./ft.	12. in.	To	90 ft.
8 in.	To	90 ft.	lbs./ft.	8 in.	To	236 ft.
				4 in.	To	280 ft.

Open Hole From 236 ft. To 280 ft.

Screen? ☐ **Type** **Make**

Static Water Level
157 ft. land surface Measure 12/12/1997

Pumping Level (below land surface)
157 ft. 3 hrs. Pumping at 40 g.p.m.

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

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

Material	Amount	From	To
neat cement	3	0 ft.	236 ft.

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

Pump ☐ Not Installed Date Installed 12/12/1997
Manufacturer's name AERMOTOR
Model Number HP 1.5 Volt 230
Length of drop pipe 189 ft Capacity 20 g.p. Typ Submersible

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

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

Miscellaneous
First Bedrock Prairie Du Chien Group Aquifer Jordan
Last Strat Jordan Sandstone Depth to Bedrock 90 ft
Located by Minnesota Geological Survey
Locate Method Digitization (Screen) - Map (1:24,000)
System UTM - Mad83, Zone 15, Meters X 454687 Y 4956585
Unique Number Verification Address verification Inpute Date 11/11/2004

Angled Drill Hole

Well Contractor

Associated Well Co.	27259	SCHULTZ, M.
Licensee Business	Lic. or Reg. No.	Name of Driller

Minnesota Unique Well Number

603564

County Scott
Quad Shakopee
Quad ID 105D

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 07/29/1998
Update Date 02/14/2014
Received Date

Well Name	Township	Range	Dir	Section	Subsection
KENNY, DAVID	115	23	W	22	BBCDAA

Elevation 861 ft. **Elev. Method** CALC FROM 2-FOOT COUNTY DEM

Address

C/W 13610 PEREGRINE CI SHAKOPEE MN 55379

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
CLAY & GRAVEL	0	190	RED	MEDIUM
SAND	190	223	BROWN	SOFT

Remarks

Well Depth 223 ft. **Depth Completed** 223 ft. **Date Well Completed** 11/07/1997

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

Use domestic **Status** Active

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

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

Casing Diameter		Weight		Hole Diameter	
4 in. To 219 ft.		2.9 lbs./ft.		8 in. To 22 ft.	
				6.7 in. To 223 ft.	

Open Hole From ft. To ft.

Screen? ☒ **Type** stainless **Make** COOK

Diameter	Slot/Gauze	Length	Set	
2 in.	18	4 ft.	219 ft.	223 ft.

Static Water Level
132 ft. land surface Measure 11/07/1997

Pumping Level (below land surface)

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

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

Material	Amount		From	To
high solids bentonite	8	Sacks	0 ft.	36 ft.

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

Pump ☐ Not Installed Date Installed
Manufacturer's name AERMOTOR
Model Number A12B75 HP 0.75 Volt 230
Length of drop pipe 160 ft Capacity 12 g.p. Typ Submersible

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

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

Miscellaneous
First Bedrock Aquifer Quat. buried
Last Strat sand-brown Depth to Bedrock ft
Located by Minnesota Geological Survey
Locate Method Digitization (Screen) - Map (1:24,000)
System UTM - Mad83, Zone 15, Meters X 454154 Y 4956342
Unique Number Verification Address verification Inpute Date 11/11/2004

Angled Drill Hole

Well Contractor
Gary's Well Co. 70417 DEW, J.
Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well Number

605935

County Scott
Quad Shakopee
Quad ID 105D

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 11/07/2001
Update Date 04/22/2005
Received Date

Well Name	Township	Range	Dir	Section	Subsection
ALLEN, PAUL	115	23	W	15	CDBDBD

Elevation 824 ft. **Elev. Method** CALC FROM 2-FOOT COUNTY DEM

Address

Well 12860 EMERY WA SHAKOPEE MN 55379

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
GRAVEL, SAND, SOME	0	6	BROWN	
ROCK	6	7		
GRAVEL/BOULDER	7	10		
GRAVEL, ROCK, SAND,	10	68	BROWN	
LIMEROCK	68	135	RED/BRN	
SANDSTONE	135	227	BRN/WHT	

Remarks

Well Depth 227 ft. **Depth Completed** 227 ft. **Date Well Completed** 05/26/1998

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

Use domestic **Status** Active

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

Casing Type Step down **Joint**
Drive Shoe? **Yes** ☒ **No** ☐ **Above/Below**

Casing Diameter		Weight		Hole Diameter	
4 in. To	155 ft.	lbs./ft.		12. in. To	70 ft.
8 in. To	70 ft.	lbs./ft.		8 in. To	155 ft.
				4 in. To	227 ft.

Open Hole From 155 ft. To 227 ft.

Screen? ☐ **Type** **Make**

Static Water Level
90 ft. land surface Measure 05/26/1998

Pumping Level (below land surface)
ft. hrs. Pumping at 30 g.p.m.

Wellhead Completion
Pitless adapter manufacturer WHITEWATER Model SUE4
☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

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

Material	Amount		From	To
neat cement	40	Sacks	10 ft.	155 ft.

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

Pump ☐ Not Installed Date Installed 06/22/1998
Manufacturer's name FLINT & WALLING
Model Number HP 0.75 Volt 2
Length of drop pipe 126 ft Capacity 10 g.p. Typ Submersible

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

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

Miscellaneous
First Bedrock Prairie Du Chien Group Aquifer Jordan
Last Strat Jordan Sandstone Depth to Bedrock 68 ft
Located by Minnesota Geological Survey
Locate Method Digitization (Screen) - Map (1:24,000)
System UTM - Mad83, Zone 15, Meters X 454507 Y 4956904
Unique Number Verification Address verification Inpute Date 11/09/2004

Angled Drill Hole

Well Contractor

Licensee Business	Lic. or Reg. No.	Name of Driller
Bohn Well Co.	70350	VONBANK, B.

Minnesota Unique Well Number

609840

County Scott
Quad Shakopee
Quad ID 105D

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 11/07/2001
Update Date 02/16/2006
Received Date

Well Name	Township	Range	Dir	Section	Subsection
WETTERLIN,	115	23	W	15	CCDCBA

Elevation 821 ft. **Elev. Method** CALC FROM 2-FOOT COUNTY DEM

Address

Contact P.O. BOX 260 CHASKA MN 55318
Well 12912 VENTURA CT SHAKOPEE MN 55379

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
SAND, GRAVEL,	0	95	BROWN	MEDIUM
BROKEN LIMEROCK	95	126	BROWN	MEDIUM
CLAY & GRAVEL	126	144	BLU/BRN	MEDIUM
LIMEROCK	144	159	RED	HARD
SANDROCK	159	200	WHITE	SOFT
LIMEROCK	200	200		

Remarks

Well Depth 200 ft. **Depth Completed** 200 ft. **Date Well Completed** 05/27/1998

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

Use domestic **Status** Active

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

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

Casing Diameter	Weight	Hole Diameter
4 in. To 174 ft.	11 lbs./ft.	11 in. To 170 ft.
		4 in. To 200 ft.

Open Hole From 174 ft. To 200 ft.

Screen? ☐ **Type** **Make**

Static Water Level
100 ft. land surface Measure 04/27/1998

Pumping Level (below land surface)

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

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

Material	Amount	From	To
neat cement	4 Cubic yards	10 ft.	170 ft.

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

Pump ☐ Not Installed Date Installed 05/27/1998
Manufacturer's name AERMOTOR
Model Number A12-100 HP 1 Volt 230
Length of drop pipe 129 ft Capacity 12 g.p. Typ Submersible

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

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

Miscellaneous
First Bedrock Prairie Du Chien Group Aquifer Jordan
Last Strat Jordan Sandstone Depth to Bedrock 144 ft
Located by Minnesota Geological Survey
Locate Method Digitization (Screen) - Map (1:24,000)
System UTM - Mad83, Zone 15, Meters X 454209 Y 4956737
Unique Number Verification Address verification Inpute Date 11/10/2004

Angled Drill Hole

Well Contractor
Hartmann Well Co. 40174 HARTMANN, B.
Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well Number

645906

County Scott
Quad Shakopee
Quad ID 105D

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 09/07/2000
Update Date 04/25/2005
Received Date

Well Name	Township	Range	Dir	Section	Subsection
SIEVERS,	115	23	W	22	BBAACA

Elevation 865 ft. **Elev. Method** CALC FROM 2-FOOT COUNTY DEM

Address

Well 13615 PERGRINE CI SHAKOPEE MN 55379
Contact 12700 PIONEER TR EDEN PRAIRIE MN 55347

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
CLAY	0	10	BROWN	SOFT
CLAY	10	44	GRAY	SOFT
BOULDER/GRAVEL	44	68	VARIED	HARD
LIMESTONE	68	166	TAN	HARD
SANDSTONE	166	189	WHITE	SOFT
SANDSTONE	189	241	WHT/TAN	HARD

Remarks

Well Depth 241 ft. **Depth Completed** 241 ft. **Date Well Completed** 05/10/2000

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

Use domestic **Status** Active

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

Casing Type Step down **Joint** Welded
Drive Shoe? Yes ☒ No ☐ **Above/Below**

Casing Diameter			Weight	Hole Diameter		
4 in.	To 189 ft.	11 lbs./ft.		12 in.	To 72 ft.	
8 in.	To 72 ft.	lbs./ft.		8 in.	To 186 ft.	
				4 in.	To 241 ft.	

Open Hole From 189 ft. To 241 ft.

Screen? ☐ **Type** **Make**

Static Water Level
146 ft. land surface Measure 05/10/2000

Pumping Level (below land surface)
180 ft. 3 hrs. Pumping at 12 g.p.m.

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

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

Material	Amount		From	To
neat cement	5	Cubic yards	0 ft.	189 ft.

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

Pump ☐ Not Installed Date Installed 05/19/2000
Manufacturer's name AERMOTOR
Model Number S-12-75 HP 0.75 Volt 230
Length of drop pipe 168 ft Capacity 12 g.p. Typ Submersible

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

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

Miscellaneous
First Bedrock Prairie Du Chien Group Aquifer Jordan
Last Strat Jordan Sandstone Depth to Bedrock 68 ft
Located by Minnesota Geological Survey
Locate Method Digitization (Screen) - Map (1:24,000)
System UTM - Mad83, Zone 15, Meters X 454302 Y 4956601
Unique Number Verification Address verification Inpute Date 11/11/2004

Angled Drill Hole

Well Contractor

Licensee Business	Lic. or Reg. No.	Name of Driller
Gary's Well Co.	70417	SCHULTZ, C.

Minnesota Unique Well Number

625963

County Scott
Quad Shakopee
Quad ID 105D

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 02/09/2000
Update Date 12/27/2013
Received Date

Well Name	Township	Range	Dir	Section	Subsection
SOUTH METRO	115	23	W	16	DDCDCB

Elevation 819 ft. **Elev. Method** CALC FROM 2-FOOT COUNTY DEM

Address

Well 3230 130TH ST W SHAKOPEE MN 55379

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
GRAVEL, CLAY ROCKS	0	7	BROWN	
BOULDER	7	9	BLACK	
SAND, GRAVEL	9	75	BROWN	
LIMEROCK	75	130	BRN/RED	
SANDSTONE	130	145	YELLOW	
SANDSTONE	145	200	WHT/YEL	

Remarks

Well Depth 200 ft. **Depth Completed** 200 ft. **Date Well Completed** 08/26/1999

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

Use domestic **Status** Active

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

Casing Type Step down **Joint** Welded
Drive Shoe? **Yes** ☒ **No** ☐ **Above/Below**

Casing Diameter			Weight	Hole Diameter		
4 in. To	145 ft.	lbs./ft.		12. in. To	76 ft.	
8 in. To	76 ft.	lbs./ft.		8 in. To	145 ft.	
				4 in. To	200 ft.	

Open Hole From 145 ft. To 200 ft.

Screen? ☐ **Type** **Make**

Static Water Level
99 ft. land surface Measure 08/26/1999

Pumping Level (below land surface)
ft. hrs. Pumping at 30 g.p.m.

Wellhead Completion
Pitless adapter manufacturer WHITEWATER Model SU4
☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

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

Material	Amount		From	To
neat cement	3	Sacks	10 ft.	145 ft.

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

Pump ☐ Not Installed Date Installed 10/08/1999
Manufacturer's name FLINT & WALLING
Model Number HP 3 Volt 220
Length of drop pipe 126 ft Capacity 27 g.p. Typ Submersible

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

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

Miscellaneous
First Bedrock Prairie Du Chien Group Aquifer Jordan
Last Strat Jordan Sandstone Depth to Bedrock 75 ft
Located by Minnesota Geological Survey
Locate Method Digitization (Screen) - Map (1:24,000)
System UTM - Mad83, Zone 15, Meters X 453665 Y 4956698
Unique Number Verification Address verification Inpute Date 11/10/2004

Angled Drill Hole

Well Contractor

Bohn Well Co.	70350	VON BANK, B.
Licensee Business	Lic. or Reg. No.	Name of Driller

Minnesota Unique Well Number

625966

County Scott
Quad Shakopee
Quad ID 105D

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 10/19/1999
Update Date 04/25/2005
Received Date

Well Name	Township	Range	Dir	Section	Subsection
OLSON, RUSS &	115	23	W	22	BBADBD

Elevation 880 ft. **Elev. Method** CALC FROM 2-FOOT COUNTY DEM

Address

Well 13621 PEPEGRINE CI SHAKOPEE MN 55379

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
CLAY	0	18	YELLOW	
CLAY	18	49	GRAY	
BOULDERS, ROCKS	49	55	BLK/WHT	
COARSE GRAY, SAND	55	103	BROWN	
LIMEROCK	103	165	BROWN	
SANDSTONE	165	260	BRN/WHT	

Remarks

Well Depth 260 ft. **Depth Completed** 260 ft. **Date Well Completed** 05/05/1999

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

Use domestic **Status** Active

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

Casing Type Step down **Joint**
Drive Shoe? **Yes** ☐ **No** ☐ **Above/Below**

Casing Diameter			Weight		Hole Diameter		
4 in. To	195 ft.		11 lbs./ft.		12. in. To	106 ft.	
8 in. To	106 ft.		lbs./ft.		8 in. To	195 ft.	
					6 in. To	260 ft.	

Open Hole From 195 ft. To 260 ft.

Screen? ☐ **Type** **Make**

Static Water Level
120 ft. null Measure 05/05/1999

Pumping Level (below land surface)
ft. hrs. Pumping at 30 g.p.m.

Wellhead Completion
Pitless adapter manufacturer WHITEWATER Model SU4
☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

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

Material	Amount		From	To
neat cement	2	Cubic yards	10 ft.	95 ft.

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

Pump ☐ Not Installed Date Installed 06/24/1999
Manufacturer's name FLINT & WALLING
Model Number 4F10A10- HP 1 Volt 220
Length of drop pipe 147 ft Capacity 10 g.p. Typ Submersible

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

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

Miscellaneous
First Bedrock Prairie Du Chien Group Aquifer Jordan
Last Strat Jordan Sandstone Depth to Bedrock 103 ft
Located by Minnesota Geological Survey
Locate Method Digitization (Screen) - Map (1:24,000)
System UTM - Mad83, Zone 15, Meters X 454297 Y 4956519
Unique Number Verification Address verification Inpute Date 11/11/2004

Angled Drill Hole

Well Contractor

Bohn Well Co.	70350	VON BANK, B.
Licensee Business	Lic. or Reg. No.	Name of Driller

Minnesota Unique Well Number

653060

County Scott
Quad Shakopee
Quad ID 105D

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 05/15/2001
Update Date 04/22/2005
Received Date

Well Name	Township	Range	Dir	Section	Subsection
SEVERSON,	115	23	W	15	CBCDBC

Elevation 810 ft. **Elev. Method** CALC FROM 2-FOOT COUNTY DEM

Address

Well 12810 CHESTNUT BL SHAKOPEE MN 55379

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
SAND & CLAY	0	77	BROWN	MEDIUM
BROKEN LIMEROCK	77	94	BROWN	MEDIUM
LIMEROCK	94	126	BROWN	HARD
SANDROCK	126	180	GRAY	SOFT

Remarks

Well Depth 180 ft. **Depth Completed** 180 ft. **Date Well Completed** 11/04/2000

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

Use domestic **Status** Active

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

Casing Type Step down **Joint** Welded
Drive Shoe? **Yes** ☒ **No** ☐ **Above/Below**

Casing Diameter			Weight		Hole Diameter		
8 in.	To	80 ft.	19	lbs./ft.	11 in.	To	80 ft.
4 in.	To	0 ft.	11	lbs./ft.	8 in.	To	150 ft.
					4 in.	To	180 ft.

Open Hole From 152 ft. To 180 ft.

Screen? ☐ **Type** **Make**

Static Water Level
100 ft. land surface Measure 11/04/2000

Pumping Level (below land surface)

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

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

Material	Amount		From	To
neat cement	2	Cubic yards	10 ft.	150 ft.
high solids bentonite	10	Sacks	10 ft.	80 ft.

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

Pump ☐ Not Installed Date Installed 11/04/2000
Manufacturer's name AERMOTOR
Model Number S12-100 HP 1 Volt 230
Length of drop pipe 129 ft Capacity 12 g.p. Typ Submersible

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

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

Miscellaneous
First Bedrock Prairie Du Chien Group Aquifer Jordan
Last Strat Jordan Sandstone Depth to Bedrock 94 ft
Located by Minnesota Geological Survey
Locate Method Digitization (Screen) - Map (1:24,000)
System UTM - Mad83, Zone 15, Meters X 454069 Y 4957123
Unique Number Verification Address verification Inpute Date 11/04/2004

Angled Drill Hole

Well Contractor
Hartmann Well Co. 40174 HARTMAN, B.
Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well Number

709026

County Scott
Quad Jordan East
Quad ID 90A

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 12/17/2004
Update Date 02/06/2012
Received Date 01/18/2005

Well Name	Township	Range	Dir	Section	Subsection
DOUCETTE,	115	23	W	28	ADCA

Elevation 790 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

C/W 14331 JOHNSON MEMORIAL DR SHAKOPEE MN

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
DIRT	0	8	BLACK	MEDIUM
CLAY & ROCKS	8	41	BROWN	MEDIUM
CLAY & GRAVEL	41	90	GRAY	MEDIUM
CLAY	90	104	GRAY	HARD
CLAY & GRAVEL	104	115	GRAY	SOFT
LIMEROCK	115	118	BROWN	HARD
SANDROCK	118	139	BROWN	SOFT

Remarks

Well Depth 139 ft. **Depth Completed** 139 ft. **Date Well Completed** 10/22/2004

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

Use domestic **Status** Active

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

Casing Type Single casing **Joint** Threaded

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

Casing Diameter		Weight		Hole Diameter	
4 in. To	134 ft.	11 lbs./ft.		10 in. To	134 ft.
				4 in. To	139 ft.

Open Hole From ft. To ft.

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

Diameter	Slot/Gauze	Length	Set	
3.5 in.	10	5 ft.	134 ft.	139 ft.

Static Water Level

60 ft. land surface Measure 06/03/2004

Pumping Level (below land surface)

Wellhead Completion

Pitless adapter manufacturer MONITOR Model

☐ Casing Protection ☐ 12 in. above grade

☐ At-grade (Environmental Wells and Borings ONLY)

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

Material	Amount		From	To
neat cement	2	Cubic yards	8 ft.	134 ft.

Nearest Known Source of Contamination

54 feet West Direction Sewer Type

Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 10/22/2004

Manufacturer's name FLINT & WALLING

Model Number 4F27A15 HP 1.5 Volt 230

Length of drop pipe 90 ft Capacity 27 g.p. Typ Submersible

Abandoned

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

Variance

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

Miscellaneous

First Bedrock Prairie Du Chien Group Aquifer Jordan

Last Strat Jordan Sandstone Depth to Bedrock 115 ft

Located by Minnesota Department of Health

Locate Method GPS SA Off (averaged)

System UTM - Mad83, Zone 15, Meters X 453616 Y 4954369

Unique Number Verification Tag on well Inpute Date 12/16/2004

Angled Drill Hole

Well Contractor

Licensee Business	Lic. or Reg. No.	Name of Driller
Hartmann Well Co.	40174	HARTMANN, B.

Minnesota Unique Well Number

745250

County Scott
Quad Shakopee
Quad ID 105D

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 01/16/2007
Update Date 10/08/2014
Received Date 11/20/2006

Well Name	Township	Range	Dir	Section	Subsection
UNIVERSAL	115	23	W	22	BCBCAC

Elevation 853 ft. **Elev. Method** Calc from DEM (USGS 7.5 min or equiv.)

Address

Well 3019 133RD ST SHAKOPEE MN

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
SAND	0	41	BROWN	MEDIUM
CLAY	41	55	BROWN	MEDIUM
SAND	55	220	BROWN	MEDIUM

Remarks

SEALED 4-19-2014; PREVIOUS USE: PS

Well Depth 220 ft. **Depth Completed** 220 ft. **Date Well Completed** 11/09/2006

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

Use abandoned **Status** Sealed

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

Casing Type Single casing **Joint** Welded

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

Casing Diameter		Weight		Hole Diameter	
4 in. To 200 ft.		0 lbs./ft.		6.5 in. To 220 ft.	

Open Hole From ft. To ft.

Screen? ☒ **Type** plastic **Make** BIGFOOT

Diameter	Slot/Gauze	Length	Set	
4 in.	10	20 ft.	200 ft.	220 ft.

Static Water Level

115 ft. land surface Measure 10/04/2006

Pumping Level (below land surface)

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

Wellhead Completion

Pitless adapter manufacturer MONITOR Model

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

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

Material	Amount	From	To
bentonite	9 Sacks	ft.	168 ft.

Nearest Known Source of Contamination

30 feet Northeas Direction Sewer Type

Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 11/02/2006

Manufacturer's name AERMOTOR

Model Number S35-500 HP 5 Volt 460

Length of drop pipe 0 ft Capacity 35 g.p. Typ Submersible

Abandoned

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

Variance

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

Miscellaneous

First Bedrock Aquifer

Last Strat Depth to Bedrock ft

Located by Minnesota Department of Health

Locate Method GPS SA Off (averaged)

System UTM - Mad83, Zone 15, Meters X 454000 Y 4956133

Unique Number Verification Info/GPS from data Inpute Date 12/19/2006

Angled Drill Hole

Well Contractor

Licensee Business	Lic. or Reg. No.	Name of Driller
Hartmann Well Co., LLP	1622	HARTMANN, B.

Minnesota Unique Well Number

772251

County Scott
Quad Shakopee
Quad ID 105D

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 10/01/2009
Update Date 09/03/2014
Received Date 10/20/2009

Well Name	Township	Range	Dir	Section	Subsection
DUCEO	115	23	W	15	CBABCB

Elevation 821 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

Well 12565 41 HY SHAKOPEE MN 55379

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
SAND & GRAVEL	0	56	BROWN	MEDIUM
LIMESTONE	56	115	BROWN	HARD
SANDROCK	115	200	BROWN	MEDIUM

Remarks

Well Depth 200 ft. **Depth Completed** 200 ft. **Date Well Completed** 09/21/2009

Drill Method Air Rotary **Drill Fluid** Foam

Use industrial **Status** Active

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

Casing Type Single casing **Joint** Welded

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

Casing Diameter			Weight		Hole Diameter		
4 in.	To	163 ft.	11	lbs./ft.	10 in.	To	62 ft.
8 in.	To	62 ft.	19	lbs./ft.	8 in.	To	162 ft.
					4 in.	To	200 ft.

Open Hole From 163 ft. To 200 ft.

Screen? ☐ **Type** **Make**

Static Water Level

95 ft. land surface Measure 08/13/2009

Pumping Level (below land surface)

Wellhead Completion

Pitless adapter manufacturer MONITOR Model

☐ Casing Protection ☐ 12 in. above grade

☐ At-grade (Environmental Wells and Borings ONLY)

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

Material	Amount		From	To
neat cement	3	Cubic yards	10 ft.	162 ft.
high solids bentonite	7	Sacks	ft.	62 ft.

Nearest Known Source of Contamination

35 feet Northeas Direction Septic tank/drain field Type

Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 09/21/2009

Manufacturer's name SCHAEFER

Model Number 10LD154 HP 1 Volt 230

Length of drop pipe 144 ft Capacity 11 g.p. Typ Submersible

Abandoned

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

Variance

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

Miscellaneous

First Bedrock Prairie Du Chien/Oneota Aquifer Jordan

Last Strat Jordan Sandstone Depth to Bedrock 56 ft

Located by Minnesota Department of Health

Locate Method GPS SA Off (averaged)

System UTM - Mad83, Zone 15, Meters X 454186 Y 4957386

Unique Number Verification Inpute Date 09/03/2009

Angled Drill Hole

Well Contractor

Licensee Business	Lic. or Reg. No.	Name of Driller
Hartmann Well Co., LLP	1622	HARTMANN, B.

Attachment J – Preliminary Drainage Reports

- **Preliminary (30 Percent) Drainage Report – Trunk Highway 169/Trunk Highway 41/ CSAH 78 Interchange Project, October 25, 2016**

- **Draft Preliminary (30 Percent) Drainage Report – Trunk Highway 169/ CSAH 14 Overpass Project, March 15, 2017**

PRELIMINARY (30 PERCENT) DRAINAGE REPORT

TRUNK HIGHWAY 169 / TRUNK HIGHWAY 41 / CSAH 78 INTERCHANGE PROJECT

October 25, 2016

Prepared for:
Scott County
200 Fourth Avenue West
Shakopee, MN 55379

WSB PROJECT NO. 3212-000

PRELIMINARY (30 PERCENT) DRAINAGE DESIGN REPORT

Trunk Highway 169/Trunk Highway 41/CSAH 78 Interchange Project
Jackson Township, Louisville Township, Scott County, Minnesota

Prepared For:

Scott County, Minnesota

October 25, 2016

Prepared By:

WSB & Associates, Inc.
701 Xenia Avenue S., Suite 300
Minneapolis, MN 55416
(763) 541-4800
(763) 541-1700 (Fax)

CERTIFICATION

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

Jeffry S. Sandberg, PE

Date: 10/25/16 Reg. No. 25393

Quality Control Review By:

Earth Evans, PE

Date: 10/25/16 Reg. No. 44235

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Appendix A – Figures 1-5
Appendix B – Existing and Proposed Hydrocad Models

Note: Appendix B of this attachment may be reviewed upon request.

I. INTRODUCTION

Scott County contracted WSB & Associates, Inc. (WSB) to complete the drainage and stormwater management design for construction of an interchange at Trunk Highway 169 (TH 169), Trunk Highway 41 (TH 41), County State Aid Highway 78 (CSAH 78), and frontage roads located in Jackson and Louisville Townships. This drainage design report addresses stormwater management for the interchange and the three frontage roads located in the northwest, southeast, and southwest quadrants of the interchange. The majority of this project falls within the Jackson Township boundary and a small portion of the southern part of the project is located in Louisville Township. The entire project is located within Scott County.

This project lies within the borders of both the Lower Minnesota River Watershed District (LMRWD) and the Scott Watershed Management Organization (Scott WMO). Scott County is the Local Government Unit (LGU) for this project. The stormwater management design is compliant with Scott County Zoning Ordinance. The LMRWD delegates review authority to Scott County for projects that overlap jurisdiction.

The drainage design in this report is consistent with the stormwater requirements of Scott County, MnDOT, and the MPCA. The proposed storm sewer and stormwater management plans are based on layout and roadway profile elevations dated August 12, 2016.

For the purposes of this document, TH 169 is considered to run north/south; TH 41 and CSAH 78 are considered to run east/west.

II. SITE DESCRIPTION

TH 169 and TH 41/CSAH 78 currently cross at an at-grade intersection. TH 169 north and south of the intersection is predominantly a rural-style roadway with ditches collecting and conveying drainage from the roadway. The existing intersection area, TH 41 west of TH 169, and CSAH 78 east of TH 169 are predominantly urban-style roadways with curb, gutter, and catch basins collecting and conveying drainage from the roadway. **Figure 1,** in Appendix A shows the existing drainage patterns for the project site.

As-built drawings for the project area indicate that two regional infiltration basins were constructed to collect and retain drainage from portions of TH 169, TH 41, and CSAH 78. One of these basins (Basin 1) is located in the northeast quadrant of the TH 41 and Union Pacific Railroad intersection and the other basin (Basin 2) is located in the northeast quadrant of the proposed interchange. Additionally there are local basins constructed with development as shown on Figure 1.

This project will address access management and the proposed design includes an elevated interchange construction in which TH 169 will pass over TH 41/CSAH 78.

LiDAR elevation data, as built drawings, and surveyed storm sewers were used to analyze existing drainage patterns within and adjacent to the proposed project area.

III. HYDROLOGY AND HYDRAULICS

Drainage Area Boundaries

The existing and proposed drainage boundaries are shown in Figures 1, 2 and 5 located in **Appendix A**. The stormwater mapping illustrates which subwatersheds discharge to the existing and proposed stormwater basins as well as runoff directed off site from the project corridor.

Existing drainage patterns were determined by use of LiDAR and supplemented by survey data.

South Subwatershed

The southern portion of this project, which includes a portion of the SE Frontage Road, the entire SW Frontage Road, and a section of TH 169 reconstruction, drains to the south and away from the project site. The existing TH 169 ditch is the primary conveyance for the South Subwatershed. The runoff eventually outlets under TH 169 through an existing culvert to the west to Sand Creek which is impaired for fish bioassessments and turbidity.

TH 41 Subwatershed

The western portion of this project is within the tributary area of an existing stormwater infiltration basin that currently takes surface runoff from TH 41 and adjacent parcels to the north and south. Storm sewers, ditches, and overland flow convey stormwater within this drainage area to the infiltration basin (Basin 1) located on the north side of TH 41 adjacent to the Union Pacific Railroad tracks. Basin 1 eventually discharges to the Minnesota River, which is impaired for mercury in fish tissue and water column, PCB in fish tissue, and turbidity.

Shakopee Subwatershed

The Shakopee subwatershed consists primarily of farmland. Runoff within this subwatershed generally flows to the northeast where it drains into the City of Shakopee. Drainage from the project area that discharges from the existing infiltration basin (labeled Basin 2 on **Figure 2**) flows through this subwatershed. The Shakopee Subwatershed discharges downstream to the Minnesota River and is part of the Upper Valley Drainageway in the City of Shakopee.

Drainage within the Shakopee Subwatershed is stored within a large depression shown on **Figure 1**. There is a high point in this depression between the project site and the City of Shakopee. Based on LiDAR data, the elevation of this high point is approximately 800.6. Based on a Simplified Hydrologic Yield Method (SHYM) analysis, discharge and overflow will occur over this high point, indicating the area is not landlocked.

Due to the high infiltration capacity of the existing soils, runoff from the Shakopee subwatershed rarely overflows into the City of Shakopee. Snowmelt events, when the ground is frozen, and saturated ground caused by wet patterns followed by heavy rainfall, typically lead to overtopping.

TH 169 Subwatershed

The interchange portion of this project is tributary to an existing infiltration basin (Basin 2) in the northeast quadrant of the TH 169/TH 41/CSAH 78 intersection. Basin 2 discharges to the northeast into the Shakopee Subwatershed.

There is approximately 169 acres of offsite run-on from the southeast quadrant of the Interchange tributary to Basin 2 in the TH 169 Subwatershed, see **Figure 1**. The area is generally bounded by Old Brickyard Road on the east, TH 41 on the north, West 133rd Street on the south, and TH 169 on the west. The run-on flows west off the bluffs to TH 169 ditch. At the TH 169 ditch, the run-on flows south into the South Subwatershed.

MN River Basin Subwatershed

A small portion of this project drains to the northwest where it eventually discharges to the Minnesota River. Runoff out of this subwatershed is limited as it goes through the gravel quarry first.

Method of Calculations

A preliminary hydrologic and hydraulic analysis was completed for the proposed stormwater management system. The project area was modeled in HydroCAD modeling software, which uses Natural Resources Conservation Service (NRCS) SCS Technical Release 55 methodology, consistent with Scott County Zoning Ordinance.

Soil Information

The NRCS web soil survey was used to determine soil conditions. The results from the project corridor indicate that soils are mainly sandy soils, generally hydrologic soil group A. The soil information indicates that the corridor and areas adjacent to the corridor are suitable for infiltration. Soil borings will be required prior to final design of the proposed best management practices to confirm that infiltration is feasible. Scott County Zoning Ordinance requires the use of an infiltration rate of 0.3 inches per hour for hydrologic soil group A soils. The County will allow a higher infiltration rate if percolation tests are completed. Conservatively, 0.3 inches per hour has been used for the modeling.

Curve number

The following curve numbers were used for modeling purposes based on the hydrologic soil group and existing land use. The MnDOT Drainage Manual and Scott County Zoning Ordinance was used for determining the appropriate curve number. Existing impervious surfaces for the offsite areas tributary to the proposed roadway were delineated based on the aerial images.

- A curve number of 98 was used for all impervious surfaces.
- A curve number of 30 was used for pervious surfaces within the proposed project right-of-way. This curve number is based on guidance from Scott County Zoning Ordinance for hydrologic soil group A.
- A curve number of 55 was used for pervious surfaces within the proposed project right-of-way for hydrologic soil group B.
- A curve number of 61 (HSG A) and 70 (HSG B) was used for rural land uses assuming row crop, contoured and terraced, good conditions.

Groundwater

No groundwater information is available for the project. Soil borings will be necessary in all proposed BMP locations to determine the depth to groundwater.

Wellhead Protection Areas

Scott County ordinances note that the Scott WMO Watershed Management Plan (WMP) governs restrictions related to infiltration practices. The entire project area lies within an area indicated to have medium bedrock susceptibility to groundwater contamination. Therefore, all proposed

infiltration features must incorporate pretreatment of stormwater. If infiltration rates are found to be in excess of five inches per hour, the Scott County Zoning Ordinance requires soil amendments to reduce the infiltration rate.

Rainfall

The Atlas 14 24-hour rainfall distribution for the project area were used for the stormwater modeling analysis of the site. The rainfall distribution was obtained from the NOAA website for the stormwater models.

Table 1 contains a summary of the rainfall totals used for the stormwater design events.

Table 1 – Design Rainfall Events

Design Event	Rainfall Total (in.)
2-Year	2.86
10-Year	4.24
100-Year	7.34

IV. WETLAND/FLOODPLAIN IMPACTS

Currently, there are two delineated wetlands within the footprint of the existing TH 169 dry basin and ditch upstream of the basin. This determination is a result of a completed Level 2 Wetland Delineation. An application for boundary and type approval is underway and waiting review from the Scott County SWCD as the LGU for the Wetland Conservation Act (WCA). The application was sent to the US Army Corps of Engineers for a jurisdictional determination. It is common for stormwater ponds, ditches, and infiltration basins to develop wetland characteristics over time. These areas are referred to as incidental wetlands.

The area in question is located in an area that has been historically upland and has only developed wetland characteristics due to the creation of a stormwater basin in the area (labeled Basin 2 on **Figure 2**). WCA does not apply to incidental wetlands. Under WCA, the definition of incidental wetland is a wetland that was created in non-wetland areas solely by actions, the purpose of which was not to create the wetland. The analysis conducted as part of this report concludes that impacts to the wetlands in question will fall under the No-Loss provision as an activity that does not affect a WCA jurisdictional wetland.

There are no FEMA floodplains located within the project boundaries. This project has no anticipated floodplain impacts.

V. STORMWATER MANAGEMENT

Controlling Stormwater Requirements

The following are the controlling stormwater management requirements for the proposed project:

Rate Control

- Peak discharge rates leaving the project site for the 2-, 10-, and 100-year events must not exceed pre-settlement rates (Scott County).
- Presettlement rate control does not apply to areas that do not change land cover. (Scott WMO Rule - Guidance)

Volume Retention/Infiltration Required

- The volume (considered as an instantaneous volume) from one inch of runoff over the area of the net new impervious surface must be retained on site (Scott County and NPDES).
- The BMPs providing the volume reduction must receive drainage from at least the amount of net new impervious surface.
- Pretreatment is required prior to discharge to infiltration BMPs

Water Quality

- Meeting the volume reduction satisfies the water quality requirements for this project (Scott County and NPDES) if calculations are provided that indicate 90% total suspended solids and 55% total phosphorus removal.

Table 2 below summarizes the impervious coverage changes for this project. **Figure 3** and **4** show the existing impervious and proposed impervious respectively. Existing impervious within the project right-of-way was assumed to be removed with the project.

Table 2: Impervious Data

Existing Impervious Surface [ac]	Proposed Impervious Surface [ac]	Net Change In Impervious Area [ac]	*Net Change In Impervious Area Plus 10% [ac]
26.0	30.6	4.6	5.1

*Due to the potential for design modifications, a 10 Percent increase in impervious area change is included.

The net new impervious, assuming a 10% increase, is **5.1 acres**.

Stormwater Summary for the Interchange & Frontage Road Projects

A combination of existing and proposed regional BMPs are proposed to meet the stormwater requirements.

- Existing Basin 1 will continue to be utilized for the TH 41 Basin Subwatershed.
- The proposed linear ditches adjacent to the Southwest Frontage Road will be utilized for rate control, infiltration and water quality treatment in the South Subwatershed.
- Basin 3 and Basin 2A are proposed in TH169 Subwatershed. Basin 2A is proposed adjacent to existing wetland Basin 2.

Interchange Stormwater Management Summary

A portion of Basin 2, located in the northeast quadrant of TH 169/TH 41/CSAH 78 intersection was delineated as a wetland (see **Figure 2**). However, review of record plans indicate that Basin 2

was constructed by the County as a regional infiltration basin. Additional discussion of the wetland delineation was provided previously in this report.

Since the WCA determination was not complete for Basin 2 with the finalizing of this document, Basin 2A was conservatively sized assuming Basin 2 could not be used for project compliance. Details of the sizing criteria for Basin 2A are defined later in this preliminary report. Basin 2A is the primary BMP for water quality, rate control and volume reduction for the project corridor.

Soil borings within the basin and further investigation of the delineated wetland are recommended to determine if the presence of the wetland or associated hydric soils preclude infiltration in Basin 2.

Storm sewer is proposed to collect and convey runoff from the elevated section of the interchange as well as from the access ramps to the existing basin to the northeast. **Figure 2** shows the locations in which storm sewer is proposed. The proposed storm sewer layouts included in this report depict a high-level overview of drainage patterns and do not constitute final locations of storm sewer or storm structures.

Frontage Roads Stormwater Management Summary

Northwest Frontage Road

The Northwest Frontage Road receives limited offsite runoff from the adjacent parcel to the west (see **Figure 2** for limits of offsite run-on). The road is entirely rural section and there are two low points proposed. Due to the limited offsite runoff, the proposed ditches adjacent to the roadway can be shallow, transitioning from one foot deep at the high points to two feet deep at the low points. Cross culverts are needed at the two points to convey the runoff from the west to east side of the frontage road. Ultimately, the runoff from the Northwest Frontage Road will discharge into the TH 169 ditch system, perpetuating the existing drainage pattern. As long as adequate freeboard is provided to TH 169 shoulder from the proposed flow in the ditch, it is not necessary to restrict the rates from the proposed Northwest Frontage Road runoff into the TH 169 ditch. The limited new impervious from the Northwest Frontage Road isn't suspected to cause an impact to the TH 169 ditch freeboard. As needed, ditch checks could be incorporated into the proposed Northwest Frontage Road ditches to provide rate control. The TH 169 ditch flows south to the Interchange where it will be collected in the proposed storm sewer system and routed to proposed Basin 2A. The ditches for the southerly 300-feet of the Northwest Frontage Road runoff will discharge into the existing frontage road ditch system.

Southwest Frontage Road

The Southwest Frontage Road also receives limited offsite runoff. The road is rural section. Due to the limited offsite runoff, the proposed ditches adjacent to the roadway can be shallow, transitioning from one foot deep at the high point to two feet deep at the low points. Cross culverts are needed at the intersection with the existing frontage road and at the south terminus of the frontage road. The frontage road drainage eventually discharges to the west into the development similar to the existing condition. It was assumed this was an acceptable design

since this flow pattern perpetuates the existing drainage patterns and ditch checks are proposed for rate control and water quality treatment of the proposed runoff.

Southeast Frontage Road

The Southeast Frontage Road is the most extensive of the proposed frontage roads. It receives runoff from the east from the bluffs. The majority of the roadway is urban; however a section between 250+00 and 260+00 (Venura Court) will be rural. The storm sewer and catch basin spacing for the urban section will need to account for the run-on from the east. The ditches for the rural section can be shallow due to limited offsite runoff. The runoff from the Southeast Frontage Road is tributary to a proposed Basin 3, which provides infiltration volume for the new impervious. The proposed storm sewer that conveys the offsite run-on from the east of Southeast Frontage Road continues under CSAH 78 into Basin 2.

Rate Control
There are three points that discharge offsite:

- South Subwatershed
- TH 41 existing Basin 1
- Proposed Basin 2A/2 complex

<u>TH 41 Subwatershed (Basin 1)</u>
There is a net reduction in impervious to the TH 41 existing Basin 1. Due to the impervious surface reduction, the proposed discharge rates are less than existing for this location.

<u>South Subwatershed</u>
The proposed ditch checks adjacent to the Southwest Frontage Road have not been modeled due to the small tributary area. However, it is expected that the proposed ditch checks will be sufficient to restrict the proposed discharge rates to less than existing.

<u>TH 169 Subwatershed (Basin 2/2A)</u>
Existing Basin 2 outlet is as follows, based on the record plan:

- 4-inch orifice low flow outlet at 798.0
- Once the orifice reaches capacity, the pond overflows the embankment to the northeast at elevation 799.3.

It is recommended that the 4-inch orifice outlet restriction be evaluated for replacement with the final design of the project due to the maintenance issues with the small orifice size and large upstream tributary area. We have assumed for the existing and proposed modeling that the Basin 2 starting elevation is 798. However, the basin does appear to drain down to approximately elevation 795.

The overall footprint and flood storage in Basin 2 and 2A accounts for the loss of flood storage in the existing basin due to the TH 169 ramp and the loss of the existing pond in the southeast corner of the Interchange.

Tables 3 and 4 provide a comparison between the existing and proposed discharge rates and volumes from Basin 2A/2 and the existing overflow point into Shakopee. The discharge rate comparison from Basin 2A/2 was made at the existing outlet.

Table 3: Discharge Rate and Volume Comparison Basin 2/2A

Storm Event	Existing		Proposed	
	Discharge (cfs)	Volume (ac-ft)	Discharge (cfs)	Volume (ac-ft)
2-year	58.7	8.0	20.6	9.6
10-year	142.9	14.8	77.6	16.7
100-year	350.5	41.8	240	34.9
Snowmelt	151.5	73.5	91.2	45.0

As shown in **Table 3**, the rate control requirement is met with the proposed BMPs. The rate control requirement controls the size of Basin 2/2A due to the elimination of a portion of the existing storage with the proposed project and large size of the offsite tributary area.

Table 4: Discharge Rate and Volume Comparison Overflow Point to Shakopee

Storm Event	Existing		Proposed	
	Discharge (cfs)	Volume (ac-ft)	Discharge (cfs)	Volume (ac-ft)
2-year	0	0	0	0
10-year	4.5	3.9	0	0
100-year	350	41.3	140	52.5
Snowmelt	280	155	212	107

There is less frequent overtopping for the proposed condition. For existing conditions, overtopping occurs for the 10-year and greater events. For proposed conditions, overtopping occurs for the 25-year and greater events. There is a slight increase in the runoff volume for the 100-year event for proposed conditions. However, this is mitigated by the reduction in the frequency of overtopping. The peak discharge rate is reduced from existing for all modeled storm events. Proposed conditions for the critical snowmelt events also results in a reduction in peak discharge and volume.

Refer to **Appendix B** for detailed Hydrocad calculations.

The high water level of Basin 2A/2 complex is 801.3 for both existing and proposed conditions (see **Figures 1 and 2**). As noted above, this high water level is based on an outlet elevation of 798 and assuming no infiltration in the existing basin 2. This is a conservative assumption as the aerials indicate that the basin does typically drawdown. The pertinent elevations of adjacent infrastructure are shown below:

- Basin 2/2A 100-year high water level – 801.3
- Northeast entrance ramp centerline low point station 31+00 – approximately 803.0
- East bound centerline TH 41 at Interchange station 127+00 – approximately 804.8
- Basin 2/2A emergency overflow elevation to the northwest – 800.6

There is adequate freeboard to the entrance ramp to meet MnDOT requirements. <u>The emergency overflow elevation should be surveyed since it plays a critical role in setting the high water level of the Basin 2/2A complex.</u>

Water Quality

Water quality treatment is provided in the form of pretreatment upstream of the proposed regional infiltration basins.

- No modifications are proposed to existing Basin 1. The record plans indicate that pretreatment is provided upstream of the infiltration basin.
- Pretreatment upstream of Basin 3 is provided in a forebay upstream of the infiltration basin.
- Pretreatment upstream of Basin 2A and 2 is provided in a forebay upstream of the infiltration basin.

Pretreatment was sized based on Minnesota Stormwater Manual guidance which recommends 25% of the water quality volume. Based on the net new impervious upstream of Basin 2/2A, the approximate pretreatment volume is 0.1 ac-ft. Assuming a four foot average depth, this equates to an approximate footprint of 1,100 square feet for pretreatment. The footprint of Basin 2A shown on **Figure 2** shows this pretreatment area.

Volume Control

The net new impervious shown in **Table 2** is 5.1 acres. This correlates to 0.43 ac-ft (18,513 cubic feet) of infiltration volume. Using an infiltration rate of 0.3 in/hr based on Scott County Zoning Ordinance requirement, the approximate footprint required for infiltration is 0.35 acres.

There is a net reduction of 0.8 acres of impervious tributary to Basin 1. No additional infiltration volume or flood storage are needed due to the project.

The proposed footprint of Basin 2A and 3 is sufficient to meet the infiltration requirement for the net new impervious from the project. The following design parameters guided the sizing of Basin 2A infiltration volume:

- Scott County requires three feet of separation from the seasonal groundwater to the bottom of the infiltration basin. Assumed the seasonal groundwater elevation to be 795 based on the delineated wetland edge. The infiltration basin bottom was set at 798 based on this requirement. Borings will be needed to confirm the actual seasonal groundwater elevation.
- As noted previously, conservatively assumed the delineated wetland is not incidental pending decision from the LGU

The following design parameters guided the sizing of Basin 3:

- Bottom of Basin 3 at five feet below Frontage Road elevation at station 258+00 (road elevation 815.6, Basin 3 bottom 810.6).
- Basin 3 outlet elevation 811.8 (assuming a maximum depth of 1.2 feet to meet the 48-hour drawdown requirement, using the Scott County infiltration rate of 0.3 in/hr)
- Footprint maximized on available land area
- Outlet sized based on providing a minimum of one-foot of freeboard to the shoulder of the proposed Frontage Road.

Storm Sewer

Anticipated storm sewer alignments are shown on **Figure 2**. Storm sewer sizing and catch basin spacing must be consistent with MnDOT Technical Memorandum 16-05-B-02, dated September 13, 2016 for work on TH 169 and TH 41. CSAH 78 storm sewer sizing and spread calculations

must follow State Aid criteria. The frontage roads will be required to meet either Scott County Zoning Ordinance or State Aid criteria depending on their classification.

VI. PERMITS

A Scott County grading permit will be required for this project. This permit includes stormwater management.

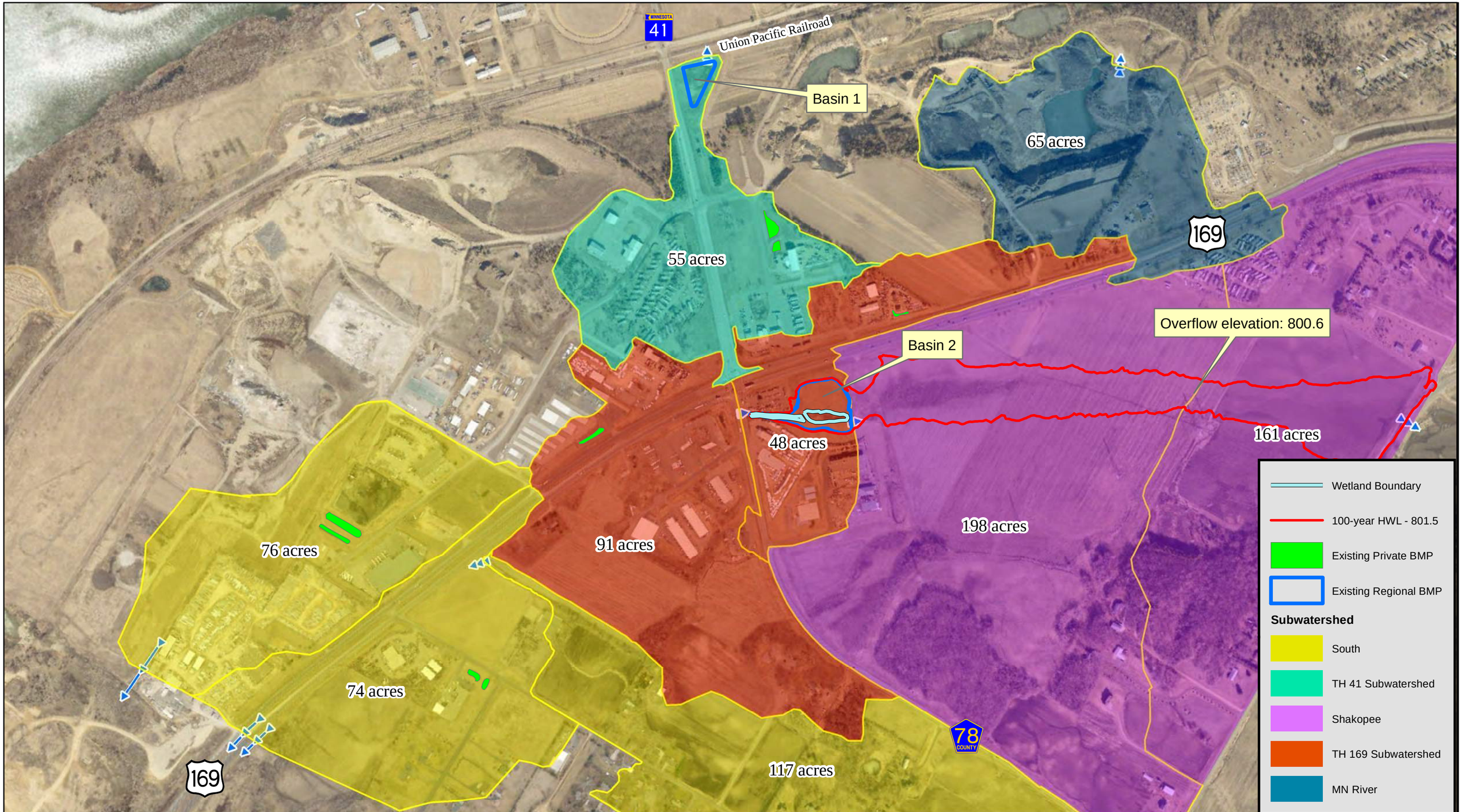
An NPDES General Permit for Construction Activity will be required from the MPCA.

VII. SUMMARY

The proposed stormwater management system, which includes utilizing the existing stormwater basin and the storm sewer system, complies with the requirements set forth by Scott County, MnDOT, and MPCA requirements. If modifications to this plan or any of the construction plans are undertaken, then the water resources plan and design must be reviewed for compliance with the project requirements.

APPENDIX A

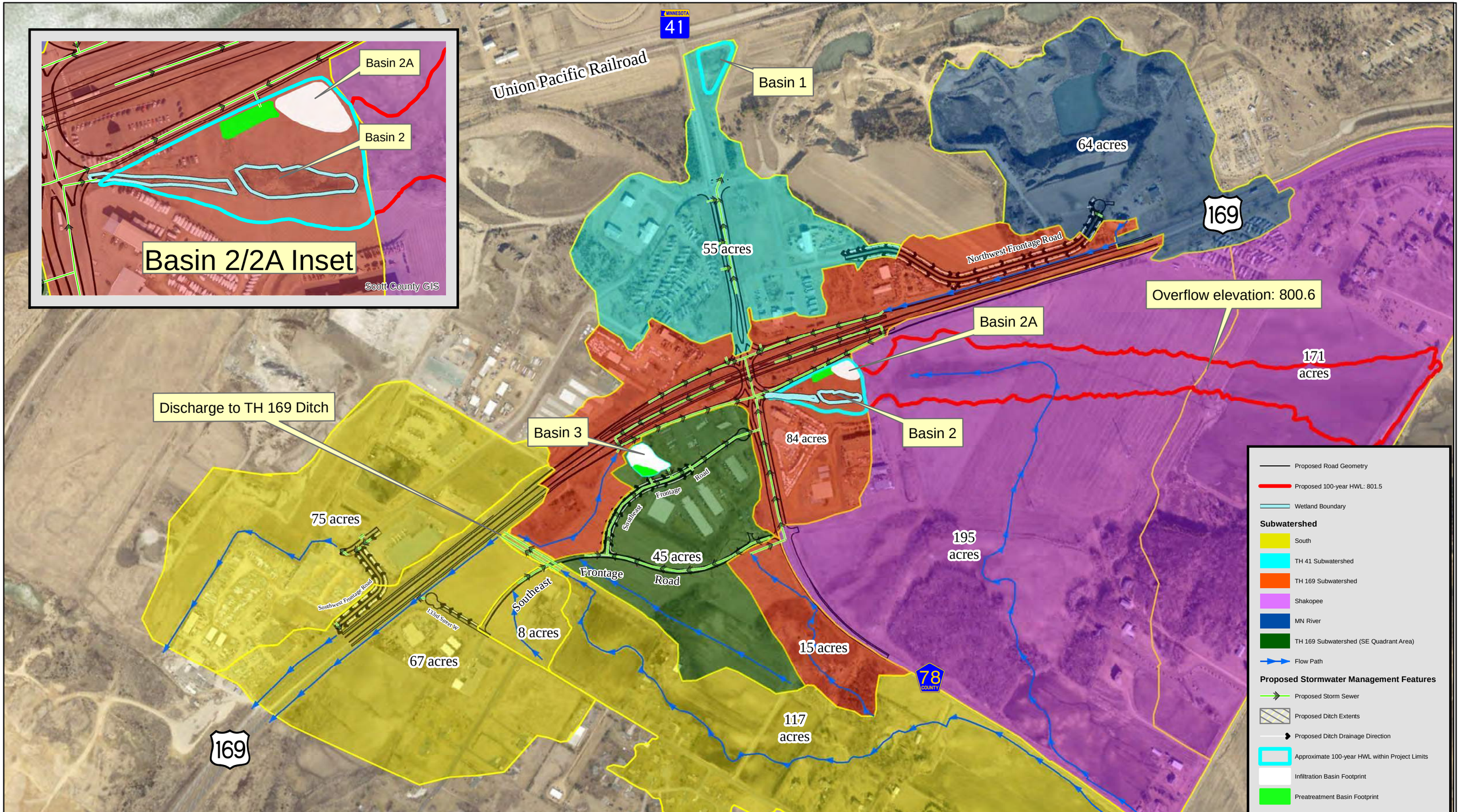
Figure 1 – Existing Conditions
Figure 2 – Proposed Conditions
Figure 3 – Existing Impervious Surface
Figure 4 – Proposed Impervious Surface
Figure 5 – Proposed Conditions Overall



Trunk Highway 169 Interchange Project at Trunk Highway 41/CSAH 78

Figure 1: Existing Conditions

Scott County, MN



Trunk Highway 169 Interchange Project at Trunk Highway 41/CSAH 78

Figure 2: Proposed Conditions

Scott County, MN

Trunk Highway 169 Interchange Project at Trunk Highway 41/CSAH 78

Figure 3: Existing Impervious Surface

Scott County, MN

500 250 0 500 Feet

N

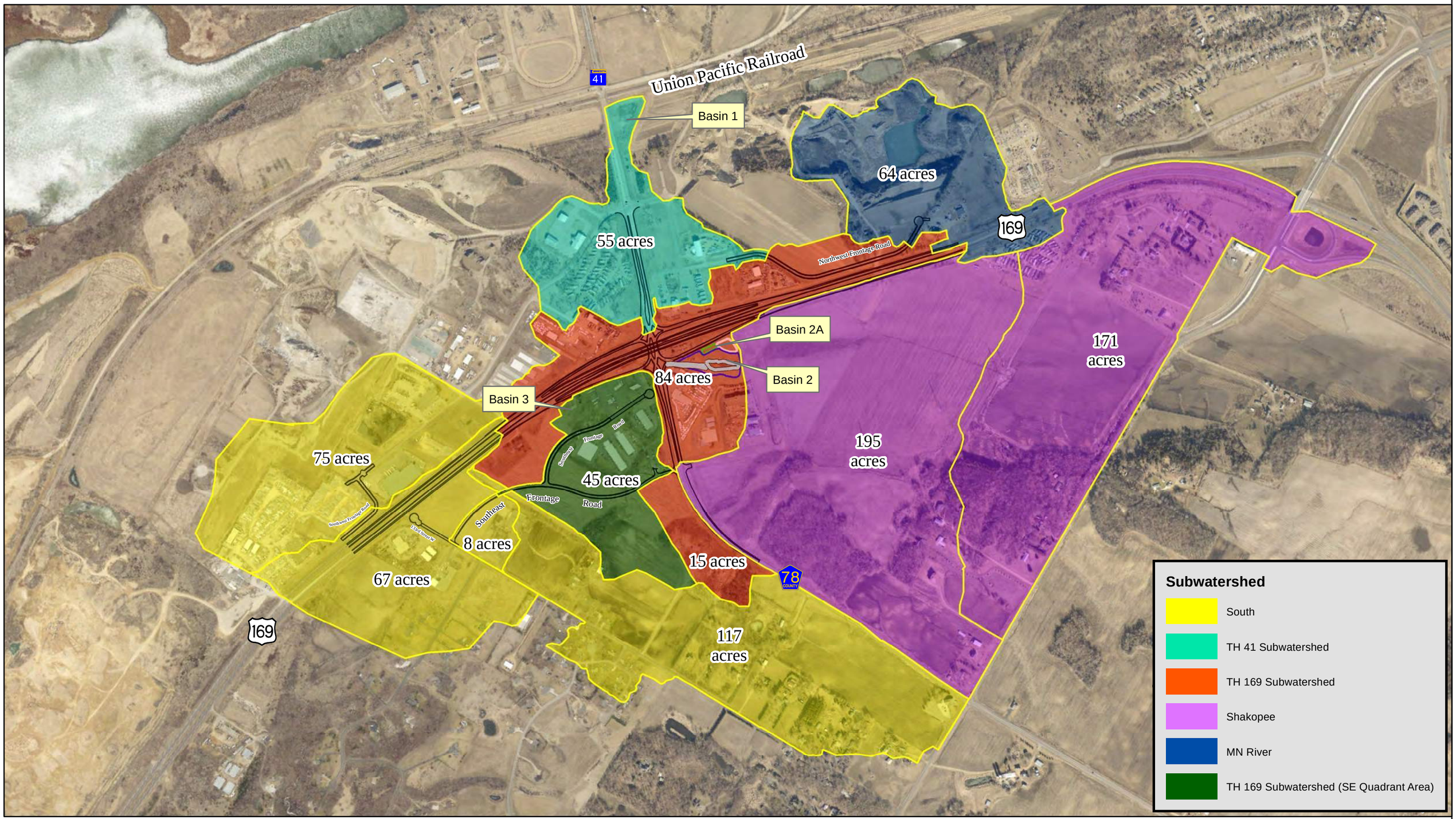
Trunk Highway 169 Interchange Project at Trunk Highway 41/CSAH 78

Figure 4: Proposed Impervious Surface

Scott County, MN

500 250 0 500 Feet

N



Trunk Highway 169 Interchange Project at Trunk Highway 41/CSAH 78

Figure 5: Proposed Conditions Overall

Scott County, MN

PRELIMINARY (30 PERCENT) DRAINAGE REPORT

TRUNK HIGHWAY 169 / CSAH 14 OVERPASS PROJECT

March 15, 2017

Prepared for:
Scott County
200 Fourth Avenue West
Shakopee, MN 55379

WSB PROJECT NO. 3212-010

PRELIMINARY (30 PERCENT) DRAINAGE DESIGN REPORT

Trunk Highway 169 / CSAH 14 Overpass Project
Louisville Township, Scott County, Minnesota

Prepared For:

Scott County, Minnesota

March 15, 2017

Prepared By:

WSB & Associates, Inc.
701 Xenia Avenue S., Suite 300
Minneapolis, MN 55416
(763) 541-4800
(763) 541-1700 (Fax)

CERTIFICATION

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

Earth Evans, PE

Date: March 15, 2017 Reg. No. 44235

Quality Control Review By:

Jeffry S. Sandberg, PE

Date: March 15, 2017 Reg. No. 25393

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Appendix D – Wetland Delineation Report

Note: Appendices B through D of this attachment may be reviewed upon request.

I. INTRODUCTION

Scott County contracted WSB & Associates, Inc. (WSB) to complete the drainage and stormwater management design for construction of frontage roads, County State Aid Highway (CSAH) 14 overpass and turn lanes along Trunk Highway (TH) 169 located in Louisville Township, Scott County.

The project lies within the borders of the Scott Watershed Management Organization (Scott WMO). The project area receives offsite drainage from the north, east, and south. The majority of offsite drainage originates from within the Scott WMO's boundaries, though small portions of offsite drainage originate within the boundaries of the Lower Minnesota River Watershed District (LMRWD) and the Prior Lake-Spring Lake Watershed District (PLSLWD). **Figure 1** in **Appendix A** shows the Watershed District boundaries in relation to the project. The proposed project limits do not extend into LMRWD or PLSLWD; however, runoff from these watershed districts does flow through the project limits.

Scott County is the Local Government Unit (LGU) for this project. The stormwater management design is compliant with Scott County Zoning Ordinance.

The drainage design in this report is consistent with the stormwater requirements of Scott County, MnDOT, and the MPCA. The proposed storm sewer and stormwater management plans are based on layout and roadway profile elevations dated January 18, 2017.

The following is a list of the other permits that are required for the project.

Permit/Approval	Agency	Action Required
Federal		
Section 106 (Historic/Archaeological)	Tribal Historic Preservation Office	Consultation
Section 106 (Historic/Archaeological)	FHWA	Consultation
Section 404 Authorization – General Permit (RGP-004-MN)	USACE	General Permit
State		
Categorical Exclusion	FHWA and MnDOT	Approval
EAW	Environmental Quality Board	Approval
Geometric Layout	MnDOT	Approval
Construction Plans	MnDOT	Approval
Controlled Access	MnDOT	Approval
Highway Interchange Request	MnDOT	Approval
Right of Way Permit	MnDOT	Permit
National Pollutant Discharge Elimination System Construction Stormwater Permit	MPCA	Permit
Wetland Conservation Act	MnDOT with review by BWSR	Approval

Replacement Plan or No Loss, depending on wetland status	and DNR if necessary	
Section 401	MPCA	Approval
Well Sealing Permit	Minnesota Department of Health	Permit
Public Waters General Permit	DNR	Permit
Water Appropriations Permit	DNR	Permit
Regional/Local		
Highway Interchange Request	Metropolitan Council	Approval
Watershed Management Organization	Scott County	Approval/Permit
Construction Plans	Scott County	Approval
Construction Plans	Louisville Township	Approval
Right of Way Work Permit	Scott County	Permit

II. SITE DESCRIPTION

TH 169 in the project area is a rural roadway with ditches collecting and conveying drainage from the roadway. **Figure 2** in **Appendix A** shows the existing drainage patterns for the project site, including the significant offsite tributary areas. **Figures 3, 4 and 7** show further detail in the project area and the existing culverts under TH 169.

LiDAR elevation data was used to analyze existing drainage patterns within and adjacent to the proposed project area. The majority of the existing culverts were surveyed and this information was incorporated into the modeling.

III. HYDROLOGY AND HYDRAULICS

III.1 Drainage Area Boundaries

Upper Subwatershed

The northern portion of this project is 1,320 acres of mostly farmland and woods with some rural residential (**Figure 3**). A series of channels and an existing ditch east of TH 169 convey water from this large section of land to two depressions south of W 133rd Street (U1E and U2E on **Figure 4**). The outlet for U1E/U2E is three 48-inch equivalent arch culverts under TH 169 that discharge to the west. The existing conditions high water levels of U1E and U2E are approximately 801.6 and 799.5, respectively. The high water level of U1E overtops TH 169 and inundates a portion of the existing property.

Middle Subwatershed

The drainage area containing the central portion of this project is 241 acres of farmland, woods, and businesses. This area generally drains south and west. The area east of TH 169 is detained in wetland M2E (**Figure 7**) before it outlets west under the road through an existing culvert, north of CSAH 14. This drainage is then detained in wetland M4E. In high flow events, this wetland backs up and discharges overland into the west TH 169 ditch that flows to the south.

Mulch Store Subwatershed

The southwestern portion of the project is 38 acres of forest and business. This area generally drains north toward an existing landlocked basin (MS1E on **Figure 7**) north of CSAH 14, between the Union Pacific Railroad and TH 169.

Picha Creek Subwatershed

On the south project limits there are two 10-foot by 6-foot box culverts under TH 169 south of CSAH 14 (identified on **Figure 7**). Previous flooding of TH 169 prompted analysis of this location. The subwatershed contributing to these culverts is 9,478 acres. It is largely farmland with some forests and rural residential areas. A series of streams, roadside ditches, and agricultural ditches conveys water to the culverts. After passing through the box culverts, the drainage is conveyed through a series of culverts under the Union Pacific Railroad tracks before it outlets to Sand Creek which is impaired for fish bioassessments and turbidity and outlets into the Minnesota River. Analysis of this area is covered in a separate memo.

III.2 Method of Calculations

A preliminary hydrologic and hydraulic analysis was completed for the proposed stormwater management system. The project area was modeled in HydroCAD modeling software, which uses Natural Resources Conservation Service (NRCS) SCS Technical Release 55 methodology, consistent with Scott County Zoning Ordinance.

III.3 Soil Information

The NRCS web soil survey was used to determine soil conditions. The results from the project corridor indicate that soils are mainly sandy soils, generally hydrologic soil group A. The soil information indicates that the corridor and areas adjacent to the corridor are suitable for infiltration. Scott County Zoning Ordinance requires the use of an infiltration rate of 0.30 and 0.15 inches per hour for hydrologic soil group A and B respectively unless soil testing indicates a different rate.

Soil borings will be required prior to final design of the proposed best management practices to confirm that infiltration is feasible.

III.4 Curve number

The curve numbers in **Table 1** were used for modeling purposes based on the hydrologic soil group and existing land use. The MnDOT Drainage Manual and Scott County Zoning Ordinance was used for determining the appropriate curve number. Existing impervious surfaces for the offsite areas tributary to the proposed roadway were delineated based on the aerial images.

- A curve number of 98 was used for all impervious surfaces.

- Stoney land, which was defined in the NRCS web soil survey as a soil type but was not classified with a hydrologic soil group, was considered to be HSG A due to the sandy nature of soil in those areas.
- Pre-settlement conditions were assumed within the entire right-of-way of the new frontage roads and in the areas within the right-of-way of TH 169 where pervious surface is being replaced with impervious surface.
- Rural land uses were assumed to be either row crops (contoured and terraced, good condition), woods (fair condition), woods/grass combination (fair condition), or brush (fair condition).

Table 1: Curve Numbers

Hydrologic Soil Group	Pre-settlement Conditions Curve Number	Row Crops Curve Number	Woods Curve Number	Woods/Grass Curve Number	Brush Curve Number
A	30	62	36	43	35
B	55	71	60	65	56
D	71	81	79	82	77

III.5 Groundwater

No groundwater information is available for the project. Soil borings will be necessary in all proposed BMP locations to determine the depth to groundwater.

III.6 Wellhead Protection Areas

Scott County ordinances note that the Scott WMO Comprehensive Water Resource Management Plan governs restrictions related to infiltration practices. The entire project area lies within an area indicated to have medium bedrock susceptibility to groundwater contamination. Therefore, all proposed infiltration features must incorporate pretreatment of stormwater.

III.7 Rainfall

The Atlas 14 24-hour rainfall distribution for the project area was used for the stormwater modeling analysis of the site. The rainfall distribution was obtained from the NOAA website for the stormwater models.

Table 2 contains a summary of the rainfall totals used for the stormwater design events.

Table 2: Design Rainfall Events

Design Event	Rainfall Total (in.)
2-Year	2.86
10-Year	4.24
100-Year	7.34

IV. WETLAND/FLOODPLAIN IMPACTS

There are six wetlands, one wet ditch and one stream within the footprint of the proposed TH 169/CSAH 14 Overpass Project. This determination is a result of a completed Level 2 Wetland Delineation. An application (**Appendix D**) for boundary and type approval is currently under review by the Scott County SWCD as the LGU for the Wetland Conservation Act (WCA). The application was also sent to the US Army Corps of Engineers for a jurisdictional determination.

A portion of the Picha Creek subwatershed is designated FEMA Zone A floodplain. Additional discussion of this area is provided in a separate memo.

V. STORMWATER MANAGEMENT

V.1 Controlling Stormwater Requirements

The following are the controlling stormwater management requirements for the proposed project:

Rate Control

- Peak discharge rates leaving the project site for the 2-, 10-, and 100-year events must not exceed pre-settlement rates (Scott County).
- Presettlement rate control does not apply to areas that do not change land cover. (Scott WMO Rule - Guidance)

Volume Retention/Infiltration Required

- The volume (considered as an instantaneous volume) from one inch of runoff over the area of the net new impervious surface must be retained on site (Scott County and NPDES).
- The BMPs providing the volume reduction must receive drainage from at least the amount of net new impervious surface.
- Pretreatment is required prior to discharge to infiltration BMPs.

Water Quality

- Meeting the volume reduction satisfies the water quality requirements for this project (Scott County and NPDES).

There are 16 acres of proposed new impervious. It was conservatively assumed that the existing gravel roads that overlap the proposed frontage road impervious would be replaced and realigned post project and therefore we have assumed no reduction in existing impervious surfaces.

The design overtopping was based on MnDOT Drainage Manual. The guidance determines overtopping frequency based on ADT for culverts larger than 48-inches in diameter. The ADT was based on the layout dated January 18, 2017.

The following sections describe the proposed methods for compliance with the rate control, volume control, and water quality requirements.

V.2 Rate Control

Upper Subwatershed

Proposed Drainage Patterns
The proposed East Frontage Road results in approximately 27 ac-ft of fill in existing depressions U1E and U2E (**Figure 4**). Proposed Louisville Infiltration Basin (**Figures 6A-6B**) mitigates the flood storage impacts and provides water quality treatment for the new impervious from the project.

The East Frontage Road from 130th Street to 133rd Street (road station 195+00 to 166+50) will be urban section. Runoff will be collected in storm sewer and routed to Louisville Infiltration Basin.

The East Frontage Road from station 166+50 to 146+00 is rural section. TH 169 ditch will be used to convey the runoff from the west side of the frontage road. The TH 169 ditch will need to be expanded to provide sufficient capacity for the increase in runoff from the proposed frontage road. A four-foot-wide ditch at 4:1 side slope is required to convey the runoff from the east side of the frontage road. The east ditch is routed to existing basin U2E. The TH 169 ditch will continue to outlet via the existing three culverts under the highway.

The proposed preliminary grading for Louisville Infiltration Basin is shown on **Figures 6A-6B**.

Design Constraints
As noted previously, the high water level overtops TH 169 for existing conditions for the 100-year event. The high water level is driven by several factors:

- **Peak discharge** – Major storage areas in the upstream 1,320-acre drainage area were modeled. Survey of the primary culverts was incorporated into the model. **Figure 5** shows the upstream modeled drainage areas. There is a flow split that occurs upstream of Louisville Infiltration Basin as labeled on **Figures 6A-6B**. For proposed conditions, this flow split will be eliminated and the upstream runoff will discharge directly into Louisville Infiltration Basin only.

- **Outlet Capacity under TH 169** – The primary outlets for the Upper Subwatershed are three 48-inch equivalent arch pipes under TH 169 at approximate invert 795.0. The culverts are all nearly flat (0.04% slope).

- **Downstream Overflow Elevation** – The primary overflow offsite for the Upper Subwatershed is labeled "Primary Overflow for Upper Drainage Area" on **Figures 6A-6B**. There is no piped outlet to the west. Runoff must travel over the existing access road. The elevation of the overflow is approximately 797.0. The elevation of the overflow point only provides three feet of separation from the shoulder elevation of TH 169 at the low point.

Analysis
Table 3 summarizes the critical elevations and design criteria.

Table 3 – Upper Subwatershed Critical Elevations and Design Criteria

TH 169 shoulder elevation	800.96
TH 169 Northbound Overtopping elevation	801.25
Proposed East Frontage Road centerline low point	800.2
TH 169 Allowable overtopping	50-year event
East Frontage Road Allowable overtopping	25-year event
Louisville Infiltration Basin normal water level	786.0*
South Pond U2E Normal water level	792.0

*Assumed infiltration would continue to occur in U1P due to the sandy soils

If soil borings indicate that the soils are not conducive to infiltration in Louisville Infiltration Basin, the footprint may need to be expanded in order to meet the rate control requirement.

Table 4A and **4B** summarize the existing and proposed high water levels for each scenario for the Louisville Infiltration Basin and U2E, respectively.

Table 4A – Louisville Infiltration Basin
Existing and Proposed Water Level Comparison

Design Event	Existing	Proposed	
		TH169 NB Ditch	Louisville Infiltration Basin
25-year	798.2	797.8	798.3
50-year	799.4	798.6	799.7
100-year	801.2	800.1	800.4

Table 4B – U2E
Existing and Proposed Water Level Comparison

Design Event	Existing	Proposed
100-year	800.8	800.3

The roadway overtopping requirement is met for both roads.

- TH 169 road elevation northbound 801.25 (surveyed) in comparison to 50-year HWL of 798.6
- East Frontage Road elevation 801.0 in comparison to 25-year HWL of 798.3

Culvert replacement is not required unless the existing centerline culverts are deemed by MnDOT to be structurally deficient.

Table 5 summarizes the existing and proposed discharge rates for the design events under TH 169.

Table 5 – Existing and Proposed Discharge Rate Comparison

Design Event	Existing	Proposed
2-year	0	***23.7***
10-year	56.8	48.2
100-year	279.9	243.8

The italicized red text in Table 5 indicates discharge rate that exceeds existing conditions. The slight increase in 2-year peak discharge can be mitigated with design refinements and outlet structure modifications.

Summary
The following summarizes the analysis and recommendations for the Upper Subwatershed:

- MnDOT input is needed on the condition of the existing culverts to determine if it is necessary to replace.
- Geotechnical analysis of the infiltration rate in the Louisville Infiltration Basin is underway. The geotechnical recommendations and soil borings will be used to determine actual infiltration rates.

Mulch Store Subwatershed

The portion of the project within the Mulch Store Subwatershed is tributary to an existing landlocked wetland, MS2E. The entire wetland will be impacted based on the proposed West Frontage Road alignment. The West Frontage Road south of 14 Overpass is urban section. The proposed storm sewer will be routed to Limestone Infiltration Basin.

Limestone Infiltration Basin is located in the triangular parcel between the Union Pacific Railroad Spur and Union Pacific Railroad, **Figure 8**. The proposed BMP is landlocked. The 100-year high water level is 734.6. This location was chosen to take advantage of a parcel that would be a challenge to develop due to maintenance access constraints with the two railroads.

Summary of recommendations and analysis for Mulch Store Subwatershed:

- Coordinate with UP Railroad to utilize the existing Mulch Store access route across the Spur for maintenance and construction access to the proposed pond.
- Coordinate with UP Railroad for jacking the outlet pipe under the tracks
- Geotechnical analysis is underway to determine the infiltration rates and preliminary investigation of potential for contamination on the proposed pond parcel

Middle and Picha Creek Subwatersheds

Proposed Drainage Patterns
The proposed frontage roads are all rural section within the Middle and Picha Creek Subwatersheds.

Conveyance and rate control will be provided in the proposed ditch section via ditch checks. A 4-foot wide ditch with 4:1 side slopes is required for all frontage roads, except and 8-foot wide ditch bottom is required for the following segments (to convey the offsite runoff from Middle 1):

- east side of the East Frontage Road from approximate road station 126+00 to 102+00
- 150th Street south ditch from CSAH 14 to TH169 ditch
- TH 169 ditch from 150th Street south to Picha Creek

Middle 1 Diversion
The proposed condition Middle 1 subwatershed (approximately 126 acres, **Figure 8**) will be diverted south through the TH 169 ditch to Picha Creek instead of west into M2E and M4E for the following reasons:

- Reduce impacts to the property on the north and south sides of CSAH 14 Overpass
- Reduce existing flooding of the property on the north side of CSAH 14 Overpass
- Minimize runoff to landlocked M4E due to inability to provide an outlet
- Reduce infrastructure costs (maintaining the existing flow path requires construction of a new box culvert under TH 169 and under CSAH 14 Overpass)

Middle 1 diversion starts at the northeast quadrant of the East Frontage Road and CSAH 14 (150th Street). Proposed Picha Wet Pond (**Figure 8**) provides rate control and wet volume to reduce the downstream sediment load for the offsite tributary area. The 54-inch outlet from Picha Wet Pond discharges south into a proposed ditch that follows 150th Street to TH 169 ditch. The following ditch parameters are required:

- Minimum 4-feet deep to convey 100-year discharge (see attached ditch flow calculations in **Appendix C**)
- Minimum 8-foot wide ditch bottom
- Minimum 3:1 side slopes (4:1 preferred)
- The critical ditch elevations are shown on **Figure 8**
- The ditch slope from 150th Street to the Picha Creek culvert is less than the MnDOT Drainage Manual suggested minimum. However, the existing ditch is also flat and standing water has not been an issue due to the existing sandy soils

There is an increase in the peak discharge to the Picha Creek culverts under TH 169 due to the diversion of runoff from Middle 1 of approximately 40 cfs for the 100-year event. The increase in discharge rate is generated due to the diversion of flow that previously discharged west into M4E.

Analysis
Table 6 lists the existing and proposed high water levels for the existing depressions.

Table 6: High Water Level Comparison

Scenario	M2E		M4E		PC2E	
	Existing	Proposed	Existing	Proposed	Existing	Proposed
100-year HWL	750.2	746.8	744.2	741.5	748.3	747.0

There is a net reduction in high water level at each location due to the diversion of Middle 1. Both wetlands M2E and M4E were classified as low susceptibility and the reduction in tributary runoff should not impact the wetland functions or values.

V.3 Water Quality

Water quality treatment is provided in the proposed rural ditch sections and BMPs (Louisville Infiltration Basin, Limestone Infiltration Basin and Picha Wet Pond).

V.4 Volume Control

The net new impervious is 16 acres. This correlates to 1.33 acre-feet (58,080 cubic feet) of required infiltration volume. Using an infiltration rate of 0.15 inches per hour based on Scott County Zoning Ordinance requirement for B soils, the approximate footprint required for infiltration is 2.22 acres.

The volume control requirement will be met with the following BMPs:

- Upper Subwatershed: Louisville Infiltration Basin.
- Mulch Store Subwatershed: Proposed Limestone Infiltration Basin is landlocked and infiltration is the only outlet. The footprint was sized to maximize the available land area to improve the drawdown time of the BMP.
- Middle Subwatershed: Primarily ditch checks are proposed. The Scott County requirement is one inch of runoff volume over the impervious surfaces. For a sample fifty-foot length of roadway this correlates to 200 CF of runoff volume. The adjacent ditches, assuming a four-foot-wide and one-foot-high ditch check, provide approximately 200 CF of infiltration volume. Therefore, the ditch checks and rural section will be sufficient to meet the infiltration requirement.

V.5 Storm Sewer

Anticipated storm sewer alignments are shown on **Figures 6A and 8** for the small portion of the project that is urban. Storm sewer sizing and catch basin spacing must be consistent with State Aid requirements and Scott County Zoning Ordinance for the urban sections of the East and West Frontage Roads.

VI. SUMMARY AND RECOMMENDATIONS

The proposed stormwater management system, which includes regional BMPs and ditch checks in the rural roadways, complies with the requirements set forth by Scott County, MnDOT, and MPCA requirements. If modifications to this plan or any of the construction plans are undertaken, then the water resources plan and design must be reviewed for compliance with the project requirements.

The following recommendations are given based on the analysis of the TH 169/CSAH 14 Overpass project:

- Coordinate with UP Railroad to utilize the existing Mulch Store access route across the Spur for maintenance and construction access to the proposed Limestone Infiltration Basin.
- Coordinate with UP Railroad for jacking the Mulch Store outlet pipe under the tracks

APPENDIX A

Figures

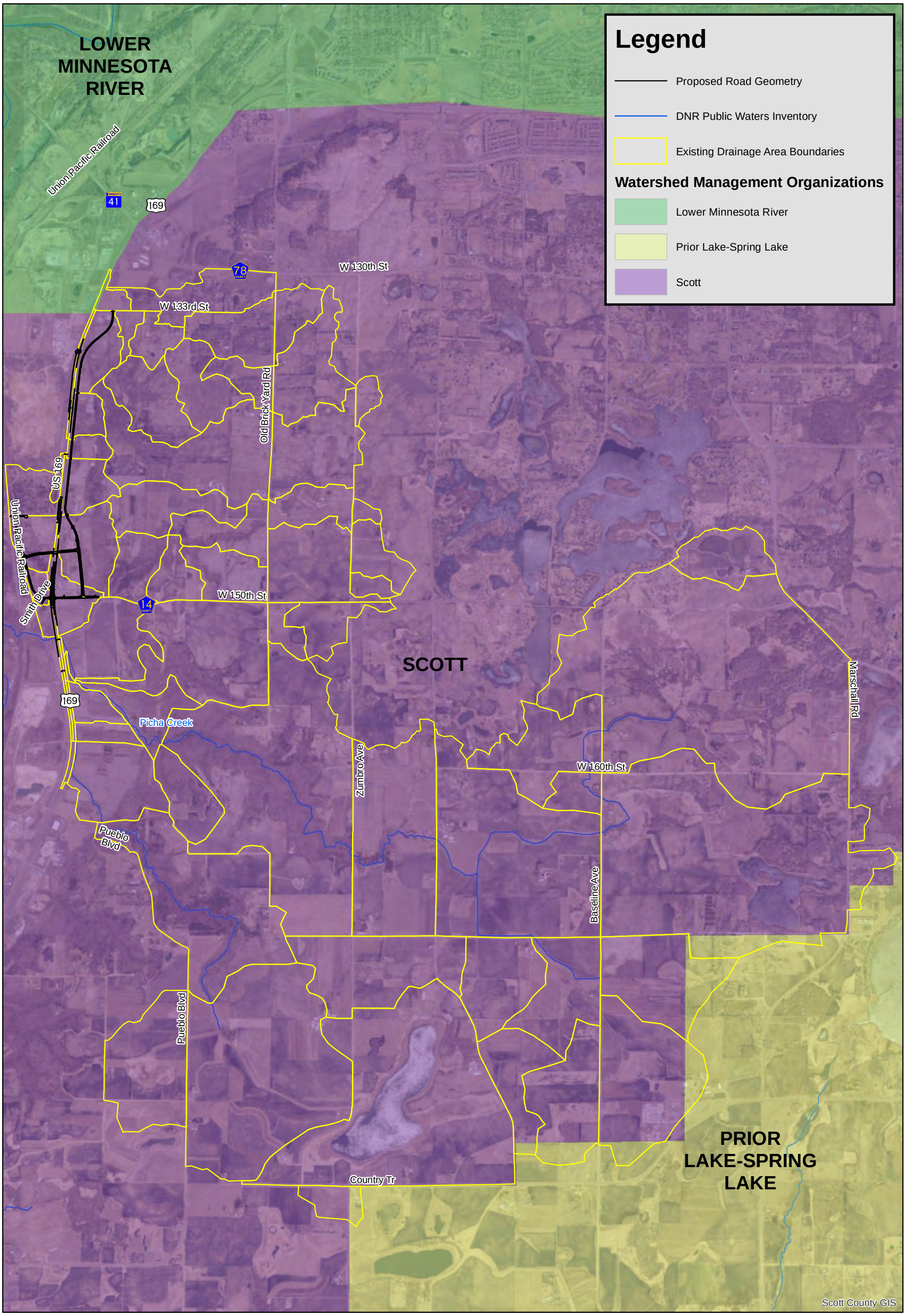
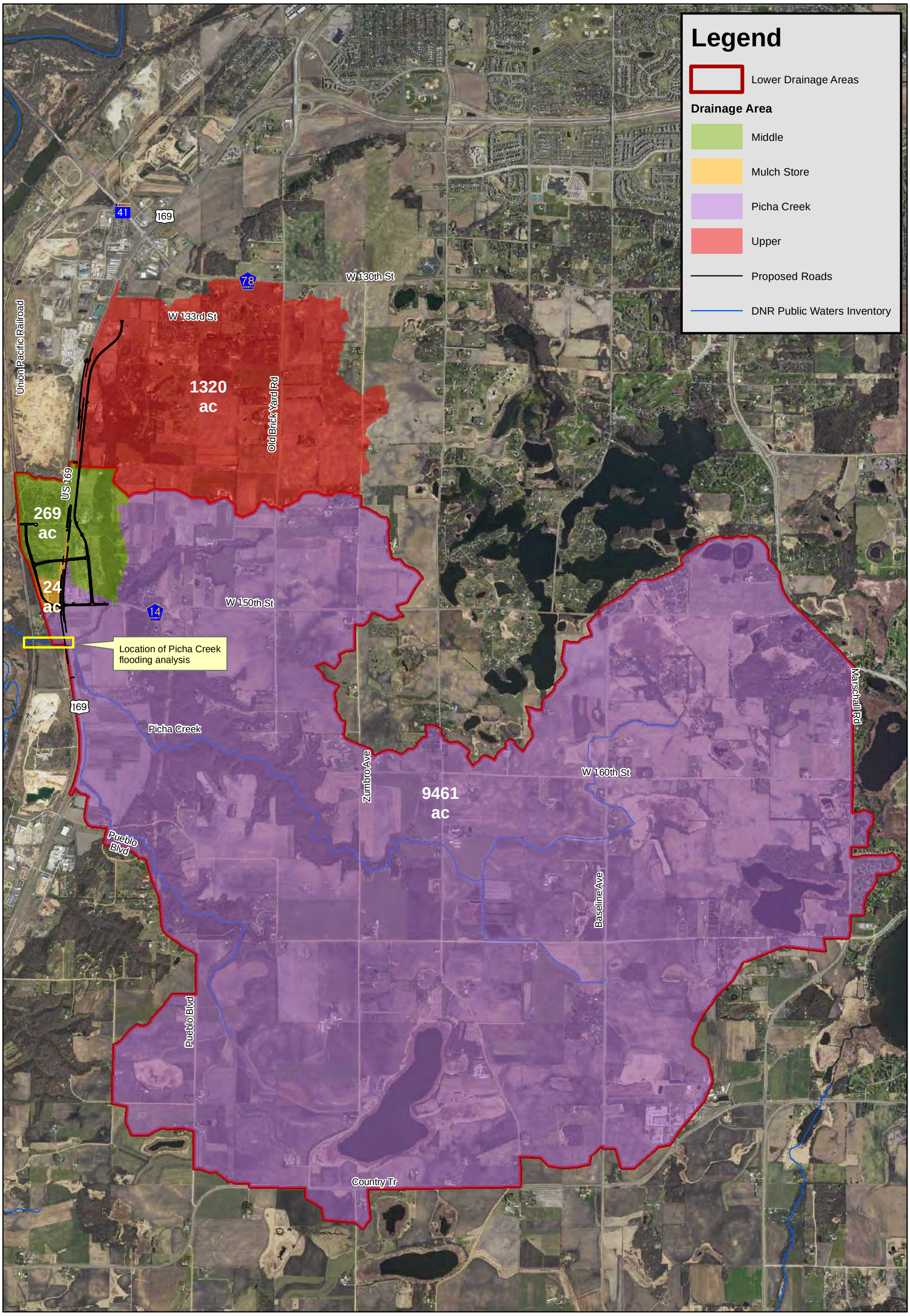


Figure 1: WMO Jurisdictions

Trunk Highway 169 / CSAH 14 Overpass Project
Scott County, MN

0 1,400 2,800 Feet

N



Document Path: K:\03212-010\GIS\Maps\Figure 2 - Drainage Areas.mxd

Figure 2: Drainage Area Map

Trunk Highway 169 / CSAH 14 Over Pass Project
Scott County, MN

0 1,400 2,800 Feet

N

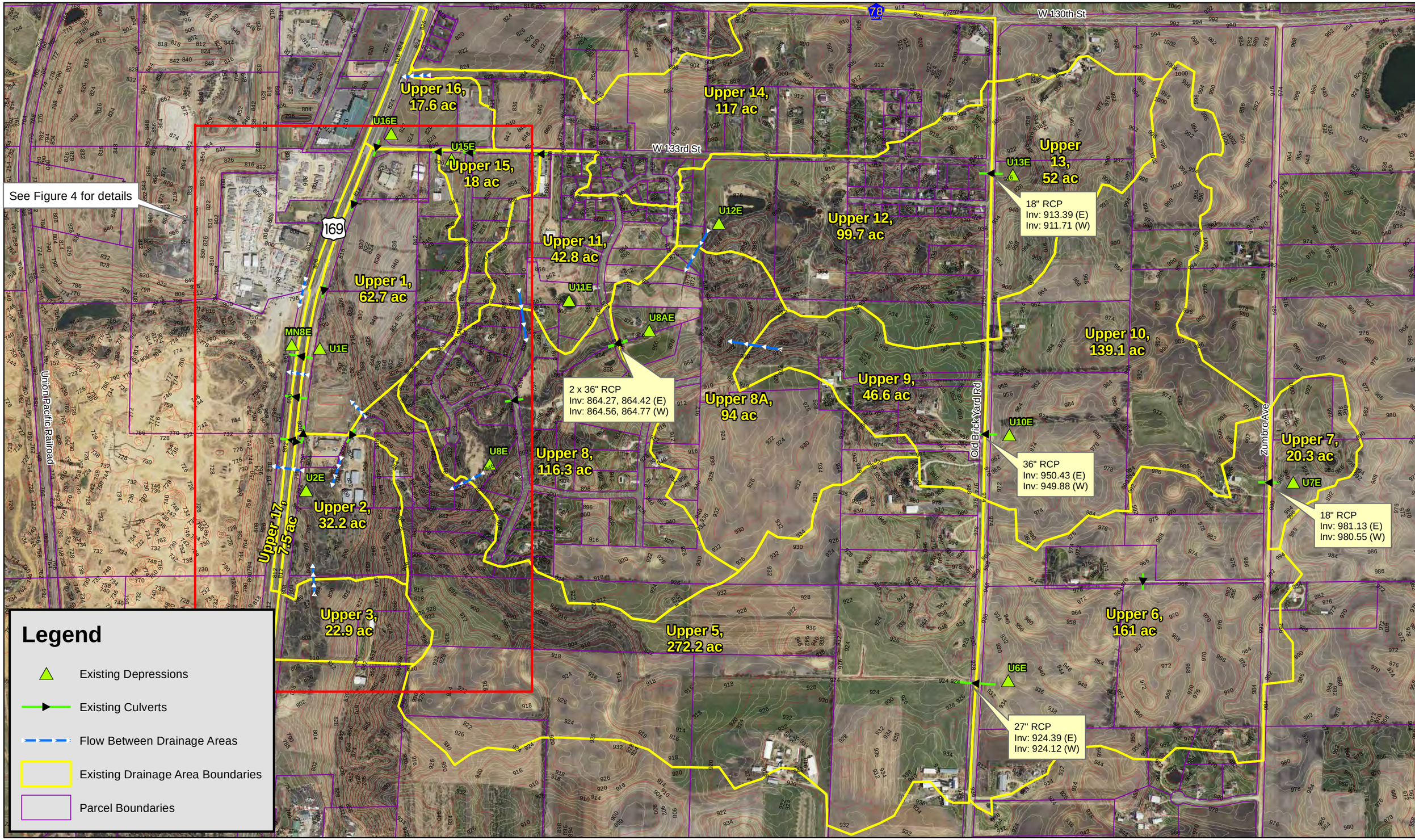


Figure 3: Existing Conditions Upper Drainage Area

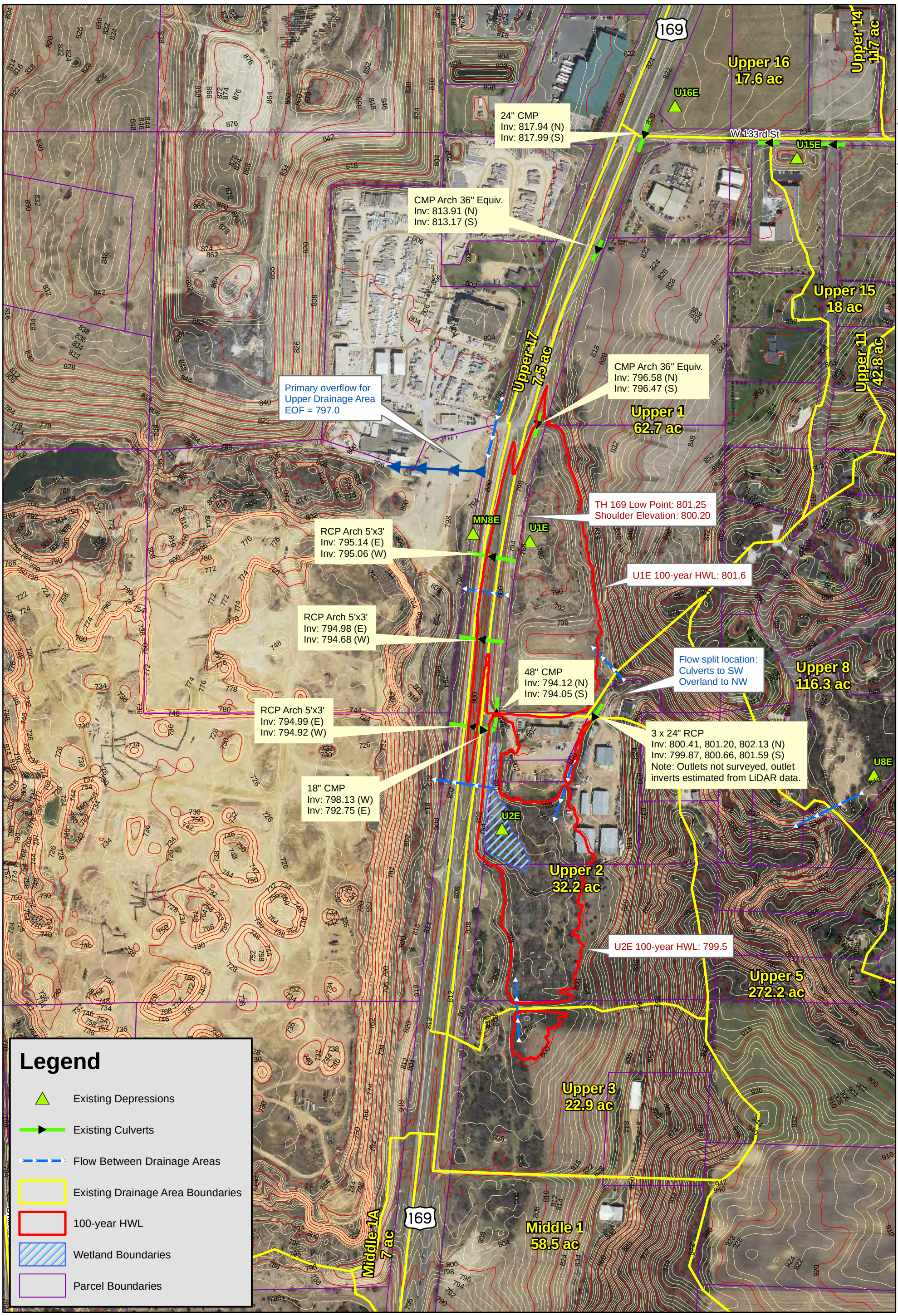
Trunk Highway 169 / CSAH 14 Overpass Project

Scott County, MN

0 400 800 1,600 Feet

N

Document Path: K:\0321\2-010\GIS\Maps\Figure 3 - Existing Upper Drainage Area.mxd



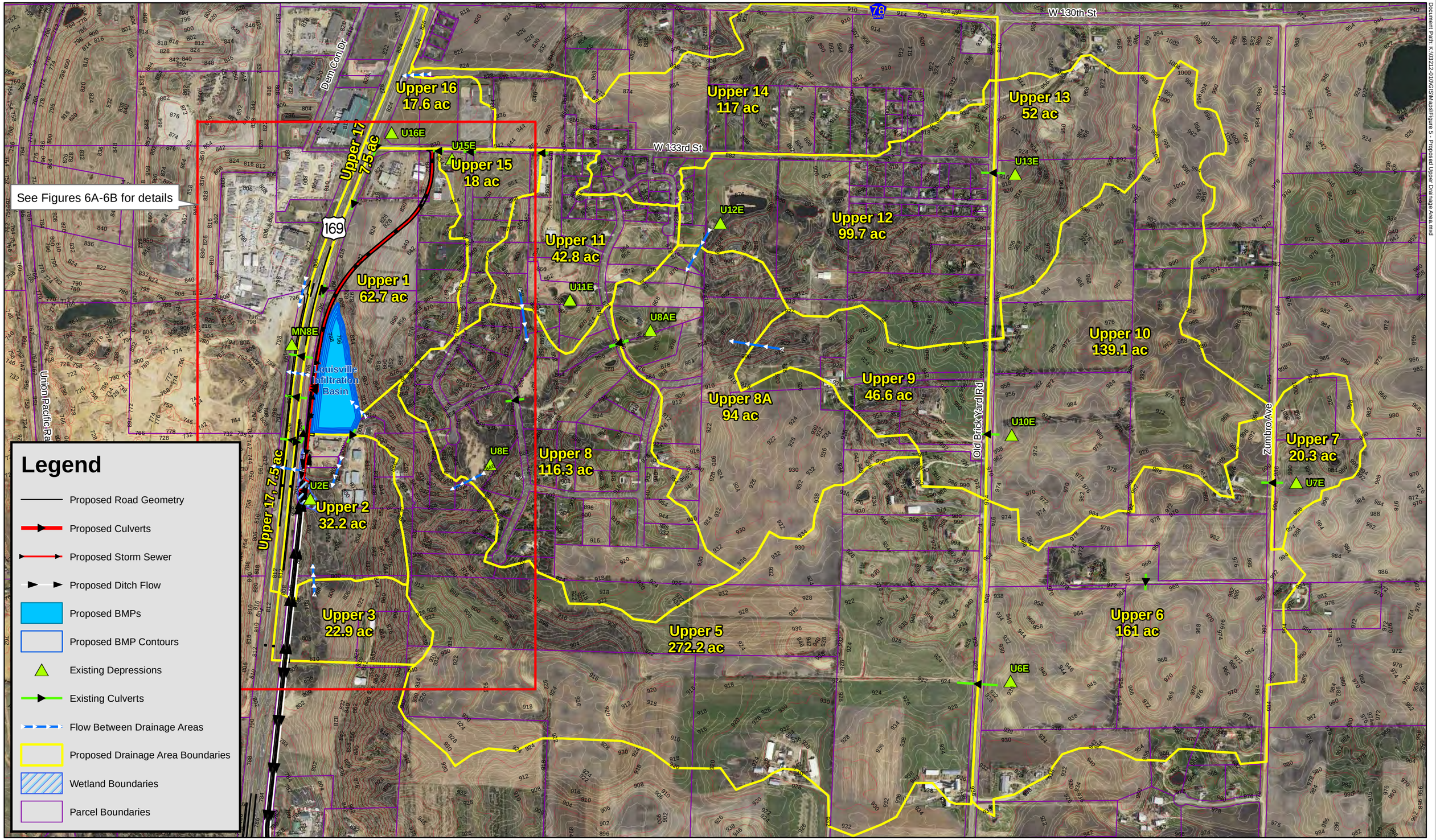
Document Path: K:\03212-010\GIS\Maps\Figure 4 - Existing Conditions Upper Inset.mxd

Figure 4: Project Area Inset Existing Conditions Upper Drainage Area

Trunk Highway 169 / CSAH 14 Overpass Project
Scott County, MN

0 200 400 Feet

N



Document Path: K:\03212-310\GIS\Maps\Figure 5 - Proposed Upper Drainage Area.mxd

Scott

Figure 5: Proposed Conditions Upper Drainage Area

Trunk Highway 169 / CSAH 14 Overpass Project
Scott County, MN

0 400 800 1,600 Feet

N

WSB

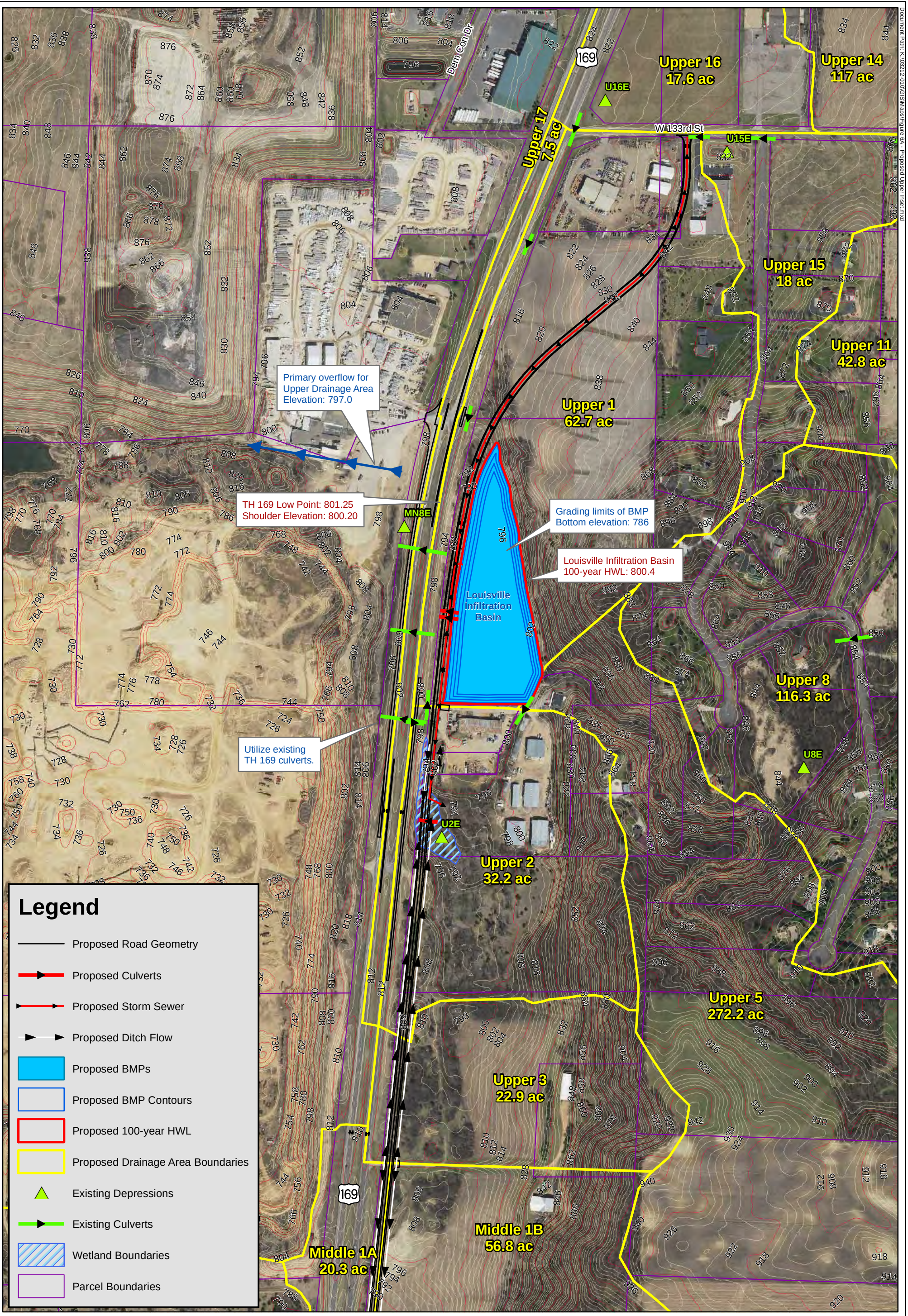


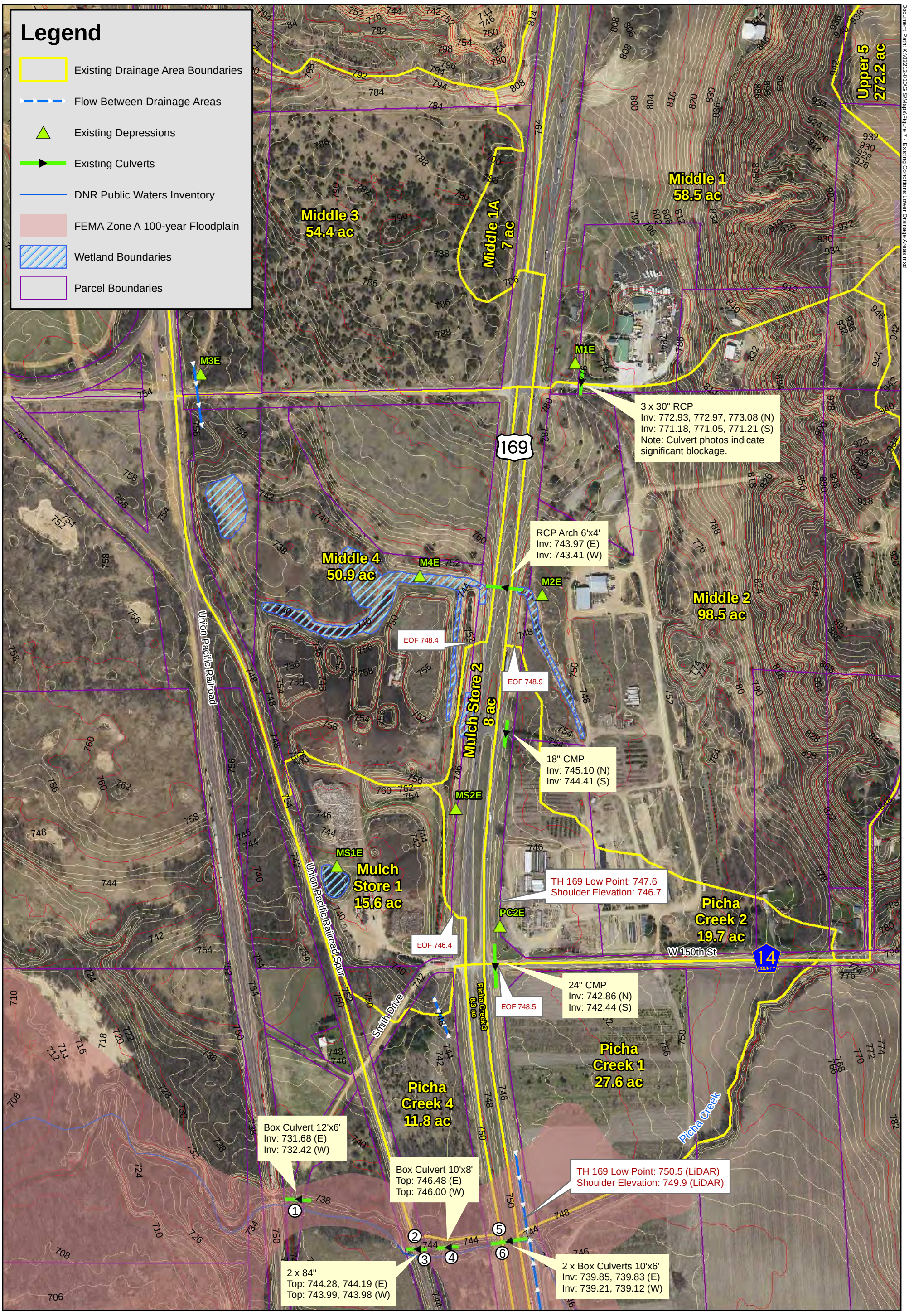
Figure 6A: Project Area Inset Proposed Conditions Upper Drainage Area - Scenario 1

Trunk Highway 169 / CSAH 14 Overpass Project

Scott County, MN

0 200 400 Feet

N



Document Path: K:\03212-010\GIS\Maps\Figure 7 - Existing Conditions Lower Drainage Areas.mxd

Scott

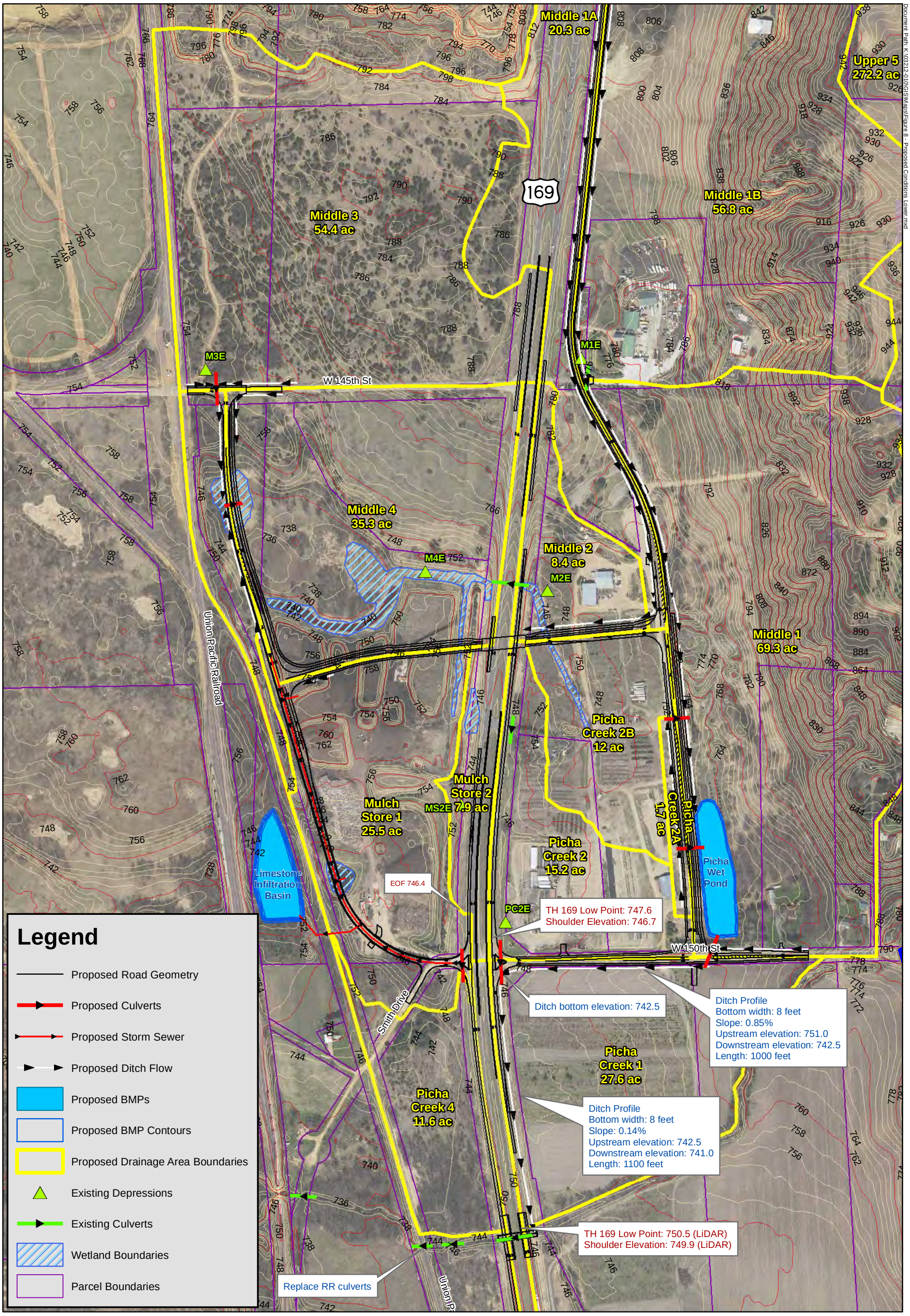
Figure 7: Existing Conditions Lower Drainage Areas

Trunk Highway 169 / CSAH 14 Overpass Project
Scott County, MN

0 200 400 Feet

N

WSB



Document Path: K:\03212-010\GIS\Maps\Figure 8 - Proposed Conditions Lower.mxd

Figure 8: Proposed Conditions Lower Drainage Areas

Trunk Highway 169 / CSAH 14 Overpass Project
Scott County, MN

0 200 400 Feet

N

Attachment K – Wetland Delineation

Wetland Delineation Report

Scott County Trunk Highway 169 & Trunk Highway 41 Intersection

Jackson Township, MN 55379

November 17, 2016

Prepared for
Scott County
200 Fourth Ave West | Shakopee, MN 55379

WSB PROJECT NO. 3212-00

701 Xenia Avenue South, Suite 300
Minneapolis, MN 55416
Tel: (763) 541-4800 · Fax: (763) 541-1700
wsbeng.com

LEVEL 2 WETLAND DELINEATION REPORT

Scott County Trunk Highway 169 Improvements

For:

Scott County

November 17, 2016

Prepared By:

WSB & Associates, Inc.
701 Xenia Avenue S., Suite 300
Minneapolis, MN 55416
(763) 541-4800
(763) 541-1700 (Fax)

CERTIFICATION

This report was prepared by me:

Dustin Simonson

Date: September 30, 2016 WDC-IT No. 5195

Quality Assurance Review completed by:

Alison Harwood

Date: September 30, 2016 WDC No. 1238

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SECTION I

I. Introduction

A. Project Location

The project is located along Minnesota Trunk Highway (TH) 169 and TH 41, within Jackson and Louisville Townships, Scott County, Minnesota. The project area consists of approximately 23 acres in Section 15, and 28 of Township 115 and Range 23, Major Watershed Lower Minnesota River (#33), BSA #9 (**Figure 1, Appendix A**).

B. Project Purpose

Scott County is proposing the following improvements along TH 169: a new interchange at the TH 41 intersection; an overpass over TH 169 between CSAH 14 and 145th Street; a frontage road along the east/south side of TH 169 between 133rd Street and CSAH 14; new roadway connections and access locations from just north of 145th Street to just south of CSAH 14; and access closures and modifications between 133rd Street and just south of CSAH 14. This report is intended to address any jurisdictional WCA, Public Waters, or Section 404 wetlands and/or waters for final design and permitting of this project. This project was authorized by Scott County.

C. Summary of Findings

During the field investigation six wetlands, five wet ditches, one watercourse, and two storm ponds were found to exist within or adjacent to the project area. The wetlands are summarized in **Table 1**. For a visual representation of the wetlands and other water body locations, please see **Figure 6**, **Appendix B**. All potential wetland areas (mapped hydric soils, NWI signatures, and low depressional areas) were reviewed on-site and either delineated or determined to be upland.

Table 1. Summary of Delineated Wetlands, Scott County Trunk Highway 169 Improvements, Scott County, Minnesota

Wetland ID	Delineation Method	No. Flags/Transects	Eggers and Reed	Circular 39) (Cowardin)	NWI	DNR PWI	County Soil Survey (Hydric/Non-Hydric)
A	Level 2	65/1	Seasonally Flooded Basin	Type 1 (PEMA)	Yes	No	Sc
B	Level 2	18/1	Wet Meadow	Type 2 (PEMB	Yes	No	TbC
C	Level 2	75/1	Wet Meadow	Type 2 (PEMB	Yes	No	TbC
D	Level 2	11/1	Wet Meadow	Type 2 (PEMB)	No	No	CdA
E	Level 2	16/1	Shallow Open Water	Type 5 (PABH)	No	No	Dd
F	Level 2	35/0	Shallow Marsh	Type 3 (PEMC)	No	No	**Cc**

II. Delineation Procedure

A. Off-Site Determination: Base Map Review

Topography: The project area is located east of the Minnesota River. The land east of the project area consists of land that slopes west, toward the TH 169 roadway. The topography of the area immediately surrounding TH 169 is generally flat. The land west of TH 169 generally slopes west toward the river. (**Figure 2, Appendix A**).

The *DNR Public Waters and Wetlands Map, Scott County, MN* (Minnesota Department of Natural Resources, 1983) indicates no DNR Public Waters are within the northern portion of the project area. An unnamed tributary to Sand Creek is located within the southern portion of the project area **(Figure 3, Appendix A)**.

The *National Wetlands Inventory Map (NWI)* (Minnesota Department of Natural Resources) did not identify either of the wetlands within the northern section of project area as part of the National Wetlands Inventory. The NWI identified three wetlands within the southern section of the project area **(Figure 4, Appendix A)**.

The *Soil Survey of Scott County, Minnesota* (http://soildatamart.nrcs.esda.gov) identified the following soils within the project area (**Figure 5, Appendix A**):

Map Symbol	Soil Unit Name	Percent Hydric	Mapped Hydric
Aa	Alluvial land, 0 to 2 percent slopes	0	No
Ab	Alluvial land, frequent overflow, 0 to 6 percent slopes	90	Yes
Cc	Comfrey silty clay loam	100	Yes
CdA	Copaston silt loam, 0 to 2 percent slopes	15	No
CdB	Copaston silt loam, 2 to 6 percent slopes	15	No
Dd	Dorchester silty clay loam	8	No
EaA	Estherville loam and sandy loam, 0 to 2 percent slopes	0	No
EaB	Estherville sandy loam, 2 to 6 percent slopes	1	No
EbB2	Salida gravelly sandy loam	0	No
HdB	Sparta fine sand, 2 to 6 percent slopes	0	No
HdC2	Sparta fine sand, 6 to 12 percent slopes	0	No
HeB	Sparta loamy fine sand, 2 to 6 percent slopes	0	No
Sc	Stony land	0	No
TbC	Terril loam, 6 to 12 percent slopes	5	No
TcA	Terril loam, 0 to 2 percent slopes	7	No
TcB	Terril loam, 2 to 6 percent slopes	8	No
WaB	Waukegan silt loam, 2 to 6 percent slopes	0	No

Antecedent Climate Conditions: Historic climate data and WETS data were obtained from the Minnesota Climatology Working Group for the three months preceding the October 23, 2015 site visit of the northern portion of the project area and the September 13, 2016 site visit of the southern portion of the project area. The precipitation preceding the 2015 site visit was determined to be normal. The three months preceding the 2016 site visit fell within the wetter than normal precipitation range. Records of the precipitation can be found in **Appendix D**.

B. On-Site Determination

Field investigation of the northern portion of the project area was conducted by Dustin Simonson (WDC-IT #5195) on October 23, 2015. The field investigation of the southern portion of the project area was conducted by Dustin Simonson and Laura Messman (WDC-IT #5228) on September 13 and September 15, 2016. No deviations or omissions were undertaken as part of this investigation.

The project area was delineated using the routine methodology described in the *Corps of Engineers Wetlands Delineation Manual* (US Army Corps of Engineers, 1987), with additional guidance provided by the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Midwest Region (Version 2.0)*. Wetlands were classified according to the methodologies set forth in *Wetlands of the United States (Circular 39)*, USFWS Shaw and Fredine 1971; *Classification of Wetlands and Deepwater Habitats of the United States*, Cowardin 1979; and *Wetland Plants and Plant Communities of Minnesota and Wisconsin, 2nd ed.*, Eggers and Reed 1997. The wetland types in this report are classified by the Circular 39, Cowardin, and Eggers and Reed Classifications.

Soil types were researched prior to the on-site investigation with the assistance of the *Soil Survey of Scott County* from the National Resources Conservation Service. All soil test pits were excavated to a minimum depth of 24 inches unless otherwise noted. Soil colors were described on-site according to the *Munsell Soil Color Charts* (2009 Revised Edition) from the test pits in and adjacent to the wetlands. Hydric soils were identified using the current technical criteria for hydric soils developed by the NRCS in 2010 (Version 7.0). The presence of water was observed after time was allowed for movement of water through the substrate. This time varied depending upon soil characteristics.

The quadrant sampling method was employed for all sample plots unless otherwise noted. Vegetation was measured as actual areal cover and may exceed 100% of total area due to overlap. Grasses and herbaceous vegetative cover was measured within a circular plot of a 5-foot-radius, woody vegetation taller than 3.28 feet and a diameter at breast height (DBH) less than 3 inches was recorded within a circular plot with a 15-foot-radius, and woody vegetation with a DBH greater than 3 inches and woody vines were measured in a 30-foot-radius circular plot. Regional plant identification resources were utilized in the identification of plant species, with indicator status taken from the *2016 National Wetland Plant List (*US Army Corps of Engineers, 2016). Plant species dominance was estimated based on the absolute percent coverage for herbaceous, shrub-sapling, and tree

strata if present. In addition to the use of indicators of hydrology, hydric soils, and the presence of hydrophytic vegetation, other evidence such as topographic breaks and watershed characteristics were used to determine the wetland boundary.

Midwest Regional Supplement Routine Wetland Delineation data forms were used to record vegetation, hydrology, and soil characteristics at sample points in and adjacent to the wetlands (**Appendix B**). Sampling transects were taken along the wetland-upland boundary of the wetlands. Flag locations were surveyed using a sub meter hand held GPS unit. Approximate sampling points, and delineated wetland edges are shown in **Figures 6, 6a, 6b, 6c, and, 6d, Appendix B.**

III. Results and Wetland Information

The wetland delineation data forms (**Appendix B**) and photos (**Appendix C**) are attached. A summary of the delineation is below.

A. *Wetland A*
Circular 39: Type1
Cowardin: PEMA
Eggers and Reed Field Classification: Seasonally Flooded Basin
Soil mapping unit: Stony Land
No. Transects: 1 **No. Additional Sample Points:** 0
Wetland Flags: 65
Wetland Size (within Project Area): 1.03 acres

Wetland A is positioned in a ditch in the southern portion of the project area. The wetland is characterized as a seasonally flooded basin. The wetland boundary is outlined in **Figure 6b, Appendix B**. Wetland A was delineated in 2016.

Dominant vegetation in the wetland consisted of lakebank sedge (*Carex lacustris*) and reed canary grass (*Phalaris arundinacea*) in the herb stratum. Hydric soil indicators consisted of assuming thick dark surface (A12). Hydrology indicators included saturation visible on aerial imagery (C9), geomorphic position (D2), and FAC-neutral test (D5).

Dominant vegetation in the upland consisted of reed canary grass (*Phalaris arundinacea*), Kentucky blue grass (*Poa pratensis*), and common plantain (*Plantago major*) in the herb stratum. Hydric soil indicators consisted of assuming thick dark surface (A12). No hydrology indicators were present at the upland sample point.

The wetland boundary was placed along a topographic break where lakebank sedge was no longer present.

B. *Wetland B*
Circular 39: Type 2
Cowardin: PEMB
Eggers and Reed Field Classification: Wet Meadow
Soil mapping unit: Terril loam
No. Transects: 1 **No. Additional Sample Points:** 1
Wetland Flags: 18
Wetland Size (within Project Area): 0.91 acres

Wetland B is positioned west of TH 169 in the southern section of the project area. The wetland is characterized as a wet meadow. The wetland boundary is outlined in **Figure 6c, Appendix B**. Wetland B was delineated in 2016.

Dominant vegetation in the wetland consisted of boxelder (*Acer negundo*) in the tree stratum; and reed canary grass (*Phalaris arundinacea*) in the herb stratum; and river bank grape (*Vitis riparia*) in the woody vine stratum. Hydric soil indicators consisted of thick dark surface (A12). Hydrology indicators included geomorphic position (D2) and FAC-Neutral test (D5).

Dominant vegetation in the upland consisted of cottonwood (*Populus deltoides*) in the tree stratum; common buckthorn (*Rhamnus cathartica)* in the sapling/shrub stratum; and Virgina creeper (*Parthenocissus quinquefolia*) and sow thistle (*Sonchus oleraceus*) in the herb stratum. No hydric soil indicators were encounter in the upland sample point. No hydrology indicators were encounter in the upland sample point.

The wetland boundary was placed along a topographic break where reed canary was no longer present.

C. *Wetland C*
Circular 39: Type 2
Cowardin: PEMB
Eggers and Reed Field Classification: Wet Meadow
Soil mapping unit: Terril loam
No. Transects: 1 **No. Additional Sample Points:** 1
Wetland Flags: 75
Wetland Size (within Project Area): 3.10 acres

Wetland C is positioned west of TH 169 and south east of Wetland B in the southern section of the project area. The wetland is characterized as a large wet meadow with a shallow marsh center. The wetland boundary is outlined in **Figure 6c, Appendix B**. Wetland C was delineated in 2016.

Dominant vegetation in the wetland consisted of cotton wood (*Populus deltoides*) in the tree stratum; and reed canary grass (*Phalaris arundinacea*) in the herb stratum. Hydric soil indicators consisted of thick dark surface (A12). Hydrology indicators included geomorphic position (D2) and FAC-Neutral test (D5).

Dominant vegetation in the upland consisted of cottonwood (*Populus deltoides*) in the tree stratum; common buckthorn (*Rhamnus cathartica)* in the sapling/shrub stratum; and Virgina creeper (*Parthenocissus quinquefolia*) and sow thistle (*Sonchus oleraceus*) in the herb stratum. No hydric soil indicators were encounter in the upland sample point. No hydrology indicators were encounter in the upland sample point.

The wetland boundary was placed along a topographic break where reed canary was no longer present.

D. *Wetland D*
Circular 39: Type 2
Cowardin: PEMB
Eggers and Reed Field Classification: Wet Meadow
Soil mapping unit: Copaston silt loam
No. Transects: 1 **No. Additional Sample Points:** 0
Wetland Flags: 11
Wetland Size (within Project Area): 0.19 acres

Wetland D is positioned south east of Wetland C. The wetland is characterized as wet meadow located within a ditch along TH 169. The wetland boundary is outlined in **Figure 6c, Appendix B**. Wetland E was delineated in 2016.

Dominant vegetation in the wetland consisted of reed canary grass (*Phalaris arundinacea*) in the herb stratum. Hydric soil indicators were assumed based on the presence of hydric vegetation and hydrology but could not be confirmed due to a restrictive compacted rock layer at 8 inches. Hydrology indicators included saturation visible on aerial imagery (C9), geomorphic position (D2), and FAC-neutral test (D5).

Dominant vegetation in the upland consisted of reed canary grass (*Phalaris arundinacea*) in the herb stratum. No hydric soil indicators were encounter in the upland sample point. No hydrology indicators were encounter in the upland sample point.

The wetland boundary was placed along a topographic break where hydrology indicators were no longer met.

E. *Wetland E*
Circular 39: Type 5
Cowardin: PABH
Eggers and Reed Field Classification: Shallow Open Water
Soil mapping unit: Dorchester
No. Transects: 1 **No. Additional Sample Points:** 0
Wetland Flags: 16
Wetland Size (within Project Area): 0.30 acres

Wetland E is positioned south of Wetland C. The wetland is characterized as shallow open water wetland. This wetland is currently functioning as a storm pond within the Mulch Store property. The wetland boundary is outlined in **Figure 6c, Appendix B**. Wetland E was delineated in 2016.

Dominant vegetation in the wetland consisted of reed canary grass (*Phalaris arundinacea*) and narrow leaf cattail (*Typha angustifolia*) in the herb stratum. Soils within the upland sample point where disturbed in the past. A pea gravel layer was hit which restricted further soil sampling. Hydric soils were assumed based on the land scape, hydrophytic vegetation, and hydrology indicators. Hydrology indicators included geomorphic position (D2) and FAC-neutral test (D5).

Dominant vegetation in the upland consisted of reed canary grass (*Phalaris arundinacea*) and sow thistle (*Sonchus arvensis*) in the herb stratum and bindweed (*Fallopia convolvulus*) in the woody vine stratum. No hydric soil indicators were present in the upland sample point. No hydrology indicators were present in the upland sample point.

The wetland boundary was placed along a topographic break where vegetation transitions from reed canary to a mixture of upland species.

F. *Wetland F*
Circular 39: Type 3
Cowardin: PEMC
Eggers and Reed Field Classification: Shallow Marsh
Soil mapping unit: Comfrey
No. Transects: 0 **No. Additional Sample Points:** 0
Wetland Flags: 35
Wetland Size (within Project Area): 0.42 acres

Wetland F is positioned east of Wetland C. The wetland is characterized as shallow marsh wetland. This wetland has been channelized and contains a culvert on the north end, and water flows south. The channel contains cattails. The wetland boundary is outlined in **Figure 6c, Appendix B**. Wetland F was delineated in 2016.

Dominant vegetation in the wetland consisted of narrow leaf cattail (*Typha angustifolia*) and reed canary grass (*Phalaris arundinacea*) in the herb stratum. No soil sample could be taken from this wetland due to the land restrictions to get to the wetland. Hydrology indicators included surface water (A1), geomorphic position (D2) and FAC-neutral test (D5).

Dominant vegetation in the upland consisted of reed canary grass (*Phalaris arundinacea*) and sow thistle (*Sonchus arvensis*) in the herb stratum. No hydric soil indicators were present in the upland sample point. No hydrology indicators were present in the upland sample point.

The wetland boundary was placed along a topographic break on the ditch slope where hydrology was no longer present.

H. Wet Ditches

In some instances, areas such as the bottoms of constructed roadside ditches can form wetland characteristics over time due to the topographic position of the ditch bottom and the frequency of hydrology from runoff. These areas may incidentally meet the three wetland criteria, but were not constructed for the purposes of creating wetland area. These areas are referred to as wet ditches. During the onsite review three areas were identified as meeting wet ditch criteria.

1. **Wet Ditch 1**
   Wet Ditch 1 (WD1) is located on the north end of the project area. This is a ditch flows north from CSAH 41 into an infiltration basin. The ditch boundary is outlined in **Figure 6a, Appendix B**.

2. **Wet Ditch 2**
   Wet Ditch 2 (WD2) is located on the north end of the south section of the project area. This is a roadside ditch on the west side of TH 169. The ditch boundary is outlined in **Figure 6b, Appendix B**.

3. **Wet Ditch 3**
   Wet Ditch 3 (WD3) is located east of TH 169 within the Minnesota Valley Garden Center. The Garden center has an irrigation system for the tree saplings. The excess water runoff from the irrigation flows into these ditches providing hydrology in a developed setting. The ditch boundary is outlined in **Figure 6b, Appendix B**.

4. **Wet Ditch 4**
   Wet Ditch 4 (WD4) is located east of TH 169 on the south portion of the project area. The ditch boundary is outlined in **Figure 6c, Appendix B**.

5. **Wet Ditch 5**
   Wet Ditch 5 (WD5) is located north of unnamed to sand creek. This is a roadside ditch on the west side of TH 169. The ditch boundary is outlined in **Figure 6d, Appendix B**.

I. Watercourse

One watercourse was identified onsite (DNR Unnamed Tributary to Sand Creek). This creek bed is located on the south end of the project and crosses under TH 169 through culverts. The banks of the creek bed were investigated and determined to not contain a wetland fringe. The top of bank for this watercourse is outlined in **Figure 6d, Appendix B**.

J. Stormwater Ponds

Similar to wet ditches, stormwater ponds can also form wetland characteristics over time. Two such areas are present within the project area. Although these areas did meet wetland characteristics, they were determined to not be under the jurisdiction of the WCA as they were created in non-wetland areas for the purpose of stormwater management and not for wetland creation. The delineated boundary for the storm ponds are outlined in **Figure 6c, Appendix B** and are described below.

1. **Stormwater Pond 1**
   Stormwater Pond 1 is located east of TH 169, adjacent to Commercial Truck Collision. This stormwater pond did not show up on aerials until 2013. Prior to 2013 it was a farm field. In May of 2012 Google earth imagery shows the area to be under construction with the expansion of the Commercial Truck Collision area. The next available aerial in 2013 shows the stormwater pond. The area has culverts bringing water into the area with a water level control structure on the south end. Aerials used in this determination can be found in **Appendix E.**

2. **Stormwater Pond 2**
   Stormwater Pond 2 is located south of Stormwater Pond 1. This stormwater pond does not appear in a 1991 aerial, but does appear in subsequent aerial images. In the 1991 aerial the area in question is an agricultural field. The next available aerial is in 2003, at which time an open water pond with defined edges appears. The pond is lined with ornamental shrubs with culverts on the west end bringing water into the pond. Aerials used in this determination can be found in **Appendix E.**

K. Additional Sampled Areas

An additional sample point (SP1) was taken in a depressional ditch area west of TH 41 and north of TH 169. The area is a mowed ditch running parallel to TH 41 (**Figure 6a, Appendix B**). The area had flowing water in the ditch during the delineation, likely due to a rainfall that preceded the 2015 site visit. The area did not meet hydrophtic vegetation or hydric soil criteria. The dominant vegetation at the sample point consisted of common mullein (*Verbascum thapsus*) and ground ivy (*Glechoma hederacea*) in the herb stratum, and quacking aspen (*Populus tremuloides*) in the sapling stratum. Because the ditch area did not meet all of the wetland criteria, it was determined to be upland and is shown on **Figure 6a** as a dry ditch.

L. Infiltration Basin

One area was investigated for the presence of wetlands and was determined to be an infiltration basin. This area is east of TH 41and south of TH 169. The area shows hydrology and hydric vegetation. However, the area does not have hydric soils. The area is mapped as an Estherville soils series. The soil sample taken had sediment fill for the top two inches. After that the soils goes to straight sand. Since the area does not meet hydric soils it was determined to be an infiltration basin and not a wetland. The infiltration basin explains the present of hydrology and hydric vegetation being present.

IV. Summary and Closing Statements

Six wetlands, Wetland A through Wetland F, were delineated within the project area using the Level 2 method. Additionally two stormwater ponds, one watercourse, one infiltration basin and five wet ditches were delineated.

The wetland delineation report was completed by Dustin Simonson of WSB & Associates, Inc. This delineation report is being submitted as a request for approval of wetland type and boundary of the wetland described herein and to address all water bodies found on site for consideration by Section 404 permitting. The application for boundary and type approval is included along with this report.

V. References

The following sources of information were reviewed to assist in performing the wetland delineation.

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APPENDIX A

Figure 1 – Project Location Map
Figure 2 – Topographic Map
Figure 3 – DNR Public Waters Inventory
Figure 4 – National Wetlands Inventory
Figure 5 – Soil Survey of Scott County

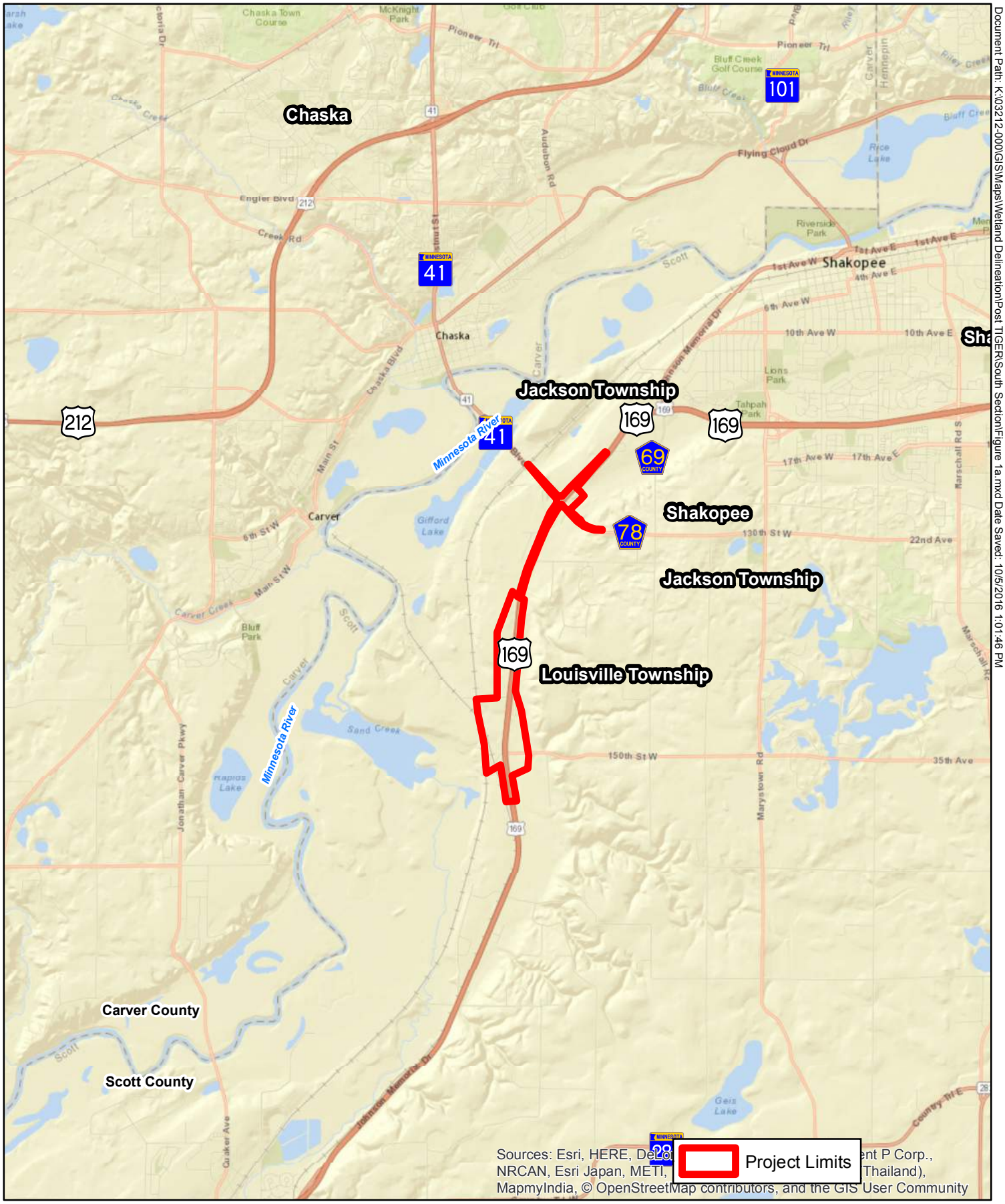

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Figure1 - Project Location
TH 169 and TH 41
Scott County

N

0 5,000 Feet
1 inch = 6,155 feet

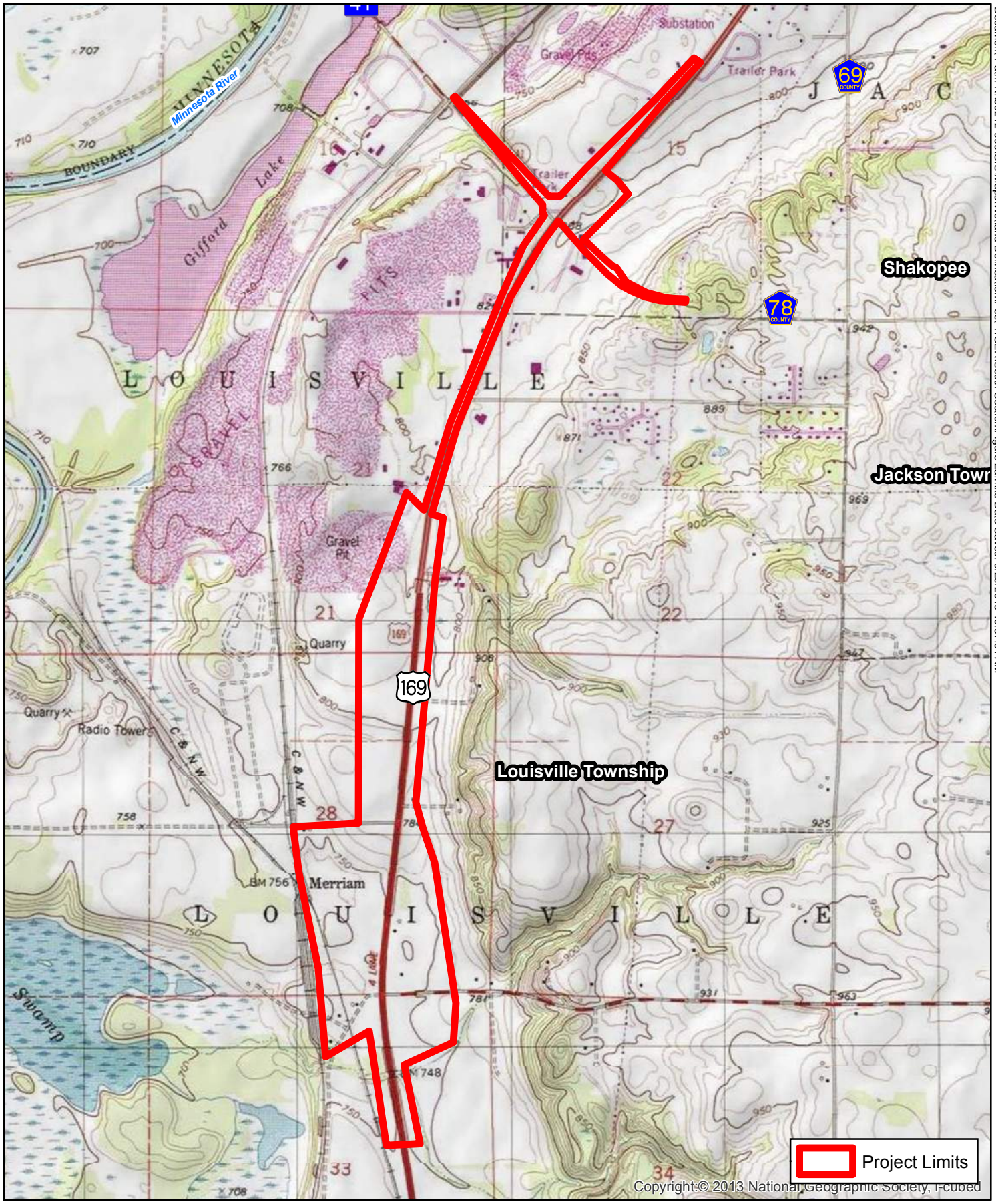

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Figure 2 - Topographic Map
TH 169 and TH 41
Scott County

N

0 2,000 Feet
1 inch = 1,982 feet

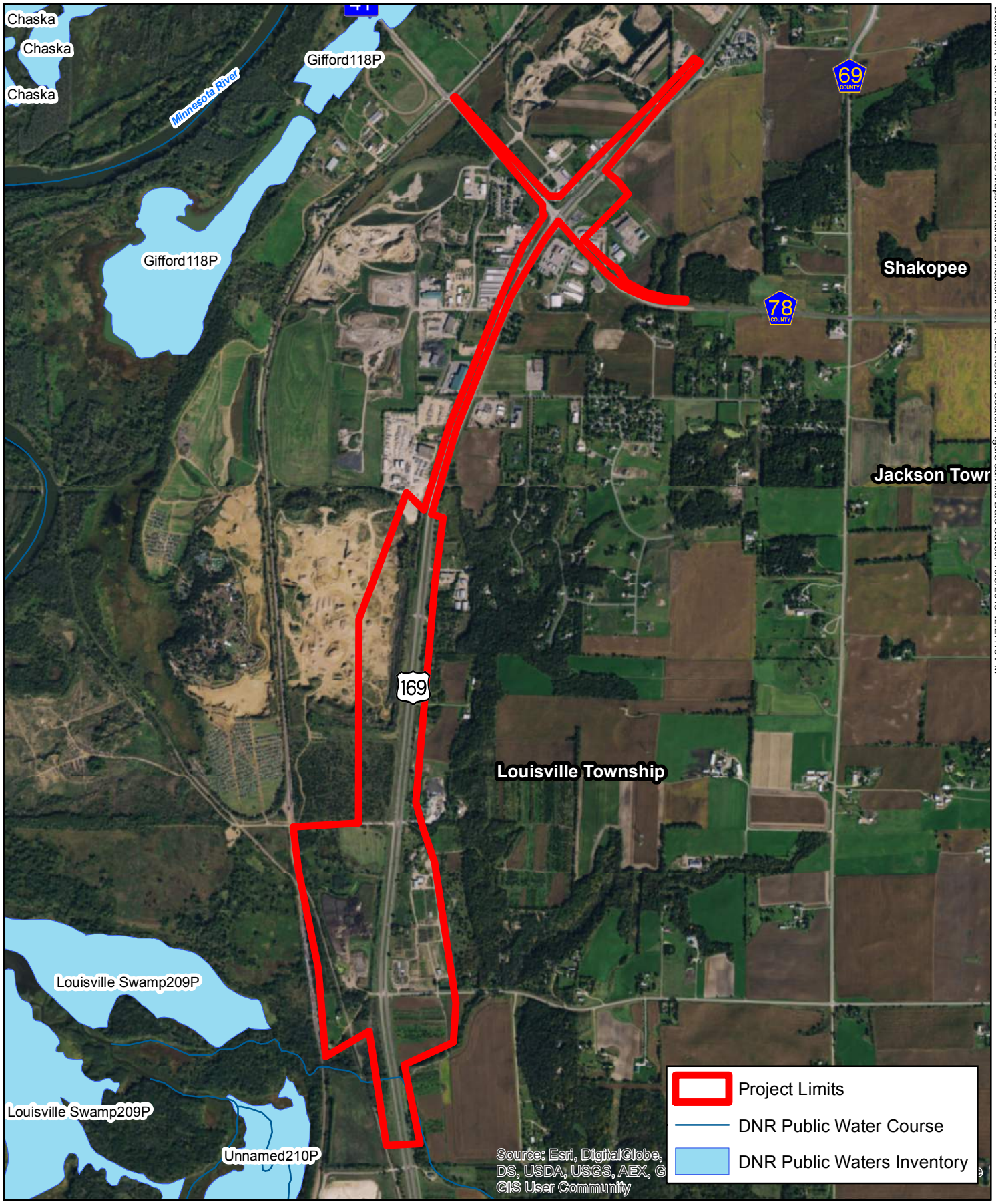

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Figure 3 - DNR Public Waters Inventory
TH 169 and TH 41
Scott County

N
0 2,000 Feet
1 inch = 1,982 feet

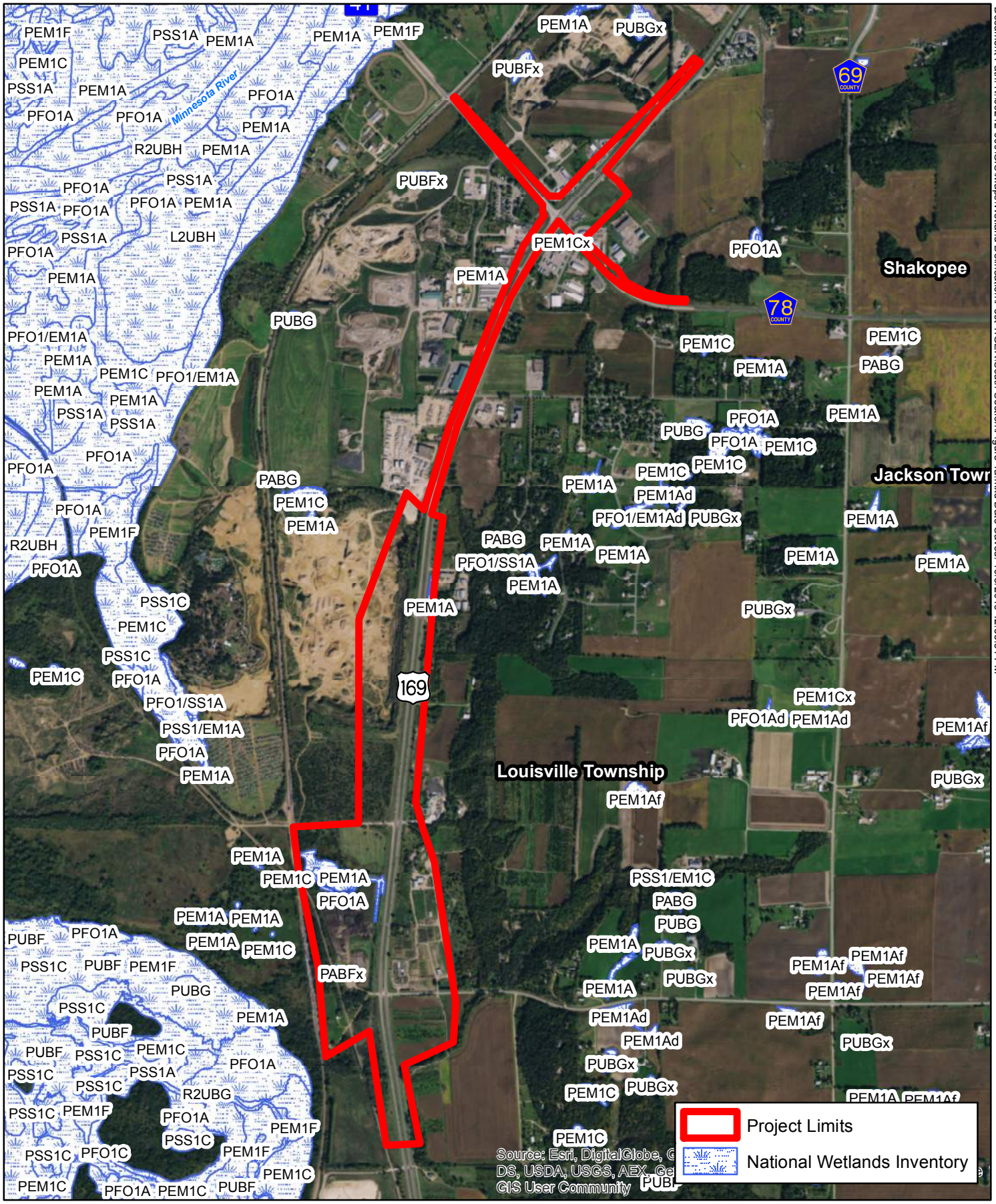

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Figure 4 - National Wetlands Inventory
TH 169 and TH 41
Scott County

N

0 2,000 Feet
1 inch = 1,982 feet

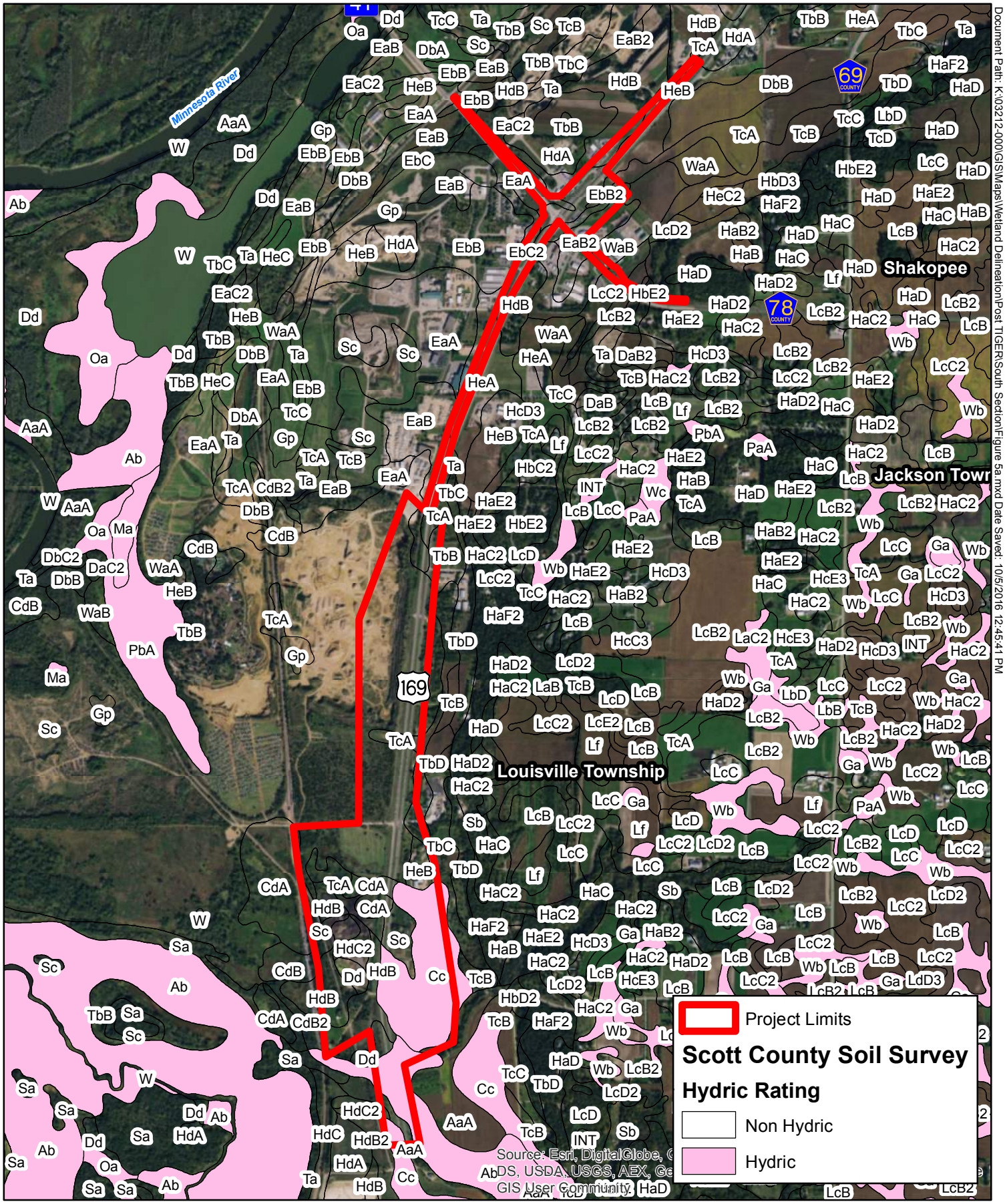

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Figure 5 - Soil Survey of Scott County

TH 169 and TH 41

Scott County

N

0 2,000 Feet

1 inch = 1,982 feet

APPENDIX B

Figure 6 – Wetland Delineation
Figure 6a – Wetland Delineation
Figure 6b – Wetland Delineation
Figure 6a – Wetland Delineation
Figure 6b – Wetland Delineation
Wetland Determination Data Forms

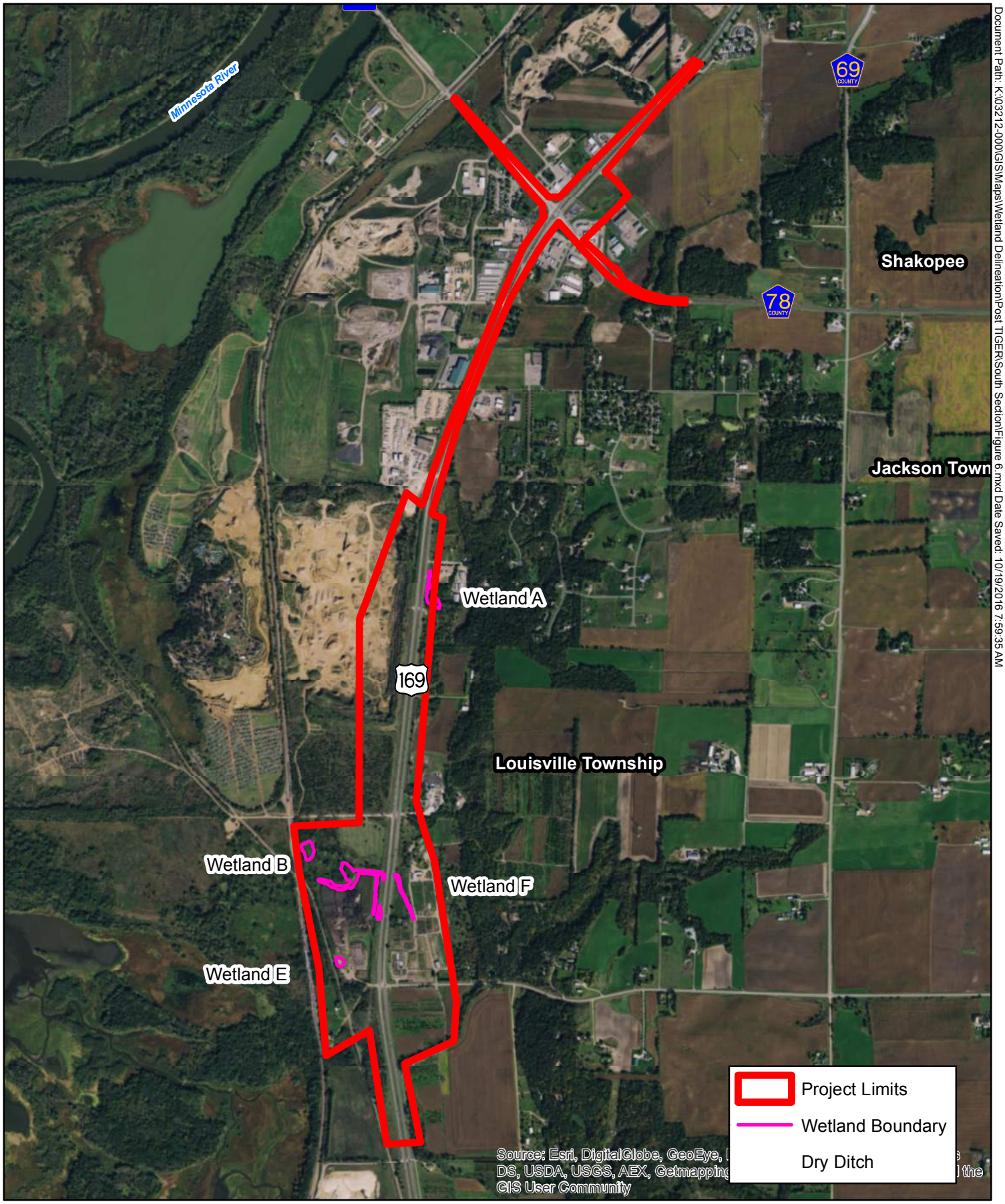

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Figure 6 - Wetland Delineation
TH 169 and TH 41
Scott County

N

0 2,000 Feet
1 inch = 1,984 feet

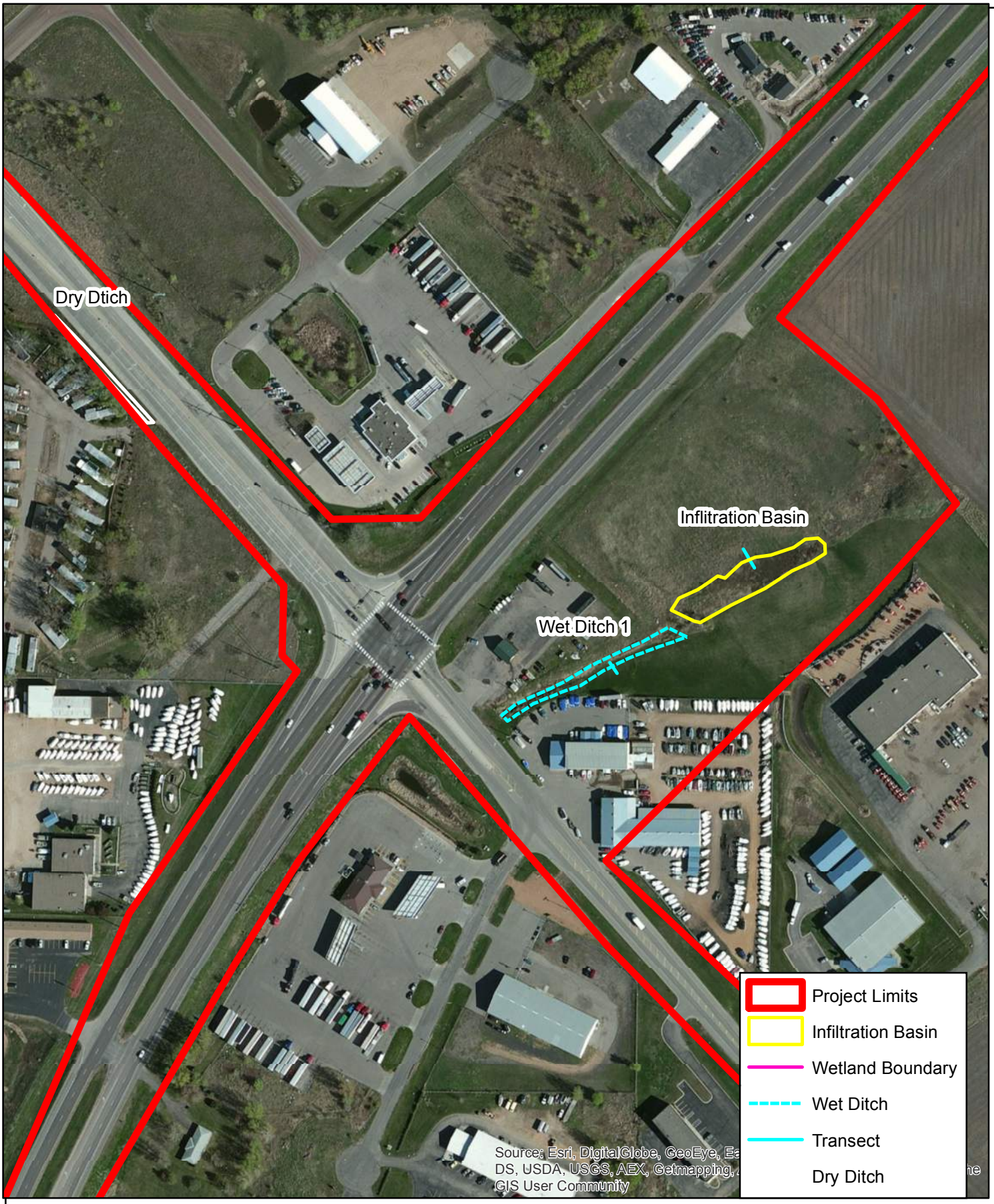

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Figure 6a - Wetland Delineation Updated

TH 169 and TH 41

Scott County

N

0 250 Feet

1 inch = 250 feet

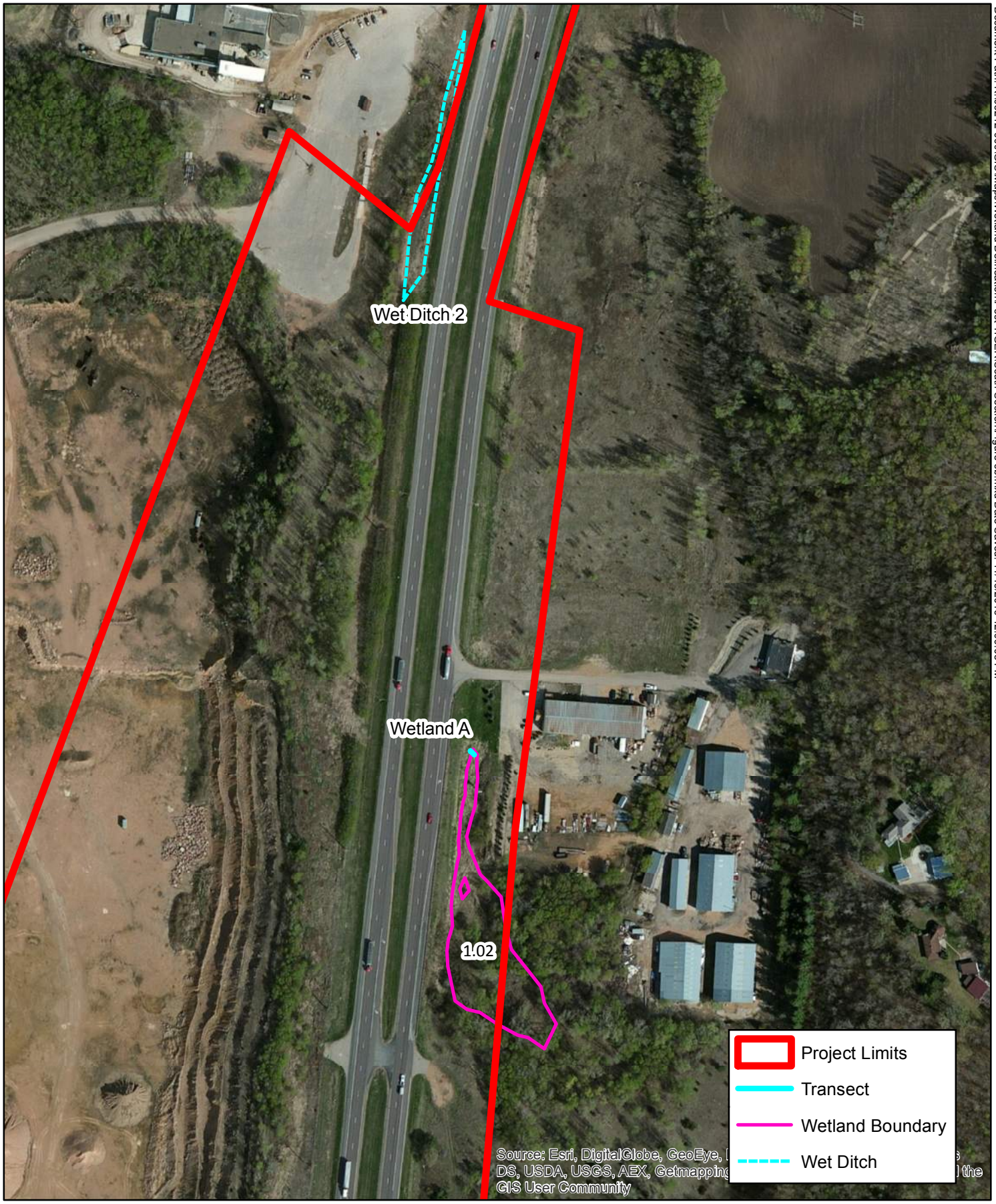

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Figure 6b - Wetland Delineation

TH 169 and TH 41
Scott County

N

0 250 Feet
1 inch = 250 feet

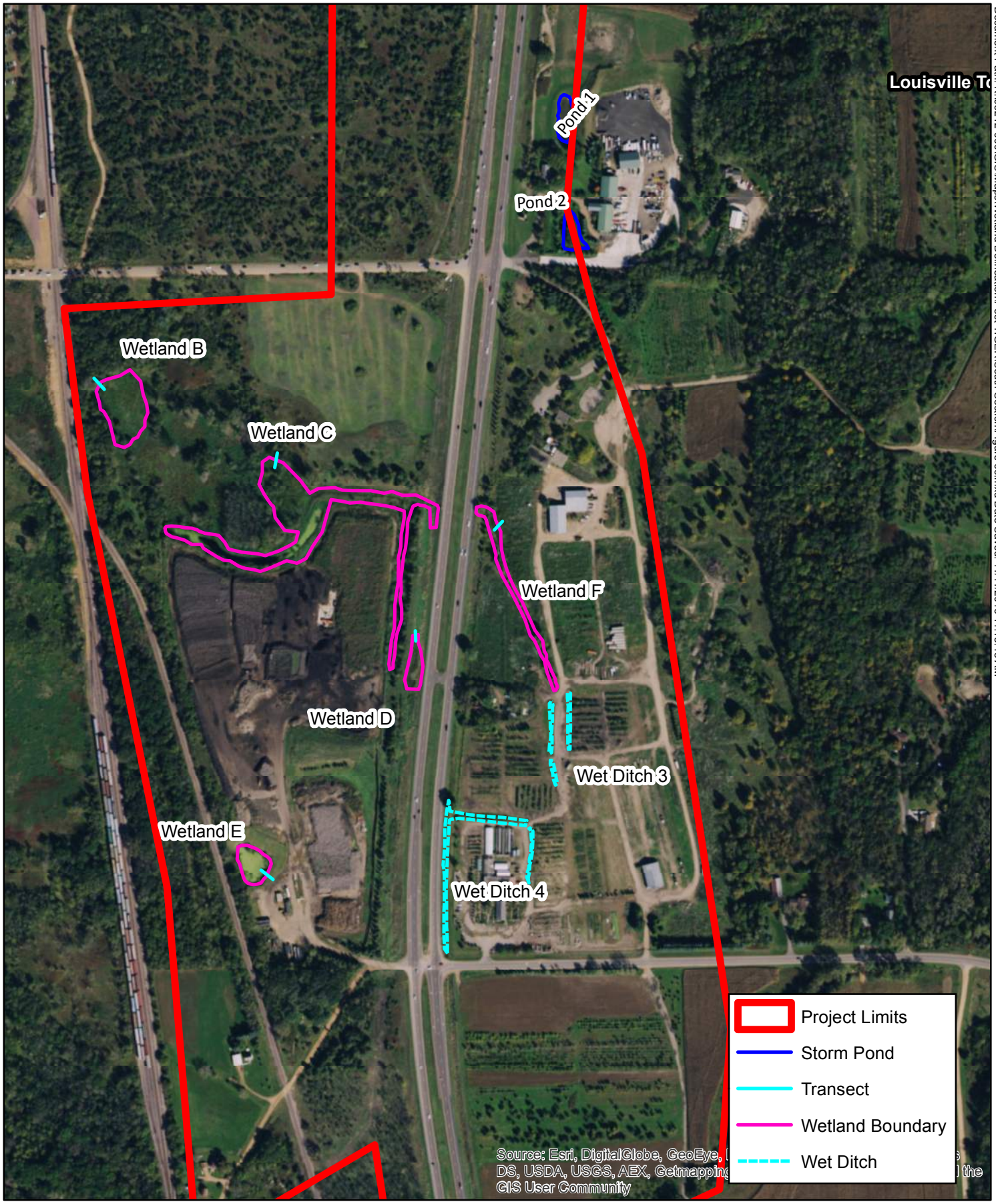

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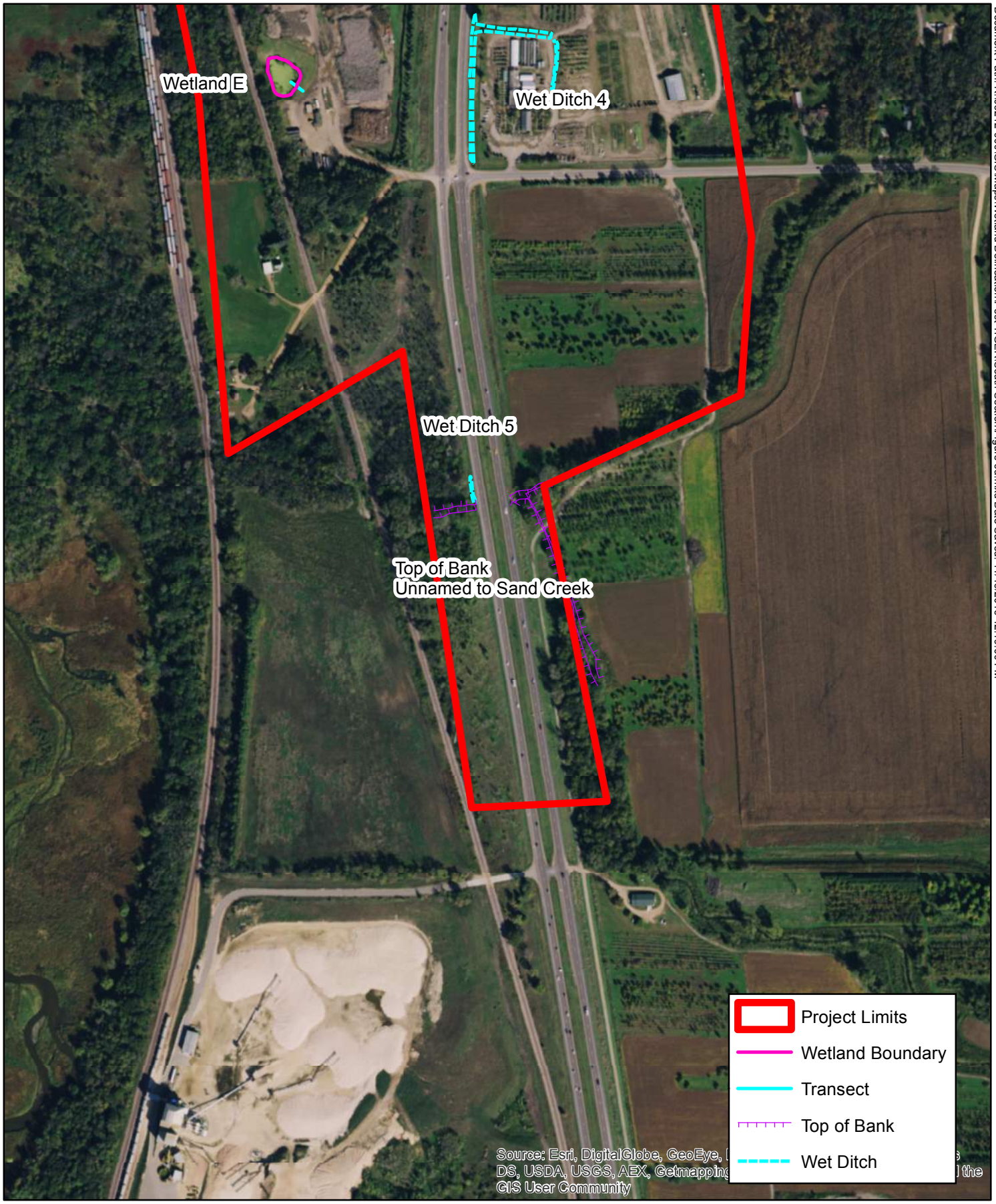
Figure 6c - Wetland Delineation

TH 169 and TH 41
Scott County

N

0 500 Feet
1 inch = 484 feet



Document Path: K:\03212-000\GIS\Maps\Wetland Delineation\Post TIGER\South Section\Figure 6d.mxd Date Saved: 11/16/2016 12:19:00 PM

Figure 6d - Wetland Delineation

TH 169 and TH 41
Scott County

N

0 500 Feet
1 inch = 494 feet

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: CSAH 169/41 South | City/County: Scott | Sampling Date: 9/15/2016

Applicant/Owner: Scott County | State: MN | Sampling Point: A1 Up

Investigator(s): Dustin S. Laura M. | Section, Township, Range: S28, T115, R23

Landform (hillslope, terrace, etc.): Hillslope | Local relief (concave, convex, none): Concave

Slope (%): 0-2% | Lat: 44.750701 | Long: -93.585977 | Datum: WGS84

Soil Map Unit Name: Stony Land | NWI Classification: PEM1A

Are climatic/hydrologic conditions of the site typical for this time of the year? N (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed?

Are vegetation ____, soil ____, or hydrology ____ naturally problematic?

Are "normal circumstances" present? Yes

SUMMARY OF FINDINGS

(If needed, explain any answers in remarks.)

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

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

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	0	= Total Cover	

Sapling/Shrub stratum (Plot size: 15')			
1			
2			
3			
4			
5			
	0	= Total Cover	

Herb stratum (Plot size: 5')			
1 *Phalaris arundinacea*	40	Y	FACW
2 *Poa Pratensis*	20	Y	FAC
3 *Plantago major*	20	Y	FAC
4 *Taraxacum officinale*	10	N	FACU
5 *Cirsium arvense*	10	N	FACU
6			
7			
8			
9			
10			
	100	= Total Cover	

Woody vine stratum (Plot size: 30')			
1			
2			
	0	= Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across all Strata: 3 (B)

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

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0
FACW species	40	x 2 =	80
FAC species	40	x 3 =	120
FACU species	20	x 4 =	80
UPL species	0	x 5 =	0
Column totals	100 (A)		280 (B)

Prevalence Index = B/A = 2.80

Hydrophytic Vegetation Indicators:

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

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

Hydrophytic vegetation present? Y

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

SOIL

Sampling Point: A1 Up

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

Depth (Inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type*	Loc**	Texture	Remarks
0-26	10YR 2/1	100					Loam	
23-36	10YR 2/1	100					Clay Loam	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L)**
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Very Shallow Dark Surface (TF12)
- X Other (explain in remarks)

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? Y

Remarks:

Assumed A12

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

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

Indicators of wetland hydrology present? N

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

Remarks:

Water flows down into ditch from sample point

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: CSAH 169/41 South City/County: Scott Sampling Date: 9/15/2016

Applicant/Owner: Scott County State: MN Sampling Point: A1 Wet

Investigator(s): Dustin S. Laura M. Section, Township, Range: S28, T115, R23

Landform (hillslope, terrace, etc.): Ditch Local relief (concave, convex, none): Concave

Slope (%): 0-2% Lat: 44.750701 Long: -93.585977 Datum: WGS84

Soil Map Unit Name: Stony Land NWI Classification: PEM1A

Are climatic/hydrologic conditions of the site typical for this time of the year? N (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed?

Are vegetation ____, soil ____, or hydrology ____ naturally problematic?

Are "normal circumstances" present? Yes

SUMMARY OF FINDINGS

(If needed, explain any answers in remarks.)

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

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

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	0	= Total Cover	

Sapling/Shrub stratum (Plot size: 15')			
1			
2			
3			
4			
5			
	0	= Total Cover	

Herb stratum (Plot size: 5')			
1 *Carex lacustris*	60	Y	OBL
2 *Phalaris arundinacea*	40	Y	FACW
3			
4			
5			
6			
7			
8			
9			
10			
	100	= Total Cover	

Woody vine stratum (Plot size: 30')			
1			
2			
	0	= Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across all Strata: 2 (B)

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

Prevalence Index Worksheet

Total % Cover of:

OBL species	60	x 1 =	60
FACW species	40	x 2 =	80
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column totals	100 (A)		140 (B)

Prevalence Index = B/A = 1.40

Hydrophytic Vegetation Indicators:

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

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

Hydrophytic vegetation present? Y

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

SOIL

Sampling Point: A1 Wet

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

Depth (Inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type*	Loc**	Texture	Remarks
0-23	10YR 2/1	100					Loam	
23-36	10YR 2/1	100					Clay Loam	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L)**
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Very Shallow Dark Surface (TF12)
- X Other (explain in remarks)

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? Y

Remarks:

Assumed A12

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- X Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

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

Indicators of wetland hydrology present? Y

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

Remarks:

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: CSAH 169/41 South City/County: Scott Sampling Date: 9/13/2016

Applicant/Owner: Scott County State: MN Sampling Point: B1 Up

Investigator(s): Dustin S. Laura M. Section, Township, Range: S28, T115, R23

Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Concave

Slope (%): 3-5% Lat: 44.73917 Long: -93.593214 Datum: WGS84

Soil Map Unit Name: Terril loam NWI Classification: PEMB

Are climatic/hydrologic conditions of the site typical for this time of the year? N (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed?

Are vegetation ____, soil ____, or hydrology ____ naturally problematic?

Are "normal circumstances" present? Yes

SUMMARY OF FINDINGS

(If needed, explain any answers in remarks.)

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

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

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species	Indicator Staus
1 *Populus deltoides*	30	Y	FAC
2			
3			
4			
5			
	30	= Total Cover	

Sapling/Shrub stratum (Plot size: 15')			
1 *Rhamnus cathartica*	40	Y	FAC
2			
3			
4			
5			
	40	= Total Cover	

Herb stratum (Plot size: 5')			
1 *Parthenocissus quinquefolia*	50	Y	FACU
2 *Sonchus oleraceus*	30	Y	FACU
3			
4			
5			
6			
7			
8			
9			
10			
	80	= Total Cover	

Woody vine stratum (Plot size: 30')			
1			
2			
	0	= Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 2 (A)

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

Percent of Dominant Species that are OBL, FACW, or FAC: 50.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0	
FACW species	0	x 2 =	0	
FAC species	70	x 3 =	210	
FACU species	80	x 4 =	320	
UPL species	0	x 5 =	0	
Column totals	150	(A)	530	(B)

Prevalence Index = B/A = 3.53

Hydrophytic Vegetation Indicators:

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

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

Hydrophytic vegetation present? N

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

SOIL

Sampling Point: B1 Up

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

Depth (Inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type*	Loc**	Texture	Remarks
0-18	10YR 2/1	100					Loam	
18-24	10YR 2/2	100					Clay Loam	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

___ Histisol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ 2 cm Muck (A10)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ 5 cm Mucky Peat or Peat (S3)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

___ Coast Prairie Redox (A16) (**LRR K, L, R**)
___ Dark Surface (S7) (**LRR K, L)**
___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
___ Very Shallow Dark Surface (TF12)
___ Other (explain in remarks)

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

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

Hydric soil present? N

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9)
___ Aquatic Fauna (B13)
___ True Aquatic Plants (B14)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres on Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Thin Muck Surface (C7)
___ Gauge or Well Data (D9)
___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

___ Surface Soil Cracks (B6)
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Stunted or Stressed Plants (D1)
___ Geomorphic Position (D2)
___ FAC-Neutral Test (D5)

Field Observations:

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

Indicators of wetland hydrology present? N

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

Remarks:

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: CSAH 169/41 South | City/County: Scott | Sampling Date: 9/13/2016

Applicant/Owner: Scott County | State: MN | Sampling Point: B1 Wet

Investigator(s): Dustin S. Laura M. | Section, Township, Range: S28, T115, R23

Landform (hillslope, terrace, etc.): Depression | Local relief (concave, convex, none): Concave

Slope (%): 0-2% | Lat: 44.739114 | Long: -93.593194 | Datum: WGS84

Soil Map Unit Name: Terril loam | NWI Classification: PEM1A

Are climatic/hydrologic conditions of the site typical for this time of the year? N (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed?

Are vegetation ____, soil ____, or hydrology ____ naturally problematic?

Are "normal circumstances" present? Yes

SUMMARY OF FINDINGS

(If needed, explain any answers in remarks.)

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

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

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species	Indicator Staus
1 *Acer negundo*	30	Y	FAC
2			
3			
4			
5			
	30	= Total Cover	

Sapling/Shrub stratum (Plot size: 15')			
1	40	Y	
2			
3			
4			
5			
	40	= Total Cover	

Herb stratum (Plot size: 5')			
1 *Phalaris arundinacea*	100	Y	FACW
2			
3			
4			
5			
6			
7			
8			
9			
10			
	100	= Total Cover	

Woody vine stratum (Plot size: 30')			
1 *Vitis riparia*	15	Y	FACW
2			
	15	= Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 3 (A)

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

Percent of Dominant Species that are OBL, FACW, or FAC: 75.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0
FACW species	115	x 2 =	230
FAC species	30	x 3 =	90
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column totals	145 (A)		320 (B)

Prevalence Index = B/A = 2.21

Hydrophytic Vegetation Indicators:

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

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

Hydrophytic vegetation present? Y

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

SOIL

Sampling Point: B1 Wet

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

Depth (Inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type*	Loc**	Texture	Remarks
0-24	10YR 2/1	100					Loam	
24-28	10YR 5/1	95	10YR 4/4	5	C	M	Clay Loam	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- X Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L)**
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? Y

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

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

Indicators of wetland hydrology present? Y

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

Remarks:

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: CSAH 169/41 South | City/County: Scott | Sampling Date: 9/13/2016

Applicant/Owner: Scott County | State: MN | Sampling Point: C1 Up

Investigator(s): Dustin S. Laura M. | Section, Township, Range: S28, T115, R23

Landform (hillslope, terrace, etc.): Hillslope | Local relief (concave, convex, none): Concave

Slope (%): 3-5% | Lat: 44.73917 | Long: -93.593194 | Datum: WGS84

Soil Map Unit Name: Terril loam | NWI Classification: PEM1A

Are climatic/hydrologic conditions of the site typical for this time of the year? N (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed?

Are vegetation ____, soil ____, or hydrology ____ naturally problematic?

Are "normal circumstances" present? Yes

SUMMARY OF FINDINGS

(If needed, explain any answers in remarks.)

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

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

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species	Indicator Staus
1 *Populus deltoides*	15	Y	FAC
2			
3			
4			
5			
	15	= Total Cover	

Sapling/Shrub stratum (Plot size: 15')			
1 *Rubus idaeus*	10	Y	FACU
2			
3			
4			
5			
	10	= Total Cover	

Herb stratum (Plot size: 5')			
1 *Cirsium arvense*	50	Y	FACU
2 *Phalaris arundinacea*	25	Y	FACW
3 *Verbascum thapsus*	15	N	UPL
4			
5			
6			
7			
8			
9			
10			
	90	= Total Cover	

Woody vine stratum (Plot size: 30')			
1 *Vitis riparia*	10	Y	FACW
2			
	10	= Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 3 (A)

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

Percent of Dominant Species that are OBL, FACW, or FAC: 60.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0
FACW species	35	x 2 =	70
FAC species	15	x 3 =	45
FACU species	60	x 4 =	240
UPL species	15	x 5 =	75
Column totals	125 (A)		430 (B)

Prevalence Index = B/A = 3.44

Hydrophytic Vegetation Indicators:

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

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

Hydrophytic vegetation present? Y

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

SOIL

Sampling Point: C1 Up

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

Depth (Inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type*	Loc**	Texture	Remarks
0-13	10YR 2/1	100					Loam	
13-21	10YR 2/2	100					Loam	
21-24	10YR 3/3	100					Clay Loam	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

___ Histisol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ 2 cm Muck (A10)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ 5 cm Mucky Peat or Peat (S3)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

___ Coast Prairie Redox (A16) (**LRR K, L, R**)
___ Dark Surface (S7) (**LRR K, L)**
___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
___ Very Shallow Dark Surface (TF12)
___ Other (explain in remarks)

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

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

Hydric soil present? N

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9)
___ Aquatic Fauna (B13)
___ True Aquatic Plants (B14)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres on Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Thin Muck Surface (C7)
___ Gauge or Well Data (D9)
___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

___ Surface Soil Cracks (B6)
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Stunted or Stressed Plants (D1)
___ Geomorphic Position (D2)
___ FAC-Neutral Test (D5)

Field Observations:

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

Indicators of wetland hydrology present? N

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

Remarks:

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: CSAH 169/41 South | City/County: Scott | Sampling Date: 9/13/2016

Applicant/Owner: Scott County | State: MN | Sampling Point: C1 Wet

Investigator(s): Dustin S. Laura M. | Section, Township, Range: S28, T115, R23

Landform (hillslope, terrace, etc.): Depression | Local relief (concave, convex, none): Concave

Slope (%): 0-2% | Lat: 44.739114 | Long: -93.593214 | Datum: WGS84

Soil Map Unit Name: Terril loam | NWI Classification: PEM1A

Are climatic/hydrologic conditions of the site typical for this time of the year? N (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed?

Are vegetation ____, soil ____, or hydrology X naturally problematic?

Are "normal circumstances" present? Yes

SUMMARY OF FINDINGS

(If needed, explain any answers in remarks.)

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

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

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species	Indicator Staus
1 *Populus deltoides*	15	Y	FAC
2			
3			
4			
5			
	15	= Total Cover	

Sapling/Shrub stratum (Plot size: 15')			
1			
2			
3			
4			
5			
	0	= Total Cover	

Herb stratum (Plot size: 5')			
1 *Phalaris arundinacea*	50	Y	FACW
2 *Cirsium arvense*	25	Y	FACU
3 *Rumex crispus*	20	Y	FAC
4			
5			
6			
7			
8			
9			
10			
	95	= Total Cover	

Woody vine stratum (Plot size: 30')			
1			
2			
	0	= Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 3 (A)

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

Percent of Dominant Species that are OBL, FACW, or FAC: 75.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0
FACW species	50	x 2 =	100
FAC species	35	x 3 =	105
FACU species	25	x 4 =	100
UPL species	0	x 5 =	0
Column totals	110 (A)		305 (B)

Prevalence Index = B/A = 2.77

Hydrophytic Vegetation Indicators:

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

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

Hydrophytic vegetation present? Y

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

SOIL

Sampling Point: C1 Wet

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

Depth (Inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type*	Loc**	Texture	Remarks
0-19	10YR 2/1	100					Loam	
19-26	10YR 3/1	100					Clay Loam	
26-30	10YR 5/2	95	10YR 4/3	5	C	M	Clay Loam	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- X Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L)**
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? Y

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- X Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

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

Indicators of wetland hydrology present? Y

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

Remarks:

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: CSAH 169/41 South City/County: Scott Sampling Date: 9/13/2016

Applicant/Owner: Scott County State: MN Sampling Point: D1 Up

Investigator(s): Dustin S. Laura M. Section, Township, Range: S28, T115, R23

Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Concave

Slope (%): 3-5% Lat: 44.736347 Long: -93.588864 Datum: WGS84

Soil Map Unit Name: Copaston silt loam NWI Classification: NA

Are climatic/hydrologic conditions of the site typical for this time of the year? N (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed?

Are vegetation ____, soil ____, or hydrology ____ naturally problematic?

Are "normal circumstances" present? Yes

SUMMARY OF FINDINGS

(If needed, explain any answers in remarks.)

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

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

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	0	= Total Cover	

Sapling/Shrub stratum (Plot size: 15')			
1			
2			
3			
4			
5			
	0	= Total Cover	

Herb stratum (Plot size: 5')			
1 *Phalaris arundinacea*	90	Y	FACW
2 *Asclepias syriaca*	10	N	FACU
3			
4			
5			
6			
7			
8			
9			
10			
	100	= Total Cover	

Woody vine stratum (Plot size: 30')			
1			
2			
	0	= Total Cover	

Dominance Test Worksheet

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

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

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

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0
FACW species	90	x 2 =	180
FAC species	0	x 3 =	0
FACU species	10	x 4 =	40
UPL species	0	x 5 =	0
Column totals	100 (A)		220 (B)

Prevalence Index = B/A = 2.20

Hydrophytic Vegetation Indicators:

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

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

Hydrophytic vegetation present? Y

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

SOIL

Sampling Point: D1 Up

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

Depth (Inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type*	Loc**	Texture	Remarks
0-18	10YR 2/1	100					Silt Loam	
18-24	10YR 3/2	100					Clay Loam	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

___ Histisol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ 2 cm Muck (A10)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ 5 cm Mucky Peat or Peat (S3)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

___ Coast Prairie Redox (A16) (**LRR K, L, R**)
___ Dark Surface (S7) (**LRR K, L)**
___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
___ Very Shallow Dark Surface (TF12)
___ Other (explain in remarks)

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

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

Hydric soil present? N

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9)
___ Aquatic Fauna (B13)
___ True Aquatic Plants (B14)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres on Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Thin Muck Surface (C7)
___ Gauge or Well Data (D9)
___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

___ Surface Soil Cracks (B6)
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Stunted or Stressed Plants (D1)
___ Geomorphic Position (D2)
X FAC-Neutral Test (D5)

Field Observations:

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

Indicators of wetland hydrology present? N

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

Remarks:

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: CSAH 169/41 South City/County: Scott Sampling Date: 9/13/2016

Applicant/Owner: Scott County State: MN Sampling Point: D1 Wet

Investigator(s): Dustin S. Laura M. Section, Township, Range: S28, T115, R23

Landform (hillslope, terrace, etc.): Ditch Local relief (concave, convex, none): Concave

Slope (%): 0-2% Lat: 44.736256 Long: -93.588879 Datum: WGS84

Soil Map Unit Name: Copaston silt loam NWI Classification: NA

Are climatic/hydrologic conditions of the site typical for this time of the year? N (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed?

Are vegetation ____, soil ____, or hydrology ____ naturally problematic?

Are "normal circumstances" present? Yes

SUMMARY OF FINDINGS

(If needed, explain any answers in remarks.)

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

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

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	0	= Total Cover	

Sapling/Shrub stratum (Plot size: 15')			
1			
2			
3			
4			
5			
	0	= Total Cover	

Herb stratum (Plot size: 5')			
1 *Phalaris arundinacea*	100	Y	FACW
2			
3			
4			
5			
6			
7			
8			
9			
10			
	100	= Total Cover	

Woody vine stratum (Plot size: 30')			
1			
2			
	0	= Total Cover	

Dominance Test Worksheet

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

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

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

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0
FACW species	100	x 2 =	200
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column totals	100 (A)		200 (B)

Prevalence Index = B/A = 2.00

Hydrophytic Vegetation Indicators:

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

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

Hydrophytic vegetation present? Y

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

SOIL

Sampling Point: D1 Wet

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

Depth (Inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type*	Loc**	Texture	Remarks
0-8	10YR 2/1	100					Silt Loam	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L)**
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Very Shallow Dark Surface (TF12)
- X Other (explain in remarks)

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

Restrictive Layer (if observed):
Type: Compacted Rock
Depth (inches): 8

Hydric soil present? Y

Remarks:
Assumed hydric based on land scape and other indicators met.

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- X Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

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

Indicators of wetland hydrology present? Y

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

Remarks:

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: CSAH 169/41 South | City/County: Scott | Sampling Date: 9/13/2016

Applicant/Owner: Scott County | State: MN | Sampling Point: E1 Up

Investigator(s): Dustin S. Laura M. | Section, Township, Range: S28, T115, R23

Landform (hillslope, terrace, etc.): Terrace | Local relief (concave, convex, none): Concave

Slope (%): 3-5% | Lat: 44.733932 | Long: -93.591 | Datum: WGS84

Soil Map Unit Name: Dorchester | NWI Classification: PABFx

Are climatic/hydrologic conditions of the site typical for this time of the year? N (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed?

Are vegetation ____, soil ____, or hydrology ____ naturally problematic?

Are "normal circumstances" present? Yes

SUMMARY OF FINDINGS

(If needed, explain any answers in remarks.)

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

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

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	0	= Total Cover	

Sapling/Shrub stratum (Plot size: 15')	Absolute % Cover	Dominant Species	Indicator Staus
1	40	Y	
2			
3			
4			
5			
	40	= Total Cover	

Herb stratum (Plot size: 5')	Absolute % Cover	Dominant Species	Indicator Staus
1 *Phalaris arundinacea*	50	Y	FACW
2 *Sonchus arvensis*	25	Y	FACU
3 *Rumex crispus*	10	N	FAC
4 *Taraxacum officinale*	10	N	FACU
5 *Daucus carota*	5	N	UPL
6			
7			
8			
9			
10			
	100	= Total Cover	

Woody vine stratum (Plot size: 30')	Absolute % Cover	Dominant Species	Indicator Staus
1 *Fallopia convolvulus*	10	Y	FACU
2			
	10	= Total Cover	

Dominance Test Worksheet

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

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

Percent of Dominant Species that are OBL, FACW, or FAC: 25.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0
FACW species	50	x 2 =	100
FAC species	10	x 3 =	30
FACU species	45	x 4 =	180
UPL species	5	x 5 =	25
Column totals	110 (A)		335 (B)

Prevalence Index = B/A = 3.05

Hydrophytic Vegetation Indicators:

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

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

Hydrophytic vegetation present? N

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

SOIL

Sampling Point: E1 Up

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

Depth (Inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type*	Loc**	Texture	Remarks
0-12	10YR 3/3	100					Loam	
12-14	10YR 4/1	100					Pea Gravel	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L)**
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

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

Restrictive Layer (if observed):

Type: Gravel

Depth (inches): 14

Hydric soil present? N

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

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

Indicators of wetland hydrology present? N

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

Remarks:

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: CSAH 169/41 South City/County: Scott Sampling Date: 9/13/2016

Applicant/Owner: Scott County State: MN Sampling Point: E1 Wet

Investigator(s): Dustin S. Laura M. Section, Township, Range: S28, T115, R23

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave

Slope (%): 0-2% Lat: 44.733932 Long: -93.591 Datum: WGS84

Soil Map Unit Name: Dorchester NWI Classification: PABFx

Are climatic/hydrologic conditions of the site typical for this time of the year? N (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed?

Are vegetation ____, soil ____, or hydrology ____ naturally problematic?

Are "normal circumstances" present? Yes

SUMMARY OF FINDINGS

(If needed, explain any answers in remarks.)

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

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

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	0	= Total Cover	

Sapling/Shrub stratum (Plot size: 15')	Absolute % Cover	Dominant Species	Indicator Staus
1	40	Y	
2			
3			
4			
5			
	40	= Total Cover	

Herb stratum (Plot size: 5')	Absolute % Cover	Dominant Species	Indicator Staus
1 *Phalaris arundinacea*	75	Y	FACW
2 *Typha angustifolia*	25	Y	OBL
3			
4			
5			
6			
7			
8			
9			
10			
	100	= Total Cover	

Woody vine stratum (Plot size: 30')	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
	0	= Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across all Strata: 3 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 66.67% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	25	x 1 =	25
FACW species	75	x 2 =	150
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column totals	100 (A)		175 (B)

Prevalence Index = B/A = 1.75

Hydrophytic Vegetation Indicators:

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

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

Hydrophytic vegetation present? Y

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

SOIL

Sampling Point: E1 Wet

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

Depth (Inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type*	Loc**	Texture	Remarks
0-10	10YR 2/1	100					Loam	
10-12	10YR 4/1	100					Pea Gravel	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L)**
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Very Shallow Dark Surface (TF12)
- X Other (explain in remarks)

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

Restrictive Layer (if observed):

Type: Gravel

Depth (inches): 12

Hydric soil present? Y

Remarks:

Strom pond lined with restricted gravel layer. Assumed hydric on vegetation and hydrology.

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

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

Indicators of wetland hydrology present? Y

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

Remarks:

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: CSAH 169/41 South | City/County: Scott | Sampling Date: 9/13/2016

Applicant/Owner: Scott County | State: MN | Sampling Point: F1 Up

Investigator(s): Dustin S. Laura M. | Section, Township, Range: S28, T115, R23

Landform (hillslope, terrace, etc.): Depression | Local relief (concave, convex, none): Concave

Slope (%): 0-2% | Lat: 44.737608 | Long: -93.587756 | Datum: WGS84

Soil Map Unit Name: Dorchester | NWI Classification: PABFx

Are climatic/hydrologic conditions of the site typical for this time of the year? N (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed?

Are vegetation ____, soil ____, or hydrology ____ naturally problematic?

Are "normal circumstances" present? Yes

SUMMARY OF FINDINGS

(If needed, explain any answers in remarks.)

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

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

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	0	= Total Cover	

Sapling/Shrub stratum (Plot size: 15')	Absolute % Cover	Dominant Species	Indicator Staus
1	40	Y	
2			
3			
4			
5			
	40	= Total Cover	

Herb stratum (Plot size: 5')	Absolute % Cover	Dominant Species	Indicator Staus
1 *Phalaris arundinacea*	75	Y	FACW
2 *Sonchus arvensis*	25	Y	FACU
3			
4			
5			
6			
7			
8			
9			
10			
	100	= Total Cover	

Woody vine stratum (Plot size: 30')	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
	0	= Total Cover	

Dominance Test Worksheet

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

Total Number of Dominant Species Across all Strata: 3 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 33.33% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0
FACW species	75	x 2 =	150
FAC species	0	x 3 =	0
FACU species	25	x 4 =	100
UPL species	0	x 5 =	0
Column totals	100 (A)		250 (B)

Prevalence Index = B/A = 2.50

Hydrophytic Vegetation Indicators:

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

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

Hydrophytic vegetation present? Y

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

SOIL

Sampling Point: F1 Up

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

Depth (Inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type*	Loc**	Texture	Remarks
0-15	10YR 2/1	100					Loam	
15-24	10YR 3/2	100					Clay Loam	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

___ Histisol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ 2 cm Muck (A10)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ 5 cm Mucky Peat or Peat (S3)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

___ Coast Prairie Redox (A16) (**LRR K, L, R**)
___ Dark Surface (S7) (**LRR K, L)**
___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
___ Very Shallow Dark Surface (TF12)
___ Other (explain in remarks)

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

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

Hydric soil present? N

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9)
___ Aquatic Fauna (B13)
___ True Aquatic Plants (B14)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres on Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Thin Muck Surface (C7)
___ Gauge or Well Data (D9)
___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

___ Surface Soil Cracks (B6)
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Stunted or Stressed Plants (D1)
___ Geomorphic Position (D2)
___ FAC-Neutral Test (D5)

Field Observations:

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

Indicators of wetland hydrology present? N

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

Remarks:

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: CSAH 169/41 South | City/County: Scott | Sampling Date: 9/13/2016

Applicant/Owner: Scott County | State: MN | Sampling Point: F1 Wet

Investigator(s): Dustin S. Laura M. | Section, Township, Range: S28, T115, R23

Landform (hillslope, terrace, etc.): Depression | Local relief (concave, convex, none): Concave

Slope (%): 0-2% | Lat: 44.737608 | Long: -93.587756 | Datum: WGS84

Soil Map Unit Name: Dorchester | NWI Classification: PABFx

Are climatic/hydrologic conditions of the site typical for this time of the year? N (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed?

Are vegetation ____, soil ____, or hydrology ____ naturally problematic?

Are "normal circumstances" present? Yes

SUMMARY OF FINDINGS

(If needed, explain any answers in remarks.)

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

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

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	0	= Total Cover	

Sapling/Shrub stratum (Plot size: 15')	Absolute % Cover	Dominant Species	Indicator Staus
1	40	Y	
2			
3			
4			
5			
	40	= Total Cover	

Herb stratum (Plot size: 5')	Absolute % Cover	Dominant Species	Indicator Staus
1 *Typha angustifolia*	75	Y	OBL
2 *Phalaris arundinacea*	25	Y	FACW
3			
4			
5			
6			
7			
8			
9			
10			
	100	= Total Cover	

Woody vine stratum (Plot size: 30')	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
	0	= Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across all Strata: 3 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 66.67% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	75	x 1 =	75
FACW species	25	x 2 =	50
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column totals	100 (A)		125 (B)

Prevalence Index = B/A = 1.25

Hydrophytic Vegetation Indicators:

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

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

Hydrophytic vegetation present? Y

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

SOIL

Sampling Point: F1 Wet

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

Depth (Inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type*	Loc**	Texture	Remarks
0-10	10YR 2/1	100					Sandy Sediment	
10-18	10YR 2/1	100					Loamy Clay	
18-24	10YR 2/1	100					Clay	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L)**
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Very Shallow Dark Surface (TF12)
- X Other (explain in remarks)

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? Y

Remarks:

Assumed A12

HYDROLOGY

Wetland Hydrology Indicators:

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

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

Surface water present?	Yes	X	No	___	Depth (inches):	3
Water table present?	Yes	X	No	___	Depth (inches):	0
Saturation present? (includes capillary fringe)	Yes	X	No	___	Depth (inches):	0

Indicators of wetland hydrology present? Y

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

Remarks:

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: Scott TH 169 &TH 41 City/County: Shakopee Sampling Date: 9/15/2016

Applicant/Owner: Scott County State: MN Sampling Point: Infiltration Basin 1

Investigator(s): Dustin Simonson Section, Township, Range: S15 T115 R23

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave

Slope (%): 0-2% Lat: 44.765982 Long: -93.576238 Datum:

Soil Map Unit Name: Estherville NWI Classification: NA

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed?

Are vegetation ____, soil ____, or hydrology ____ naturally problematic?

Are "normal circumstances" present? Yes

SUMMARY OF FINDINGS

(If needed, explain any answers in remarks.)

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

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

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	0	= Total Cover	

Sapling/Shrub stratum (Plot size: 15)			
1			
2			
3			
4			
5			
	0	= Total Cover	

Herb stratum (Plot size: 5)			
1 *Sorghastrum nutans*	100	Y	FACU
2			
3			
4			
5			
6			
7			
8			
9			
10			
	100	= Total Cover	

Woody vine stratum (Plot size: 30)			
1			
2			
	0	= Total Cover	

Dominance Test Worksheet

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

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

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

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0	
FACW species	0	x 2 =	0	
FAC species	0	x 3 =	0	
FACU species	100	x 4 =	400	
UPL species	0	x 5 =	0	
Column totals	100	(A)	400	(B)

Prevalence Index = B/A = 4.00

Hydrophytic Vegetation Indicators:

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

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

Hydrophytic vegetation present? N

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

SOIL

Sampling Point: Infiltration Basin 1

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

Depth (Inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type*	Loc**	Texture	Remarks
0-4	10YR 2/2	100					Sand	
4-12	10YR 4/4	100					Gravel Fill	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L)**
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

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

Restrictive Layer (if observed):

Type: Rock

Depth (inches): 12

Hydric soil present? N

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

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

Indicators of wetland hydrology present? N

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

Remarks:

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: Scott TH 169 &TH 41 City/County: Shakopee Sampling Date: 9/15/2016

Applicant/Owner: Scott County State: MN Sampling Point: Infiltration Basin 2

Investigator(s): Dustin Simonson Section, Township, Range: S15 T115 R23

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave

Slope (%): 0-2% Lat: 44.765982 Long: -93.576238 Datum:

Soil Map Unit Name: Estherville NWI Classification: NA

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed?

Are vegetation ____, soil ____, or hydrology ____ naturally problematic?

Are "normal circumstances" present? Yes

SUMMARY OF FINDINGS

(If needed, explain any answers in remarks.)

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

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

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	0	= Total Cover	

Sapling/Shrub stratum (Plot size: 15)			
1			
2			
3			
4			
5			
	0	= Total Cover	

Herb stratum (Plot size: 5)			
1 *Carex lacustris*	70	Y	OBL
2			
3			
4			
5			
6			
7			
8			
9			
10			
	70	= Total Cover	

Woody vine stratum (Plot size: 30)			
1			
2			
	0	= Total Cover	

Dominance Test Worksheet

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

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

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

Prevalence Index Worksheet

Total % Cover of:

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

Prevalence Index = B/A = 1.00

Hydrophytic Vegetation Indicators:

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

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

Hydrophytic vegetation present? Y

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

Open water 30% cover

SOIL

Sampling Point: Infiltration Basin 2

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

Depth (Inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type*	Loc**	Texture	Remarks
0-2	10YR 2/1	100					Sediment	Runoff
2-8	10YR 2/1	100					Sandy Clay	
8-10	10YR 2/1	100					Sand	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L)**
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? N

Remarks:

Standing water made getting a deeper sand sample impossible

HYDROLOGY

Wetland Hydrology Indicators:

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

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

Surface water present?	Yes	X	No	___	Depth (inches):	3
Water table present?	Yes	X	No	___	Depth (inches):	Surface
Saturation present? (includes capillary fringe)	Yes	X	No	___	Depth (inches):	Surface

Indicators of wetland hydrology present? Y

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

Remarks:

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: Scott TH 169 &TH 41 City/County: Shakopee Sampling Date: 9/15/2016

Applicant/Owner: Scott County State: MN Sampling Point: Ditch 1 Up

Investigator(s): Dustin Simonson Section, Township, Range: S15 T115 R23

Landform (hillslope, terrace, etc.): Ditch Slope Local relief (concave, convex, none): Concave

Slope (%): 5-7% Lat: 44.765982 Long: -93.576238 Datum:

Soil Map Unit Name: Estherville NWI Classification: NA

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)

Are vegetation X, soil ____, or hydrology ____ significantly disturbed?

Are vegetation ____, soil ____, or hydrology ____ naturally problematic?

Are "normal circumstances" present? No

SUMMARY OF FINDINGS

(If needed, explain any answers in remarks.)

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

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

Mowed edge up to ditch slope

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	0	= Total Cover	

Sapling/Shrub stratum (Plot size: 15)	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	0	= Total Cover	

Herb stratum (Plot size: 5)	Absolute % Cover	Dominant Species	Indicator Staus
1 *Poa pratensis*	60	Y	FAC
2 *Phalaris arundinacea*	40	Y	FACW
3			
4			
5			
6			
7			
8			
9			
10			
	100	= Total Cover	

Woody vine stratum (Plot size: 30)	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
	0	= Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across all Strata: 2 (B)

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

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0
FACW species	40	x 2 =	80
FAC species	60	x 3 =	180
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column totals	100 (A)		260 (B)

Prevalence Index = B/A = 2.60

Hydrophytic Vegetation Indicators:

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

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

Hydrophytic vegetation present? Y

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

SOIL

Sampling Point: Ditch 1 Up

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

Depth (Inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type*	Loc**	Texture	Remarks
0-8	10YR 2/2	100					Sand	
8-14	10YR 4/4	100					Gravely Sand	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L)**
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

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

Restrictive Layer (if observed):

Type: Rocky

Depth (inches): 14

Hydric soil present? N

Remarks:

Sample taken on upslope of ditch. Area has been urbanized resulting in an excess gravel creating a restrictive layer.

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

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

Indicators of wetland hydrology present? N

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

Remarks:

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: Scott TH 169 &TH 41 City/County: Shakopee Sampling Date: 9/15/2016

Applicant/Owner: Scott County State: MN Sampling Point: Ditch 1 Wet

Investigator(s): Dustin Simonson Section, Township, Range: S15 T115 R23

Landform (hillslope, terrace, etc.): Ditch Local relief (concave, convex, none): Concave

Slope (%): 0-2% Lat: 44.765982 Long: -93.576238 Datum:

Soil Map Unit Name: Estherville NWI Classification: NA

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed?

Are vegetation ____, soil ____, or hydrology ____ naturally problematic?

Are "normal circumstances" present? Yes

SUMMARY OF FINDINGS

(If needed, explain any answers in remarks.)

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

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

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	0	= Total Cover	

Sapling/Shrub stratum (Plot size: 15)			
1			
2			
3			
4			
5			
	0	= Total Cover	

Herb stratum (Plot size: 5)			
1 *Phalaris arundinacea*	60	Y	FACW
2 *Typha angustifolia*	40	Y	OBL
3			
4			
5			
6			
7			
8			
9			
10			
	100	= Total Cover	

Woody vine stratum (Plot size: 30)			
1			
2			
	0	= Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across all Strata: 2 (B)

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

Prevalence Index Worksheet

Total % Cover of:

OBL species	40	x 1 =	40
FACW species	60	x 2 =	120
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column totals	100 (A)		160 (B)

Prevalence Index = B/A = 1.60

Hydrophytic Vegetation Indicators:

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

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

Hydrophytic vegetation present? Y

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

SOIL

Sampling Point: Ditch 1 Wet

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

Depth (Inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type*	Loc**	Texture	Remarks

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L)**
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Very Shallow Dark Surface (TF12)
- X Other (explain in remarks)

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? Y

Remarks:

No Soil sample could be taken in the wetland due to high flowing water within the ditch. Based on land form, vegetatio

HYDROLOGY

Wetland Hydrology Indicators:

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

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

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

Indicators of wetland hydrology present? Y

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

Remarks:

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: CSAH 169/41 South City/County: Scott Sampling Date: 9/13/2016

Applicant/Owner: Scott County State: MN Sampling Point: Wet Ditch 3

Investigator(s): Dustin S. Laura M. Section, Township, Range: S28, T115, R23

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave

Slope (%): 0-2% Lat: 44.735744 Long: -93.586675 Datum: WGS84

Soil Map Unit Name: Comgrey silty clay loam/stony land NWI Classification: NA

Are climatic/hydrologic conditions of the site typical for this time of the year? N (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed?

Are vegetation ____, soil ____, or hydrology ____ naturally problematic?

Are "normal circumstances" present? Yes

SUMMARY OF FINDINGS

(If needed, explain any answers in remarks.)

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

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

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	0	= Total Cover	

Sapling/Shrub stratum (Plot size: 15')	Absolute % Cover	Dominant Species	Indicator Staus
1	40	Y	
2			
3			
4			
5			
	40	= Total Cover	

Herb stratum (Plot size: 5')	Absolute % Cover	Dominant Species	Indicator Staus
1 *Typha angustifolia*	50	Y	OBL
2 *Phalaris arundinacea*	50	Y	FACW
3			
4			
5			
6			
7			
8			
9			
10			
	100	= Total Cover	

Woody vine stratum (Plot size: 30')	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
	0	= Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across all Strata: 3 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 66.67% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	50	x 1 =	50
FACW species	50	x 2 =	100
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column totals	100 (A)		150 (B)

Prevalence Index = B/A = 1.50

Hydrophytic Vegetation Indicators:

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

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

Hydrophytic vegetation present? Y

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

SOIL

Sampling Point: Wet Ditch 3

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

Depth (Inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type*	Loc**	Texture	Remarks
0-8	10YR 2/1	100					Loam	
8-16	10YR 2/1	100					Gravel Sediment	
16-24	10YR 2/1	100					Loam	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

___ Histisol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ 2 cm Muck (A10)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ 5 cm Mucky Peat or Peat (S3)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

___ Coast Prairie Redox (A16) (**LRR K, L, R**)
___ Dark Surface (S7) (**LRR K, L)**
___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
___ Very Shallow Dark Surface (TF12)
___ Other (explain in remarks)

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

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

Hydric soil present? N

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

___ Surface Water (A1)
___ High Water Table (A2)
X Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9)
___ Aquatic Fauna (B13)
___ True Aquatic Plants (B14)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres on Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Thin Muck Surface (C7)
___ Gauge or Well Data (D9)
___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

___ Surface Soil Cracks (B6)
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Stunted or Stressed Plants (D1)
X Geomorphic Position (D2)
X FAC-Neutral Test (D5)

Field Observations:

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

Indicators of wetland hydrology present? Y

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

Remarks:
Ditch collecting excess water from irrigation system.

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: CSAH 169/41 South | City/County: Scott | Sampling Date: 9/13/2016

Applicant/Owner: Scott County | State: MN | Sampling Point: Wet Ditch 5

Investigator(s): Dustin S. Laura M. | Section, Township, Range: S28, T115, R23

Landform (hillslope, terrace, etc.): Depression | Local relief (concave, convex, none): Concave

Slope (%): 0-2% | Lat: 44.735744 | Long: -93.586675 | Datum: WGS84

Soil Map Unit Name: Comgrey silty clay loam/stony land | NWI Classification: NA

Are climatic/hydrologic conditions of the site typical for this time of the year? N (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed?

Are vegetation ____, soil ____, or hydrology ____ naturally problematic?

Are "normal circumstances" present? Yes

SUMMARY OF FINDINGS

(If needed, explain any answers in remarks.)

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

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

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	0	= Total Cover	

Sapling/Shrub stratum (Plot size: 15')	Absolute % Cover	Dominant Species	Indicator Staus
1	40	Y	
2			
3			
4			
5			
	40	= Total Cover	

Herb stratum (Plot size: 5')	Absolute % Cover	Dominant Species	Indicator Staus
1 *Typha angustifolia*	50	Y	OBL
2 *Phalaris arundinacea*	50	Y	FACW
3			
4			
5			
6			
7			
8			
9			
10			
	100	= Total Cover	

Woody vine stratum (Plot size: 30')	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
	0	= Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across all Strata: 3 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 66.67% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	50	x 1 =	50
FACW species	50	x 2 =	100
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column totals	100 (A)		150 (B)

Prevalence Index = B/A = 1.50

Hydrophytic Vegetation Indicators:

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

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

Hydrophytic vegetation present? Y

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

SOIL

Sampling Point: Wet Ditch 5

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

Depth (Inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type*	Loc**	Texture	Remarks
0-8	10YR 2/1	100					Loam	
8-16	10YR 2/1	100					Gravel Sediment	
16-24	10YR 2/1	100					Loam	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

___ Histisol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ 2 cm Muck (A10)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ 5 cm Mucky Peat or Peat (S3)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

___ Coast Prairie Redox (A16) (**LRR K, L, R**)
___ Dark Surface (S7) (**LRR K, L)**
___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
___ Very Shallow Dark Surface (TF12)
___ Other (explain in remarks)

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

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

Hydric soil present? N

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

___ Surface Water (A1)
___ High Water Table (A2)
X Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9)
___ Aquatic Fauna (B13)
___ True Aquatic Plants (B14)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres on Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Thin Muck Surface (C7)
___ Gauge or Well Data (D9)
___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

___ Surface Soil Cracks (B6)
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Stunted or Stressed Plants (D1)
X Geomorphic Position (D2)
X FAC-Neutral Test (D5)

Field Observations:

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

Indicators of wetland hydrology present? Y

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

Remarks:
Ditch collecting excess water from irrigation system.

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: Scott TH 169 &TH 41 City/County: Shakopee Sampling Date: 9/15/2016

Applicant/Owner: Scott County State: MN Sampling Point: Infiltration Basin 2

Investigator(s): Dustin Simonson Section, Township, Range: S15 T115 R23

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave

Slope (%): 0-2% Lat: 44.765982 Long: -93.576238 Datum:

Soil Map Unit Name: Estherville NWI Classification: NA

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed?

Are vegetation ____, soil ____, or hydrology ____ naturally problematic?

Are "normal circumstances" present? Yes

SUMMARY OF FINDINGS

(If needed, explain any answers in remarks.)

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

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

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	0	= Total Cover	

Sapling/Shrub stratum (Plot size: 15)			
1			
2			
3			
4			
5			
	0	= Total Cover	

Herb stratum (Plot size: 5)			
1 *Carex lacustris*	70	Y	OBL
2			
3			
4			
5			
6			
7			
8			
9			
10			
	70	= Total Cover	

Woody vine stratum (Plot size: 30)			
1			
2			
	0	= Total Cover	

Dominance Test Worksheet

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

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

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

Prevalence Index Worksheet

Total % Cover of:

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

Prevalence Index = B/A = 1.00

Hydrophytic Vegetation Indicators:

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

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

Hydrophytic vegetation present? Y

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

Open water 30% cover

SOIL

Sampling Point: Infiltration Basin 2

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

Depth (Inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type*	Loc**	Texture	Remarks
0-2	10YR 2/1	100					Sediment	Runoff
2-8	10YR 2/1	100					Sandy Clay	
8-10	10YR 2/1	100					Sand	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L)**
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? N

Remarks:

Standing water made getting a deeper sand sample impossible

HYDROLOGY

Wetland Hydrology Indicators:

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

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

Surface water present?	Yes	X	No	___	Depth (inches):	3
Water table present?	Yes	X	No	___	Depth (inches):	Surface
Saturation present? (includes capillary fringe)	Yes	X	No	___	Depth (inches):	Surface

Indicators of wetland hydrology present? Y

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

Remarks:

APPENDIX C

Wetland Photos

culvert north ditch

Edge of pond

Ponding in wetland B

rock rip rap non wetland

sample point 1 2

Wetland B boundary

Wetland B north

Wetland B sample point

Wetland B

Culvert at end of wet ditch

Storm Pond 1

Unnamed to Sand Creek

Upland Island in Wetland C

Wet Dich South on 169

Wetland C boundary facing south

Wetland C facing north

Wetland D North Boundary

Wetland D

Wetland Ditch North Side

Wetland F

Wetland F2

APPENDIX D

Antecedent Precipitation Data

NRCS method - Rainfall Documentation Worksheet Hydrology Tools for Wetland Determination
NRCS Engineering Field Handbook Chapter 19

Date	9/13/2016	**Landowner/Project**	Scott County
Weather Station	Merriam	**State**	MN
County	Scott	**Growing Season**	Yes
Photo/obs Date	9/13/2016	**Soil Name**	Stony Land

shaded cells are locked or calculated

Long-term rainfall statistics (from WETS table or State Climatology Office)

	Month	**30% chance <**	**30% chance >**	**Precip**	Condition **D**ry, **W**et, **N**ormal	Condition Value	Month Weight Value	Product of Previous 2 Columns
1st Prior Month*	August	3.45	5.37	8.34	W	3	3	9
2nd Prior Month*	July	2.47	4.36	5.01	W	3	2	6
3rd Prior Month*	June	3.21	4.66	3.19	D	1	1	1
							Sum	**16**

*compared to photo/observation date

Note: If sum is	
6 - 9	prior period has been drier than normal
10 - 14	prior period has been normal
15 - 18	prior period has been wetter than normal

Condition value:
Dry =1
Normal =2
Wet =3

Conclusions: **prior period has been wetter than normal**

APPENDIX E

Historic Aerials of Stormwater Ponds

Storm Ponds 2016

Storm Pond 1 Construction 2012

Storm Pond 2 Pre construction 1991

Attachment L – Wetland Assessment and Two Part Finding

WETLAND ASSESSMENT & TWO PART FINDING

County: Scott

Watershed: Lower Minnesota River

State Aid Manual Chapter 5.1, VI.J.

BACKGROUND

Wetlands within the project corridor were delineated in conformance with the US Army Corps of Engineers guidelines in 2015 and 2016, and are shown on **Figures 1 and 2**. Six wetlands were found during the field investigation. The wetland boundaries fell within two different jurisdictions of Local Government Units (LGU). The wetland boundaries have been approved under the Wetland Conservation Act by both MnDOT and Scott County SWCD as joint LGUs on the project and by the US Army Corp of Engineers. The delineation report was submitted to Wetland Conservation Act Local Government Unit (MnDOT & Scott County SWCD) and the US Army Corps of Engineers for final review and approval in October 2016.

WETLAND ASSESSMENT

A table documenting the assessment for the project is attached as **Table 1**.

AVOIDANCE ALTERNATIVES

Various alternatives were reviewed that would have resulted in changes in the overall impacts to the wetlands. There were other alternatives for the project that would not have resulted in changes in the overall impacts to wetlands. These other alternatives are described in the main Categorical Exclusion Determination (CATEX) document. The avoidance alternatives are summarized below, and discussed in detail in the Alternatives section and Attachments D and E of the main CATEX document.

No Build Alternative

The No Build Alternative would continue to have an at-grade, signalized intersection at TH 169 and TH 41/CSAH 78. It would maintain the existing four-lane section on TH 169 with single dedicated left- and right-turn lanes onto TH 41 and CSAH 78 at the signalized intersection. It would also maintain the existing two-lane section on CSAH 78 with single dedicated left- and right-turn lanes onto TH 169 from CSAH 78. The No Build Alternative would also continue to maintain two through lanes on TH 41 from TH 169 to Dem Con Drive/Frontage Road going northbound and a single through lane on TH 41 from Dem Con Drive/Frontage Road going southbound with dual left-turn lanes, a through lane and a right-turn lane at the intersection with TH 169.

In the southern portion of the project area, the No Build Alternative would continue to have an at-grade intersection at TH 169 and CSAH 14, with stop-controlled traffic on CSAH 14 and Smith Drive. It would maintain the existing four-lane section on TH 169 with single dedicated left- and right-turn lanes onto CSAH 14 and Smith Drive at the

intersection. It would also maintain the existing two-lane section on CSAH 14. The No Build Alternative would not modify existing access on TH 169.

Pedestrian facilities under this alternative would be limited to painted crosswalks at the intersection of TH 169 and TH 41/CSAH 78.

The No Build Alternative was not selected as the preferred alternative because it would not resolve existing and projected safety and mobility problems at the TH 169 and TH 41/CSAH 78 intersection or safety and mobility problems noted on TH 169 within the project area. Additionally, the No Build Alternative does not provide for additional pedestrian/bicycle facilities to facilitate crossing of TH 169.

Alternatives Considered

A number of alternatives were developed and evaluated (including the preferred alternative) for the project. Additionally, several alternative concepts were developed for frontage road connections surrounding the TH 169/TH 41/CSAH 78 intersection. As part of a separate alternatives development process coordinated between Scott County, MnDOT, Louisville Township, and property owners, the preferred alternative was developed for the intersection of TH 169 and CSAH 14 as an overpass over TH 169 north of CSAH 14 with associated frontage road connections in the CSAH 14 area. All of the alternatives evaluated attempted to address the project purpose and need.

Alternatives for the Intersection of TH 169 and TH 41/CSAH 78

Development of the intersection alternatives at TH169/TH 41/CSAH 78 included a partial interchange option that provided grade-separated movements in the southbound direction on TH 169 and at-grade elements in the northbound direction. The rest of the alternatives considered were fully grade-separated interchange options. Alternatives considered for frontage road connections would work with any of the proposed intersection concepts and were evaluated in conjunction with the intersection improvement alternatives.

The preferred alternative does not impact any wetlands at the TH 169 and TH 41/CSAH 78 intersection. Because this part of the project does not impact any wetlands, the other intersection alternatives are not discussed in detail. For additional information—including a summary of the reasons for rejection of these alternatives; the criteria that were used in screening the alternatives; a matrix that shows the different alternatives and how well they addressed screening criteria as well as their associated impacts on social, economic and environmental factors pertinent to the project; and details why the alternatives were rejected—see the Alternatives section and Attachments D and E of the main CATEX document.

Alternatives for the Southern Project Area

Traffic on TH 169 near CSAH 14 is currently free flowing – it is not required to stop if travelling north-south through the CSAH 14 intersection. Traffic on public streets (145th Street and 150th Street) currently is controlled by side-street stops and has full access to TH 169. The proposed project replaces the full access to TH 169 with a new overpass of 147th Street over TH 169. The overpass and its associated frontage roads east and west of TH 169 would eliminate existing left-turning movements to and from TH 169. The overpass increases the safety of the TH 169 and CSAH 14 intersection and adds

pedestrian access to the adjacent properties. During the environmental review process, two alternatives for the overpass were developed. The wetland impacts for the two alternatives are described below and in the Avoidance Alternatives table. The difference between the concept that was incorporated into the Preferred Alternative (Alternative #2) and the one (Alternative #1) that was rejected was the location of the overpass.

Southern Overpass (Alternative #1)

The overpass location in this alternative is located slightly further to the south than the preferred alternative location. **Figure 16** of the main CATEX document shows the concept with the more southerly overpass. This alternative avoids wetland impacts to Wetlands C and Wetland D and reduces the overall project impacts by 0.36 acres. Two large business properties border the east and west sides of TH 169 in this location. These large properties would both be split up by the overpass and resulting roadway.

This alternative fulfills the purpose and need of the project but creates a large burden on the adjacent property owners. Businesses on both sides of the corridor indicated that the southern location could hamper their operations enough that they were concerned about their ability to remain viable. This alternative was rejected because of the harm that it could do to the local business.

Northern Overpass (Alternative #2, Preferred Alternative)

The overpass location in this alternative is slightly north of the location evaluated in Alternative #1. This alternative increases wetland impacts by 0.38 acres due to the impact of two new wetlands. The overpass would run along the edges of the two wetlands.

This alternative also fulfills the purpose and need of the project. The property owners on both sides of TH 169 supported the northern location due to fewer property impacts in terms of circulation on the properties. This alternative was selected because it meets the project's purpose and need reducing local business impact. The preferred alternative is discussed in further detail in the Alternatives section and Attachments D and E of the main CATEX document.

	AVOIDANCE ALTERNATIVES		
		Anticipated Encroachment per Alternative, acres	
	No Build Alternative	Alternative #1 (Southern overpass)	Alternative # 2 (Northern overpass, Preferred Alternative)
Wetland A	0	1.01 acres	1.01 acres
Wetland B	0	0.86 acres	0.86 acres
Wetland C	0	0	0.17 acres
Wetland D	0	0	0
Wetland E	0	0.42 acres	0.42 acres
Wetland F	0	0.10 acres	0.31 acres
Total, acres	0	2.39 acres	2.77 acres

MINIMIZATION MEASURES

In order to minimize impacts to wetlands, the project plans have incorporated the following minimization measures: review of slopes.

WETLAND IMPACTS

WETLAND IMPACTS (Preferred Alternative)										
	Anticipated Encroachment per Type of Wetland, acres									
	1	1L	2	3	4	5	6	7	8	
Wetland A	1.01									1.01
Wetland B			0.86							0.86
Wetland C			0.17							0.17
Wetland D										
Wetland E						0.42				0.42
Wetland F				0.31						0.31
Total	1.01		1.03	0.31		0.42				2.77

COMPENSATION (REPLACEMENT/ENHANCEMENTS)

It may be determined that the some wetlands identified are incidental to the construction of stormwater ponds or ditches at the same location. If the areas are determined to be incidental, replacement for impacts will not be required. If replacement is determined to be necessary for wetlands impacts, impacts within MnDOT right of way are expected to be replaced via MnDOT's wetland bank at a minimum 2:1 ratio and all other impacts are expected to be replaced via local bank at a minimum 2:1 ratio. The location and type of wetland that will provide the replacement will be evaluated in accordance with the Wetland Conservation Act and US Army Corps of Engineers siting requirements.

	ID # TBD
Location	TBD
onsite, offsite	offsite
Classification	TBD
Approx. Size, acres	5.54
Topographic setting	TBD
Method of construction	N/A
Timetable	In advance

CONCLUSION

Based upon the above factors and considerations, it is determined that there is no practicable alternative to the proposed construction in the identified wetlands, and the proposed action includes all practicable measures to minimize harm to the wetlands.

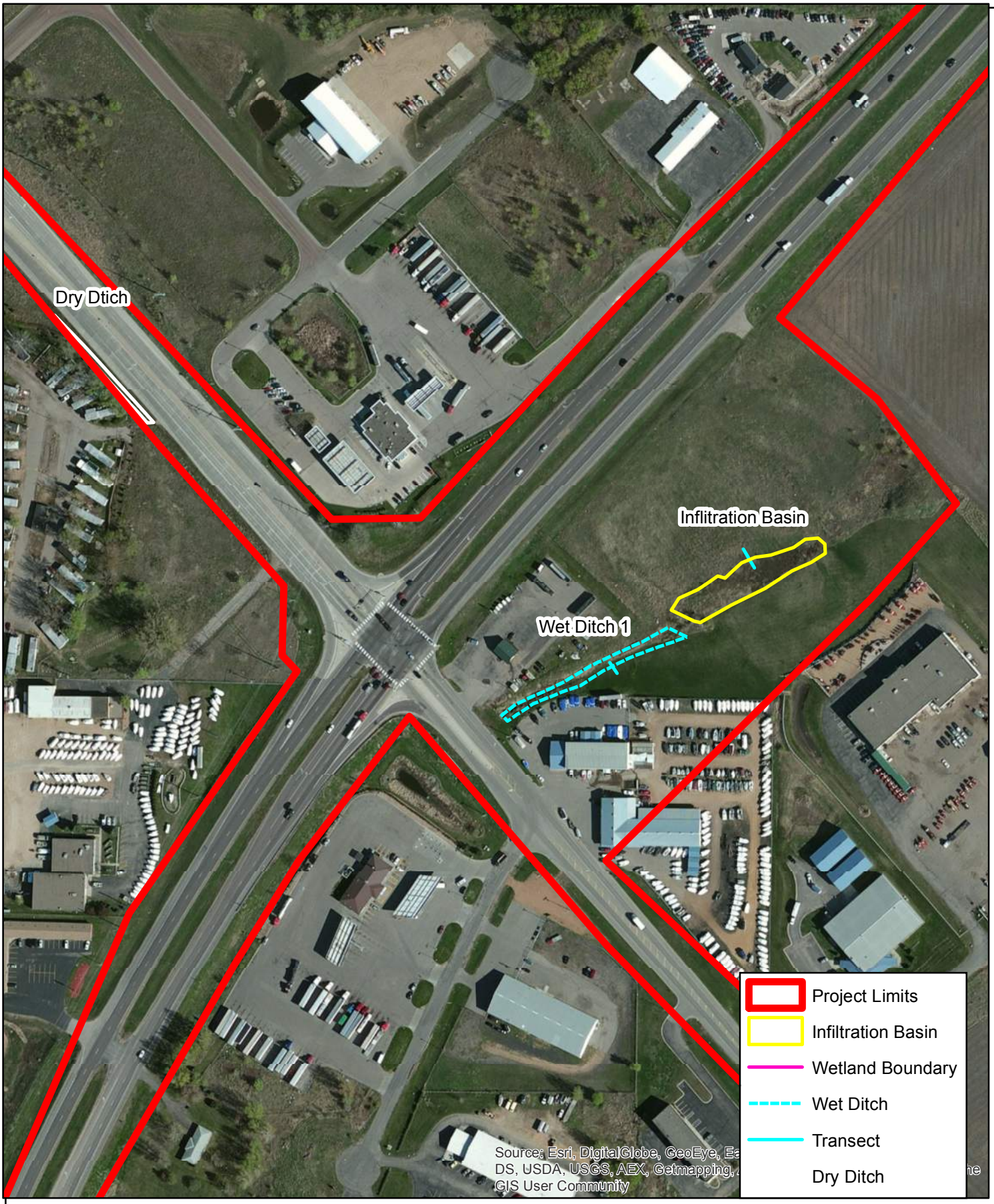
ATTACHMENTS

Table 1: Individual Wetland Impacts

Figure 1: Wetland Delineation

Table 1: Individual Wetland Impacts

WETLAND ASSESSMENT	ID # A	ID # B	ID # C	ID # E	ID #F
Classification (Type of wetland)	**Type 1**	**Type 2**	**Type 2**	**Type 5**	**Type 3**
Approx. Basin Size, acres	**1.01**	**0.86**	**2.58**	**0.42**	**0.31**
Anticipated Encroachment Size, acres	**1.01**	**0.86**	**0.17**	**0.42**	**0.31**
Type of Impact: fill, excavation, drain	**Fill, excavate**	**Fill**	**Fill**	**Fill, excavate**	**Fill**
% Encroachment to Basin Size	**100%**	**100%**	**6%**	**100%**	**100%**
Protected wetland? Y/N	**N**	**N**	**N**	**N**	**N**
Connection to other wetlands? Y/N	**N**	**N**	**N**	**N**	**N**
Impacts to public water supply? Y/N	**N**	**N**	**N**	**N**	**N**
Water Quality impacts? ----recharge/discharge ----water pollution ----flooding ----sedimentation ----erosion	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Impacts to fish/wildlife & habitat?	**N**	**N**	**N**	**N**	**N**
Impacts to recreational, cultural, or scientific uses?	**N**	**N**	**N**	**N**	**N**



Document Path: K:\03212-000\GIS\Maps\Wetland Delineation\Post TIGER\South Section\Figure 6a.mxd Date Saved: 11/11/2016 9:40:13 AM

Figure 1a - Wetland Delineation
TH 169 and TH 41
Scott County

N

0 250 Feet
1 inch = 250 feet

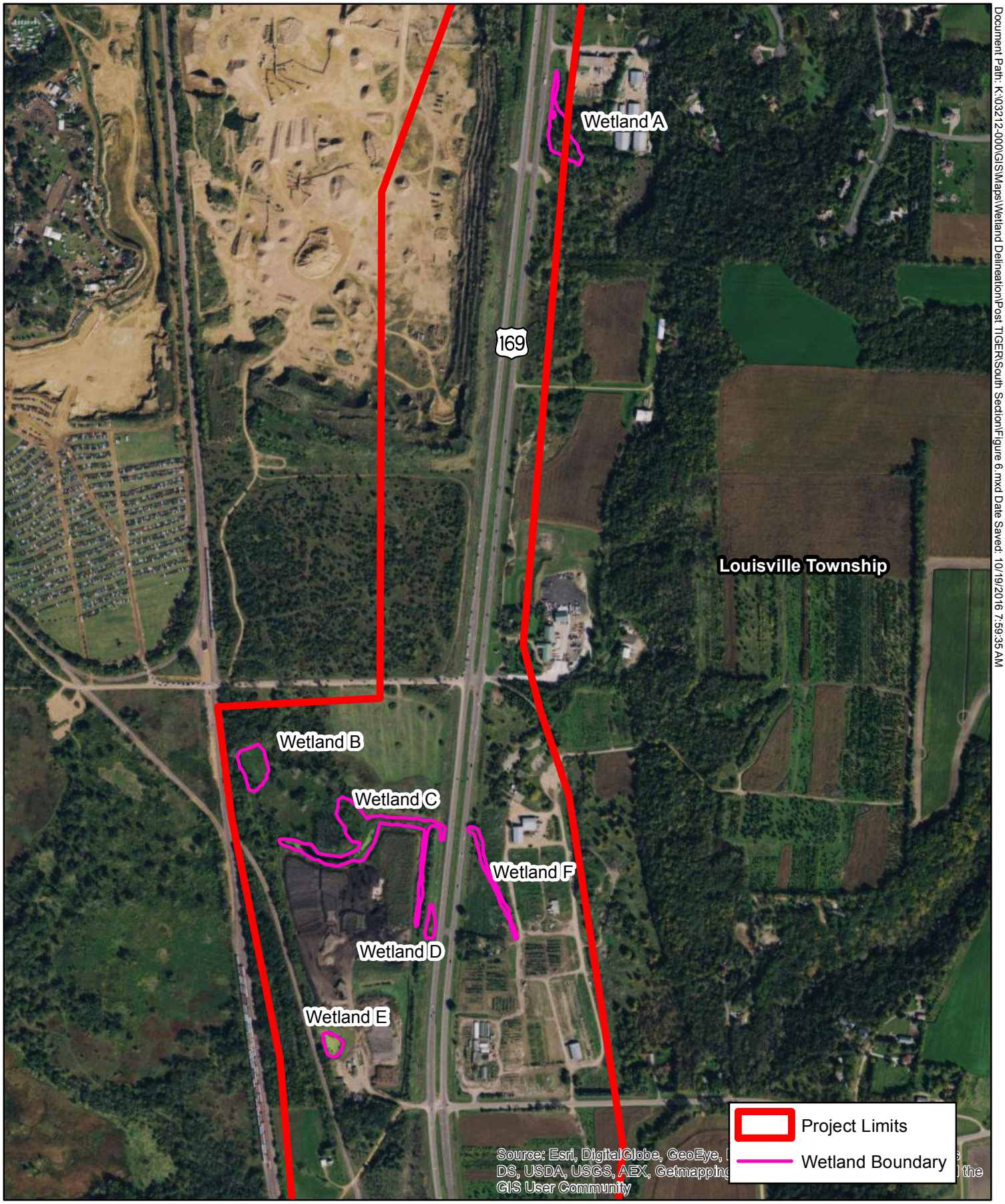


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Figure 1b - Wetland Delineation
TH 169 and TH 41
Scott County

N

0 1,000 Feet
1 inch = 798 feet

Attachment M – Limited Phase I Site Assessments

LIMITED PHASE 1 ENVIRONMENTAL SITE ASSESSMENT
CPT169-06
US169 / TH41 Interchange
City of Shakopee, MN

Prepared for:
Scott County Highway Department

SCOTT COUNTY
SCOTT COUNTY GOVERNMENT CENTER
200 FOURTH AVENUE WEST
SHAKOPEE, MINNESOTA 55379

November 20, 2015

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1937
1957
1964
1970
1980
1990
2000
2005
2015

Appendix D Reconnaissance Photos

1.0 EXECUTIVE SUMMARY

Scott County Public Works is starting the concept development for improvements at the US Highway 169, Trunk Highway (TH) 41, and County Highway (CH) 78 intersection. The proposed project will identify and develop intersection improvements that address safety, mobility, freight, accessibility, and connectivity needs while minimizing impacts to residents, businesses, and natural resources. A number of intersection designs, including interchanges, and a connected frontage road system will be developed and explored. This Limited Phase I Environmental Site Assessment was conducted for the preliminary concept interchange and frontage roads area, see Figure 7. The concept interchange and frontage roads are subject to change as the project is further studied and refined.

A Limited Phase I Environmental Site Assessment (ESA) was conducted in conformance with the scope and limitations of the Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process, American Society of Testing Materials Designation E 1527-05 for CPT169-06. Road improvement project CPT169-06 includes approximately 2500 feet north on US169, 2750 feet south on US169, 1750 feet east on CH 78, and 1250 feet west on TH 41. All distances are based on measurements taken from Figure 7 Preliminary Concept Map from the intersection of US 169 and TH 41. The location of the Project is shown on Figure 1 Location Map. Potential contamination sites were identified based on our review of environmental databases, historical records, interviews with persons familiar with the project area, and a reconnaissance of the project area. In addition, Environmental Data Resources Inc. was retained to conduct a database search of government records.

This assessment has revealed five sites with high potential for contamination. A Phase II may be warranted if further study determines that road construction will occur at or near the location with a high potential for contamination. Please review Section 7 Findings to review recognized environmental conditions (REC) and recommendations.

2.0 INTRODUCTION

2.1 Purpose

The purpose of this Limited Phase I ESA is to identify possible sources of contamination that could impact the proposed Project. We assessed properties within a 1 mile, 0.5 mile, or 100 foot radius of the perimeter of the Project Area.

2.2 Scope of Work

The scope of this work included the following tasks:

- Review historical aerial photographs.
- Interview County and City staff regarding the project.
- Conduct an on-site reconnaissance of the project.
- Rank/classify all identified REC within the Project Area in accordance with high, medium, or low potential for contamination.
- Prepare a report to include an executive summary and a summary of all project preparation and data collection activities undertaken.

2.3 Significant Assumptions

The following were beyond the scope of the assessment:

- Sampling and analysis of radon, lead in water, soil and groundwater samples, and the evaluation of indoor and outdoor air quality, regulatory compliance, industrial hygiene, or noise impacts are beyond the scope of this evaluation.
- Evaluations of buildings within the road corridor or construction limits are beyond the scope of the evaluation.
- The identification of geological or geotechnical hazards were beyond the scope of the assessment.

It is possible that even with the proper application of the methodologies followed in performing this ESA, there may exist conditions that could not be identified within the scope of the review or which were not reasonably identifiable from available information.

The information obtained from our review of environmental databases, historical records, interviews concerning the project, and information obtained from the reconnaissance is reliable. However, this ESA cannot and does not warrant or guarantee that the information provided by these sources is accurate or complete. The methodologies of this assessment are not intended to produce all inclusive or comprehensive results, but rather provide the Scott County Highway Department and the Minnesota Department of Transportation with information relating to the project.

2.4 Limitations and Exceptions of Assessment

The report was compiled based on information available from Federal, State, City and County information in the public domain. The conclusions and opinions herein are based on the information compiled in the report.

No ESA can wholly eliminate uncertainty regarding the potential for contamination in connection with a property or project. Performance of this ESA is intended to reduce, but not eliminate, uncertainty regarding the potential for identifying possible sources of contamination in connection with the project. Other limitations to this project include the following:

- We did not access individual parcels within the project area except for a reconnaissance inspection of the US169 / TH41 interchange.
- Individual parcel owners were not interviewed.
- It is possible that surrounding properties used fuel oil in the past. Spills, leaks, releases of petroleum products could generate contamination.
- Contamination could have occurred on surrounding properties, where there are/were aboveground or underground storage tanks that are/were not registered with the Federal, State, and County, or where hazardous petroleum products and maintenance/cleaning chemicals are/were stored or used.

2.5 Special Terms and Conditions

Recognized environmental conditions (RECs) were ranked as having high, medium, or low potential for contamination. This ranking system is similar to the ranking system used by the Minnesota Department of Transportation. The ranking is used to help the reviewers of this document

understand RECs that are of greater concern compared to others. The rankings are defined as follows:

- High Potential for Contamination – All active and inactive Voluntary Investigation and Cleanup (VIC) and Minnesota Environmental Response and Liability ACT (MERLA) sites, all active and inactive dump sites, all dry cleaner sites, and all active Leaking Underground Storage Tank (LUST) sites.
- Medium Potential for Contamination – All closed LUST sites, all sites with Underground Storage Tanks (USTs) or Aboveground Storage Tanks (ASTs), and salvage yards.
- Low Potential for Contamination – All licensed and inspected hazardous waste generator sites and possibly some commercial and farmstead sites.

2.6 Reliance

This Limited Phase I ESA has been prepared for the exclusive use of Scott County and MNDOT. The scope and classification of Recognized Environmental Concerns (RECs) has been completed to the satisfaction of Scott County for evaluation of potential risk. Reliance on this report by other parties may result in assumptions that are incorrect and misinterpreted. Therefore no other parties, unless given consent by Scott County, should rely upon this Limited Phase I ESA to evaluate risk.

Scott County assumes no responsibility for the accuracy of information obtained from other sources, including other regulatory and governmental agencies, persons interviewed for this project or vendors of public data.

3.0 PROJECT DESCRIPTION

3.1 Location

The road interchange project is located to the west of the City of Shakopee, in Scott County Minnesota in Jackson Township. The road improvement project CPT169-06 includes approximately 2500 feet north on US169, 2750 feet south on US169, 1750 feet east on CH 78, and 1250 feet west on TH 41. All distances measured from the intersection of US 169 and TH 41 based on Figure 7 Preliminary Concept Map.

Twp 115N, Range 23W, Section 15, 16, 21 and 22

Project Name: CPT169-06

3.2 Current Use and Past Uses of the Project Area

Aerial photographs, a site visit, and interviews with Scott County Environmental Health staff confirm that the current use of the Project Area is a roadway through adjoining commercial property. Historical photographs and interviews with Scott County Environmental Health staff confirm that in the 1930s the project area was agricultural with farmsteads. In the late 1950s the project area was agricultural and mining. In approximately the mid-1960s two mobile home parks opened in the area. In 1970 Louisville Landfill, a municipal solid waste landfill, and Anchor Block, a concrete and masonry block manufacture, opened in the area. DemCon a demolition and construction landfill opened in 1990; please see Appendix C Historical Photos.

Scott County Public Works was contacted on the history of the roadway. Their records note that parts of the roadway, within the Project Area, were platted as Shakopee city streets on sub-division plats dated as early as circa 1856. Other parts of the roadway were shown as a main auto road on Highway System Maps, circa 1919. The roadway was constructed as a rural two (2) lane highway, circa 1922, by the State road authority with a designation as a state highway route including some re-alignment of its route in conjunction with the construction of two (2) railroad bridges to provide grade separation between the roadway and railway tracks of two operating railroads. The roadway was designated as US169, circa 1931. The last major improvements were made to the roadway, circa mid-1950's, including reconstruction as an undivided four (4) lane urban highway. The railroad bridges were replaced over US 169, circa mid-1950s. Minor improvements were made to the roadway, circa 1980's into 1990's, including resurfacing by mostly bituminous overlays. The roadway through downtown Shakopee was bypassed by the construction of US 169 as a freeway on new alignment, circa 1996. The state road authority turned back jurisdiction of the bypassed segment of roadway through downtown Shakopee to the County road authority, circa 1997. The County road authority designated the roadway on its County Highway System as County State Aid Highway No. 69.

3.3 Description of Structures, Roads, Other Improvements on the Site

History of the road and railroad is provided above in 3.2. The road improvement corridor is bounded by commercial businesses, such as SuperAmerica, Holiday, and DemCon.

4.0 RECORDS REVIEW

4.1 Physical Setting Sources Review of Available Soil, Bedrock, Groundwater, and Floodplain Information

Soils: Listed below are the soil types within a 100 foot buffer of the road improvement corridor obtained from the Natural Resources Conservation Services Soil Survey. Please see Figure 4 Soil Classification.

TcA	Terril silt loam, 0 to 2 percent slopes
EbB	Estherville gravelly sandy loam, 0 to 6 percent slopes
EbC2	Estherville gravelly sandy loam, 6 to 12 percent slopes, moderately eroded
DbB	Dakota sandy loam, 2 to 6 percent slopes
EbB2	Estherville gravelly sandy loam, 0 to 6 percent slopes, moderately eroded
HeA	Sparta loamy fine sand, 0 to 2 percent slopes
EaA	Estherville loam and sandy loam, 0 to 2 percent slopes
HdB	Hubbard fine sand, 2 to 6 percent slopes
HeB	Hubbard loamy fine sand, 2 to 6 percent slopes
TcA	Terril silt loam, 0 to 2 percent slopes
EaB2	Estherville loam and sandy loam, 2 to 6 percent slopes, moderately eroded
WaB	Waukegan silt loam, w to 6 percent slopes
LcC2	Lester silt loam, 6 to 12 percent slopes, moderately eroded
WaA	Waukegan silt loam, 0 to 2 percent slopes

Bedrock: The easterly portion of the project area where the US169/TH41 interchange is located is over the Prairie du Chien Group bedrock formation. The westerly portion of the project area is above a

large buried valley downcut through the Prairie du Chien Group and underlying bedrock formations. This buried valley formed by stream erosion and subsequently filled with glacial drift during periods of glaciations. The glacial drift typically consists of sand, gravel and clay.

The depth to the bedrock is typically less than 50 feet throughout the project area. The Prairie du Chien Group is typically 140 to 190 feet thick where past erosion has not diminished the thickness of the unit. In the project area the bedrock may be 25 to 70 feet thick due to past erosion of the uppermost portion of this bedrock unit.

Underlying the Prairie du Chien Group is the Jordan Sandstone. The Jordan Sandstone is approximately 80 to 120 feet thick within the project area. The Jordan is underlain by the St Lawrence Formation, the Tunnel City Group (formerly known as the Franconia Formation), the Wonewoc Sandstone (formerly known as the Ironton and Galesville Sandstones), and the Eau Claire Formation.

Please see Figure 5 Bedrock Geology.

Groundwater:

The project area is underlain by several bedrock aquifer systems; the Prairie du Chien-Jordan aquifer is the uppermost aquifer. The underlying St. Lawrence Formation is considered a regional confining bed hydraulically separating the overlying Prairie du Chien-Jordan aquifer from the underlying Tunnel City-Wonewoc (Franconia-Ironton-Galesville) aquifer. The Eau Claire Formation is made of shale, siltstone, and very fine-grained sandstone, averaging about 75 feet in thickness and acts as a confining layer hydraulically separating the overlying Wonewoc from the underlying Mt. Simon-Hinckley aquifer. In addition to the bedrock aquifers, sand layers in the glacial drift may be used as a source of water supply. The groundwater beneath the project site flows north west toward the Minnesota River.

Well Record Review & Wellhead Protection Areas:

Well records from the Minnesota Department of Health (MDH) County Well index were reviewed. Please see Figure 8 for wells found in the MDH CWI database. The project site is not located in a Shakopee Municipal Wellhead Protection Area. There is a section within the 1 mile buffer zone of the project to the NE that is in the Shakopee Municipal Wellhead Protection Area.

Septic:

Septic systems records from the Scott County database were reviewed. Please see Figure 9 for septic system locations.

Floodplain:

Federal Emergency Management Agency (FEMA) maps were reviewed. There is approximately ¼ of a mile of 100 year flood plain on the western edge of the 1 mile project area. Please see Figure 6 FEMA.

4.2 Database Search

A search of various federal, state, and local databases for sites located within a one mile, half mile, or 100 foot radius of the project was performed. The search was performed by EDR. The various databases searched are listed and described in Figure 10.

A regulatory information search of the project area was obtained from EDR. The EDR report is a compilation of records of facilities that are included on current federal and state environmental regulatory databases. Environmental Health staff reviewed the EDR report to identify records that indicate known or potential environmental hazards. Environmental Health staff also reviewed select files available on the Minnesota Pollution Control Agency MPCA website

4.3 Historical Use Information

The history of the corridor and adjoining areas was examined by reviewing sources likely to be useful in developing historical uses of the road improvement corridor. Sources we reviewed include the following: Topographic maps, aerial photographs, and FEMA maps.

Aerial Photograph Review
Aerial photographs that include the project area for the following years were examined:1937,1957,1964,1970,1980,1990,2000, 2005, 2015.
The aerial photographs are included in Appendix C Historical Photographs.

4.4 Additional Record Sources

Fire Insurance Maps were not reviewed for this location.

Recorded Land Records have been collected and reviewed by the Scott Count Highway Department.

5.0 PROPERTY RECONNAISSANCE

Richard Jones (Environmentalist II) and David Guenther (Environmentalist II) of Scott County Environmental Health conducted a reconnaissance of the project area on 10/30/15. The site reconnaissance consisted of a visual inspection of the proposed road improvement project to determine the presence of RECs.

Photographs were taken on 10/30/15, and are included in Appendix D Reconnaissance Photographs. At the time of the reconnaissance inspection, there were 3 areas within the project area that looked like solid waste abandonment.

6.0 INFORMATION FROM INTERVIEWS

An inquiry letter was sent to Louisville and Jackson Township, a Louisville and Jackson Township resident and business owner in the project area, the area Fire Marshal, and the Scott County Environmental Health Department. Responses to inquiry are below:

Peter Schmitt – Scott County Community Development Div. – Environmental Health Dept.
Peter Schmitt, Scott County Environmentalist III (34 years) was interviewed. Please see Figure 11 Scott County Environmental Assessment letter regarding any investigations and complaints.

Tom Pitschneider – Fire Marshal Shakopee Fire Department
Nothing additional concerning the project area.

7.0 FINDINGS

7.1 Database Review

The Limited Phase I ESA was conducted to identify, to the extent possible, potential contamination in the road improvement corridor. A total of 5 high potential, 35 moderate potential and 8 low potential sites were identified during the ESA. The Scott County Environmental Health Database was verified to be current and correct. Potential sites that are within 100 feet of the Project Area are highlighted in bold in the High and Moderate potential sites. The EDR report in Figure 10 was also referred to identify REC's.

Environmental Health recommends that records from the MPCA should be obtained for the selected properties where construction (ground disturbance such as excavation and grading) will occur. It is also recommended that MPCA records be obtained for all property that Scott County may purchase for the road improvement. These records should be reviewed by Scott County Public Works and Environmental Health. A Phase II and test soil borings may be warranted for properties that are high potential for contamination.

High Potential Sites
Criteria for sites ranked as high potential for contamination include all active and inactive Voluntary Investigation and Cleanup (VIC) and Minnesota Environmental Response and Liability ACT (MERLA) sites, all active and inactive dump sites, all drycleaner sites, and all active Leaking Underground Storage Tank (LUST) sites.

Voluntary Investigation and Clean up:

- **Theis Auto Repair at 12706 Chestnut Blvd. (VIC record VP17830 closed April 28, 2004)**

MERLA/Superfund:

- Louisville Landfill Inc. adjacent to Dem-Con Landfill at 3601 130th St. W. Closed municipal solid waste landfill now managed by the MPCA (SR118).

Solid Waste Landfills

- Dem-Con is a demolition/construction landfill licensed by Scott County located at 13020 Dem Con Dr. in Louisville Twp.

Active and inactive dump sites:

- **Anchor Block and Concrete at 13450 Memorial Drive in Louisville Twp. had a dump of solid waste and a minor amount of hazardous waste in the early 1990s. Scott County required that some of the waste to be removed, but most of it was covered with soil.**

All Active LUST sites: none found

Misc:

- Rub-R-Wall at 3136 130 St. W. in Louisville Twp. had an estimated spill of 20-40 gallons of solvent in 1992. During an MPCA inspection in 1993 the clean-up soil pile was found to be missing. Speculation was that it was thin spread on the property, but was never confirmed.

Medium Potential Sites

Criteria for sites ranked as medium potential for contamination include all closed LUST sites, all sites with Underground Storage Tanks (USTs) or Aboveground Storage Tanks (ASTs), and a salvage yard.

Closed LUST sites within ¼ mile (MPCA Database):

- **SuperAmerica at 12835 Ventura Ct. (closed January 9, 2003). MPCA Site ID# LEAK00014045.**
- Elander Mechanical at 2915 133rd St. W. (closed September 30,1994). MPCA Site ID# LEAK00007549.
- **Theis Auto Repair at 12706 Chestnut Blvd. (closed April 28, 2004). The MPCA Site ID# is LEAK00015254**.
- **MNDOT at 12550 Chestnut Blvd. (closed August 18, 1997). The MPCA Site ID# is LEAK00007185**.
- Patriot Auto Sales at 12810 Chestnut Blvd. (Closed February 2, 2004). The MPCA Site ID# is LEAK00015522.
- **Holiday Station store at 12681 Chestnut Blvd.**
  MPCA Site ID# is LEAK00015811 closed April 4, 2005.
  MPCA Site ID# is LEAK00019058 closed August 1, 2013.
  MPCA Site ID# is LEAK00007887 closed April 2, 1996.
- **Anchor Block Co. at 13450 Johnson Memorial Hwy.**
  MPCA Site ID# is LEAK00004755 closed July 29, 1992.
  MPCA Site ID# is LEAK00008096 closed June 20, 1996.
- **Commercial Asphalt Co. at 12355 Chestnut Blvd. (closed November 13, 1996). The MPCA Site ID # is LEAK00007036**.

All Active UST and AST within 1 mile project area (MPCA Database):

Business Name	Street	City	County	TankCount
Anchor Block Co	**13450 Johnson Memorial Dr**	**Shakopee**	**Scott**	**33**
Barton Sand/jackson Twns Pit 746	**12355 Chestnut Blvd**	**Shakopee**	**Scott**	**4**
Commercial Asphalt Co (11)	**12355 Chestnut Blvd**	**Shakopee**	**Scott**	**8**
Commercial Asphalt Co (9)	**3460 W 130th St**	**Shakopee**	**Scott**	**5**
Dem-Con Companies	**13020 Dem-Con Dr**	**Shakopee**	**Scott**	**5**
Ditch Witch Of Minnesota	**12836 Emery Way**	**Shakopee**	**Scott**	**1**
Du-al Construction Co	**3136 W 130th St**	**Shakopee**	**Scott**	**1**
Dueco	**12716 Chestnut Blvd**	**Shakopee**	**Scott**	**3**
Holiday Stationstore #246	**12681 Chestnut Blvd**	**Shakopee**	**Scott**	**9**
Jdf Trucking & Repair	3186 W 130th St	Shakopee	Scott	1
Lano Equipment Inc	**3021 W 133rd St**	**Shakopee**	**Scott**	**1**
Malkerson Sales Inc	12355 Chestnut Blvd	Shakopee	Scott	6
Midwest Utility Equipment	12716 Chestnut Blvd	Shakopee	Scott	1
Mn Valley Wholesale Inc	14505 Johnson Memorial Dr	Shakopee	Scott	4
Nitehawk Express Inc	**3122 W 130th St**	**Shakopee**	**Scott**	**2**
Plehal Black Topping	13060 Demcon Dr	Shakopee	Scott	12
R & R Marine	**12827 Chestnut Blvd**	**Shakopee**	**Scott**	**2**
Resource Recovery Technologies LLC	**3230 130th St**	**Shakopee**	**Scott**	**1**
Shakopee Sand LLC	15566 Johnson Memorial Dr	Shakopee	Scott	5
Shakopee Truck Station/ Mndot	12550 Chestnut Blvd	Shakopee	Scott	8

Specialized Environmental Technologies	14800 Johnson Memorial Dr	Shakopee	Scott	3
SuperAmerica #4439	**12835 Ventura Ct**	**Shakopee**	**Scott**	**6**
Theis Auto Repair (old Gas Sta)	**12706 Chestnut Blvd**	**Shakopee**	**Scott**	**7**
Village Mobile Storage Systems Inc	**3186 W 130th St**	**Shakopee**	**Scott**	**2**

Active Salvage Yard: None Found

Low Potential Sites

Criteria for sites ranked as low potential for contamination include all hazardous waste generator sites and possibly some commercial and farmstead sites.

Generator Name	Site Address	PID	Generator Size
3T REPAIR LLC	3186 130 ST W	79160150	Minimal Generator
ALLEN ADVERTISING PRODUCTS INC	12860 EMERY WAY	60240010	Minimal Generator
ANCHOR BLOCK COMPANY	13450 JOHNSON MEMORIAL DR	79210050	Small Quantity Generator
ANDERSON BUS COMPANY	12830 VENTURA CT	69150444	Minimal Generator
APPLIANCE SERVICE	13122 JOHNSON MEMORIAL DR	70070010	Minimal Generator
APS AUTOWORKS	3136 130 ST W	79160150	Minimal Generator
BODY BY BOB	3198 130 ST W	79160150	Minimal Generator
BRYAN ROCK PRODUCTS INC	13040 DEM CON DR	70320010	Minimal Generator
BRYAN ROCK PRODUCTS INC.	13580 JOHNSON MEMORIAL DR	79210080	Minimal Generator
COMMERCIAL ASPHALT CO PLANT 911	12355 CHESTNUT BLVD	79160010	Very Small Quantity Generator
DEM-CON LANDFILL, LLC	13020 DEM CON DR	70320010	Minimal Generator
FRITZ CABINETRY	12900 VENTURA CT SUITE 2	60170030	Very Small Quantity Generator
G L WULF TRUCKING INC	3134 130 ST W	79160150	Minimal Generator
GARZA MOTORS	12580 JOHNSON MEMORIAL DR	60110010	Minimal Generator
JOHNNY'S AUTO SALES & REPAIR	12832 VENTURA CT	69150444	Very Small Quantity Generator
LANO EQUIPMENT INC	3021 133 ST W	79210210	Minimal Generator
MNDOT - SHAKOPEE	12550 CHESTNUT BLVD	79160090	Minimal Generator
MNDOT - SHAKOPEE	12550 CHESTNUT BLVD	79160090	Minimal Generator
MOMS LANDSCAPING AND DESIGN LLC	12276 JOHNSON MEMORIAL DR	69150030	Minimal Generator
PLEHAL BLACKTOPPING INC	13060 DEM CON DR	70320010	Very Small Quantity Generator
R & R MARINE	12827 CHESTNUT BLVD	69150344	Very Small Quantity Generator
RUS LLC	3200 130 ST W	79160150	Very Small Quantity Generator
SUPERAMERICA #4439	12835 VENTURA CT	60170010	Minimal Generator
TMBC SHAKOPEE	12720 DEM CON DR	69150400	Minimal Generator

Since the low potential sites listed above are all licensed or registered by Scott County Environmental Health as Hazardous Waste Generators and are routinely inspected to ensure that they remain in compliance with Federal, State, and County regulations, they are not identified as RECs of significant concern.

7.2 Property Reconnaissance

The reconnaissance visual inspection did not discover any RECs of concern. The reconnaissance did locate some areas of solid waste abandonment along at the north end of Holiday Lane and just

south of the mobile home park on Dem Con Dr. There also appeared to be a possible abandoned trailer / mobile home just south of the Acorn Mini-Storage. See Appendix D Reconnaissance Photos.

8.0 SIGNATURES, QUALIFICATIONS, AND RESUMES

We declare that, to the best of our professional knowledge and belief, we meet the definition of Environmental Professional as defined in §312.10 of 40 CFR 312 and we have the specific qualifications based on education, training, and experience to assess a property of the nature, history, and setting of the project area.

Environmental Professional means:

(1) a person who possesses sufficient specific education, training, and experience necessary to exercise professional judgment to develop opinions and conclusions regarding conditions indicative of releases or threatened releases (see § 312.1(c)) on, at, in, or to a property, sufficient to meet the objectives and performance factors in § 312.20(e) and (f).

(2) Such a person must:

(i) Hold a current Professional Engineer's or Professional Geologist's license or registration from a state, tribe, or U.S. territory (or the Commonwealth of Puerto Rico) and have the equivalent of three (3) years of full-time relevant experience; or

(ii) Be licensed or certified by the federal government, a state, tribe, or U.S. territory (or the Commonwealth of Puerto Rico) to perform environmental inquiries as defined in §312.21 and have the equivalent of three (3) years of full-time relevant experience; or

(iii) Have a Baccalaureate or higher degree from an accredited institution of higher education in a discipline of engineering or science and the equivalent of five (5) years of full time relevant experience; or

(iv) Have the equivalent of ten (10) years of full-time relevant experience.

(3) An environmental professional should remain current in his or her field through participation in continuing education or other activities.

(4) The definition of environmental professional provided above does not preempt state professional licensing or registration requirements such as those for a professional geologist, engineer, or site remediation professional. Before commencing work, a person should determine the applicability of state professional licensing or registration laws to the activities to be undertaken as part of the inquiry identified in 312.21(b).

(5) A person who does not qualify as an environmental professional under the foregoing definition may assist in the conduct of all appropriate inquiries in accordance with this part if such person is under the supervision or responsible charge of a person meeting the definition of an environmental professional provided above when conducting such activities.

Relevant experience, as used in the definition of environmental professional in this section, means: participation in the performance of all appropriate inquiries investigations, environmental site assessments, or other site investigations that may include environmental analyses, investigations, and remediation which involve the understanding of surface and subsurface environmental conditions and the processes used to evaluate these conditions and for which professional judgment was used to develop opinions regarding conditions indicative of releases or threatened releases (see 312.1(c)) to the subject property.

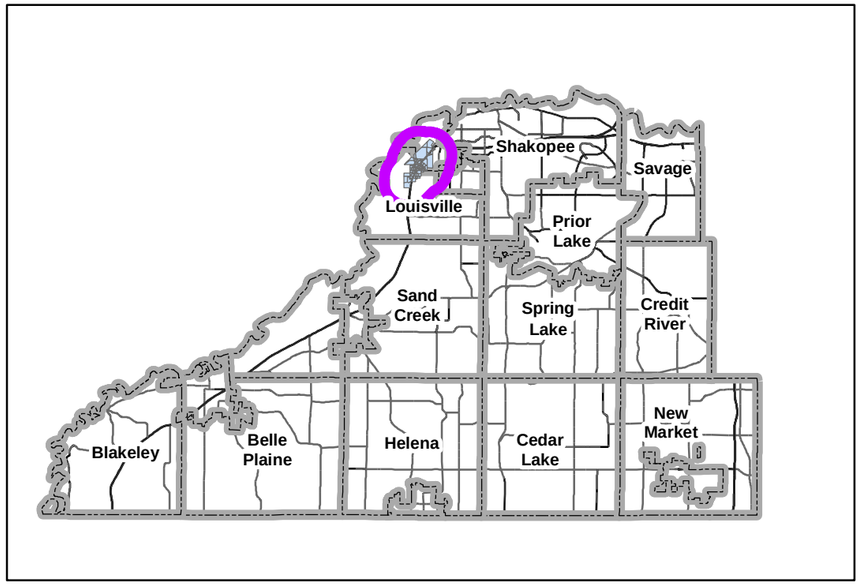
CERTIFICATIONS AND SIGNATURE

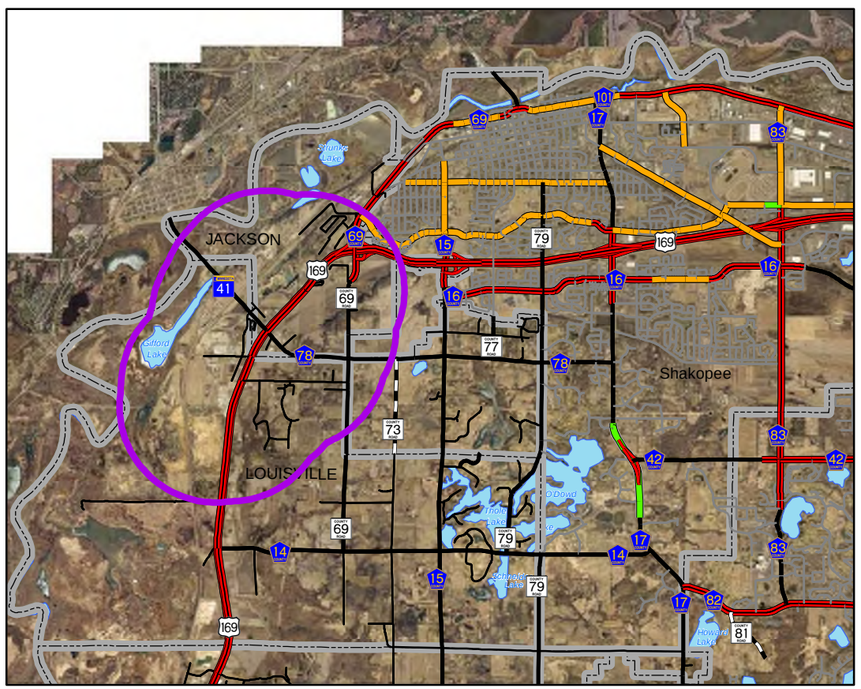
Kate Sedlacek B.S. Environmental Science
Environmental Health and Waste Programs Supervisor
MN Registered Environmental Health Specialist/Sanitarian
MPCA Trained, Qualified and Experienced Hazardous Waste Inspector
MN Subsurface Sewage Treatment Systems Certified Advanced Inspector
OSHA 1910.120 Hazardous Materials Handling 24 Hour Hazwopper Training with annual refreshers

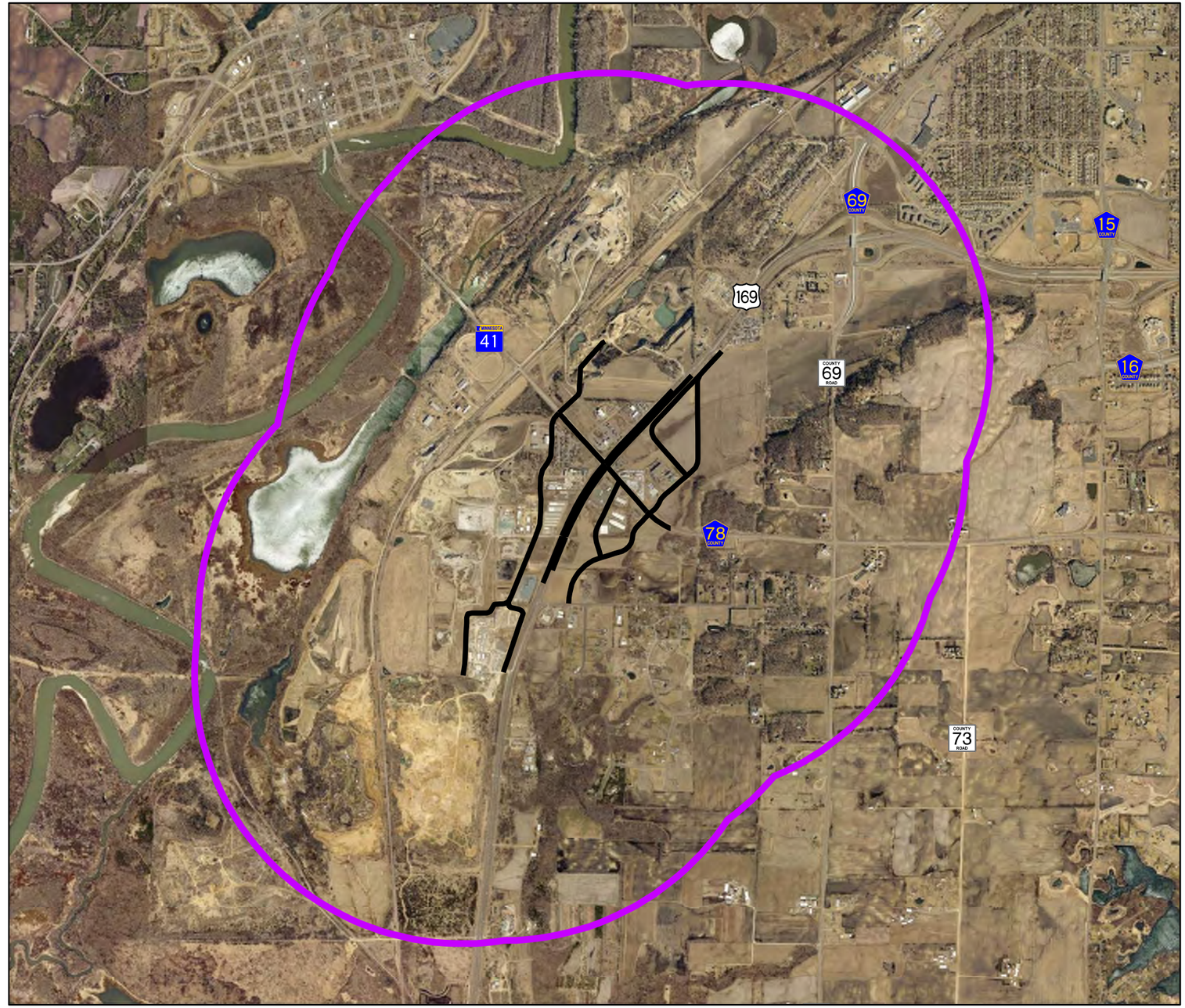
Richard Jones B.S. Ecology
Environmentalist II
Qualified and Experienced Hazardous Waste Inspector
MN Subsurface Sewage Treatment Systems Certified Inspector
OSHA 1910.120 Hazardous Materials Handling 24 Hour Hazwopper Training and annual refreshers

Appendix A Location Maps

Figure 1 Location Map
Figure 2 7.5 Topographic Map
Figure 3 Zoning - Adjacent Properties
Figure 4 Soil Classification
Figure 5 Bedrock Geology
Figure 6 FEMA
Figure 7 Scott County Public Works Preliminary Concept Map







Scott County Community Services
Environmental Services
200 Fourth Avenue West
Shakopee, MN 55379

US 169/TH 41/CSAH 78 Interchange

N

FIGURE 1 LOCATION MAP
10-1-15

1 Mile Project Area
Hwy 169, TH 41, CSAH 78 Alignment

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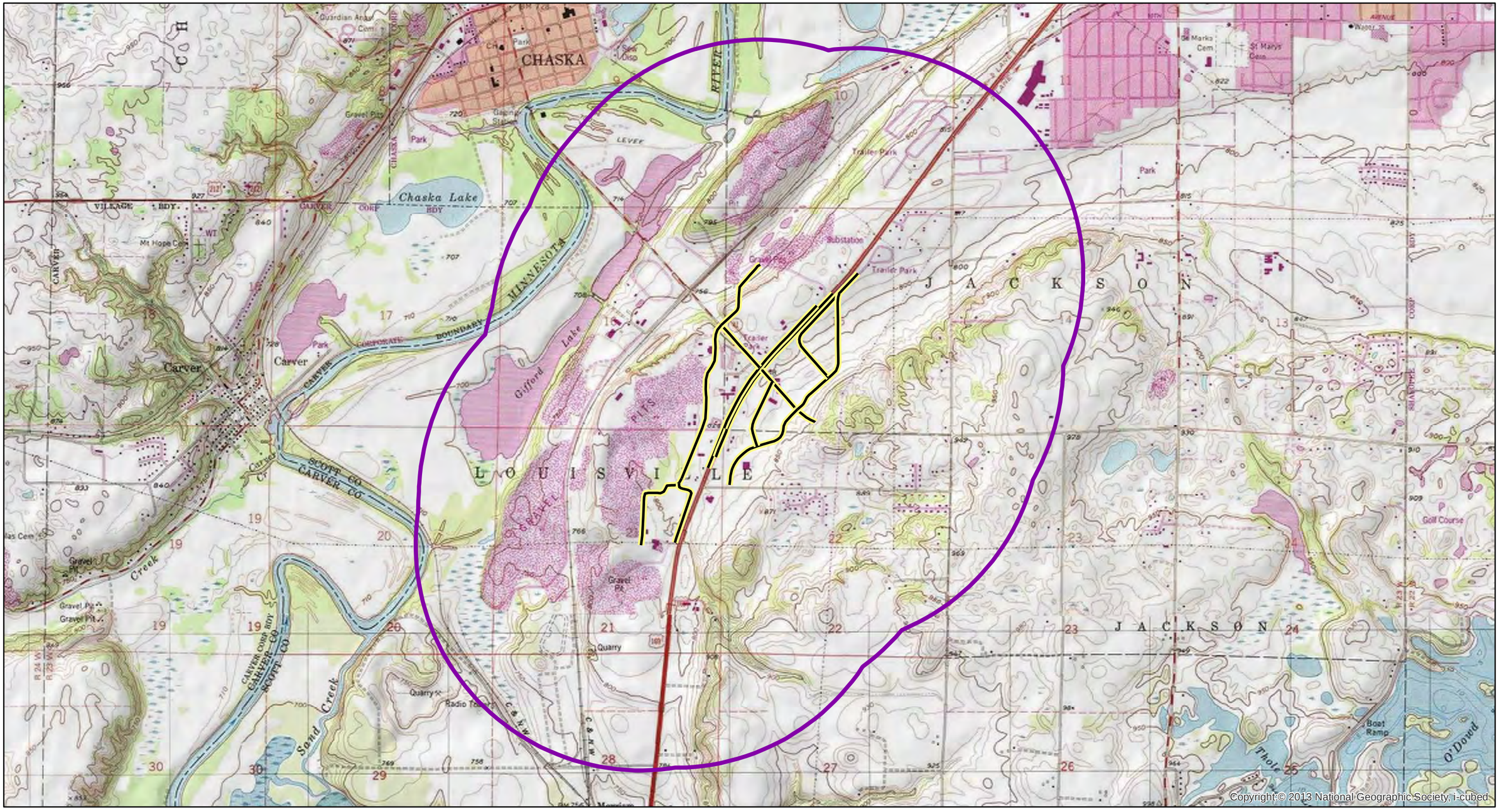

Scott County Community Services
Environmental Services
200 Fourth Avenue West
Shakopee, MN 55379

US 169/TH 41/CSAH 78 Interchange

N

10-1-15

FIGURE 2 TOPOGRAPHY

Source: USGS

Hwy 169, TH 41, CSAH 78 Alignment

1 Mile Project Area

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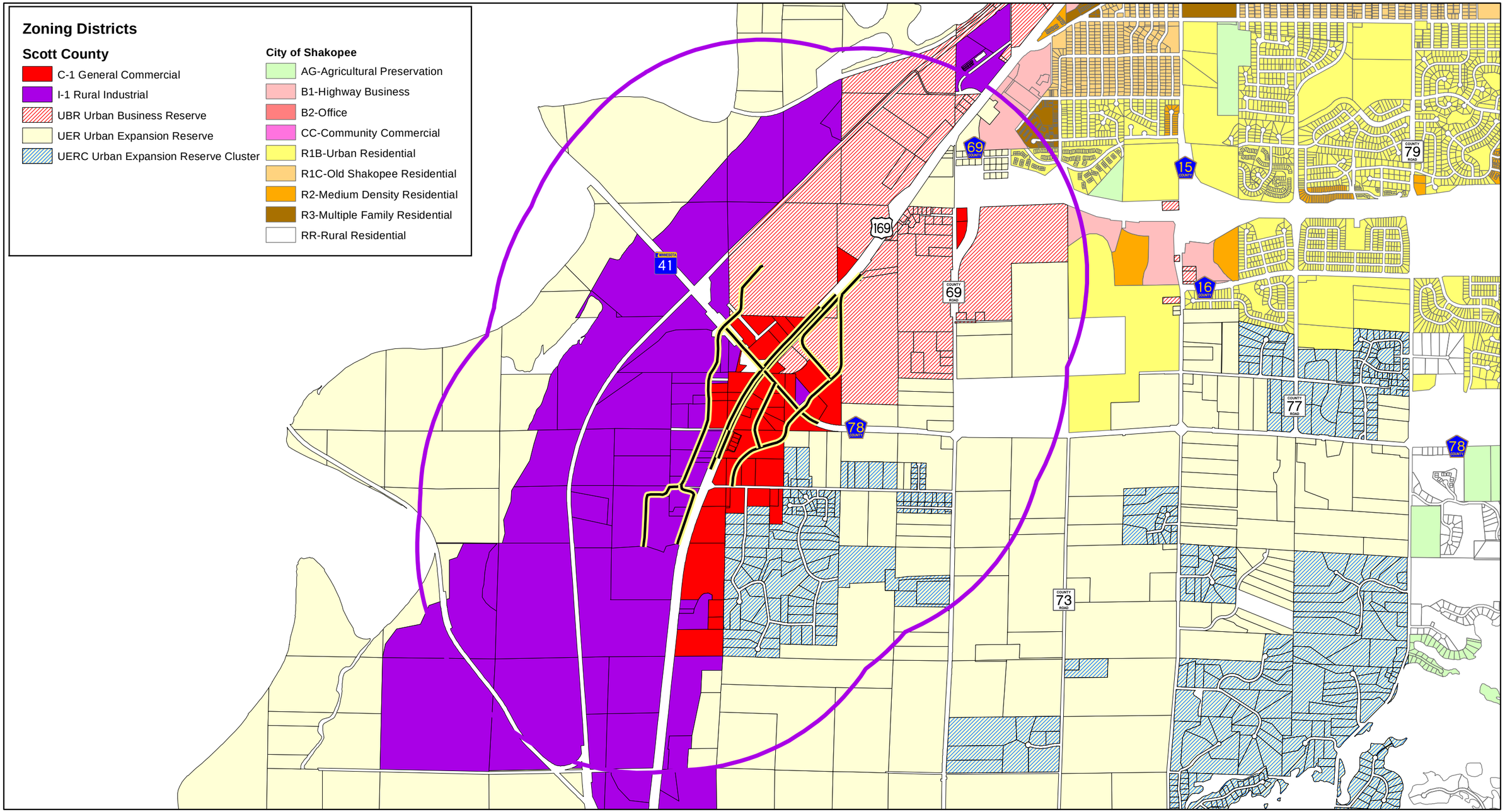

Scott County Community Services
Environmental Services
200 Fourth Avenue West
Shakopee, MN 55379

US 169/TH 41/CSAH 78 Interchange

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10-1-15

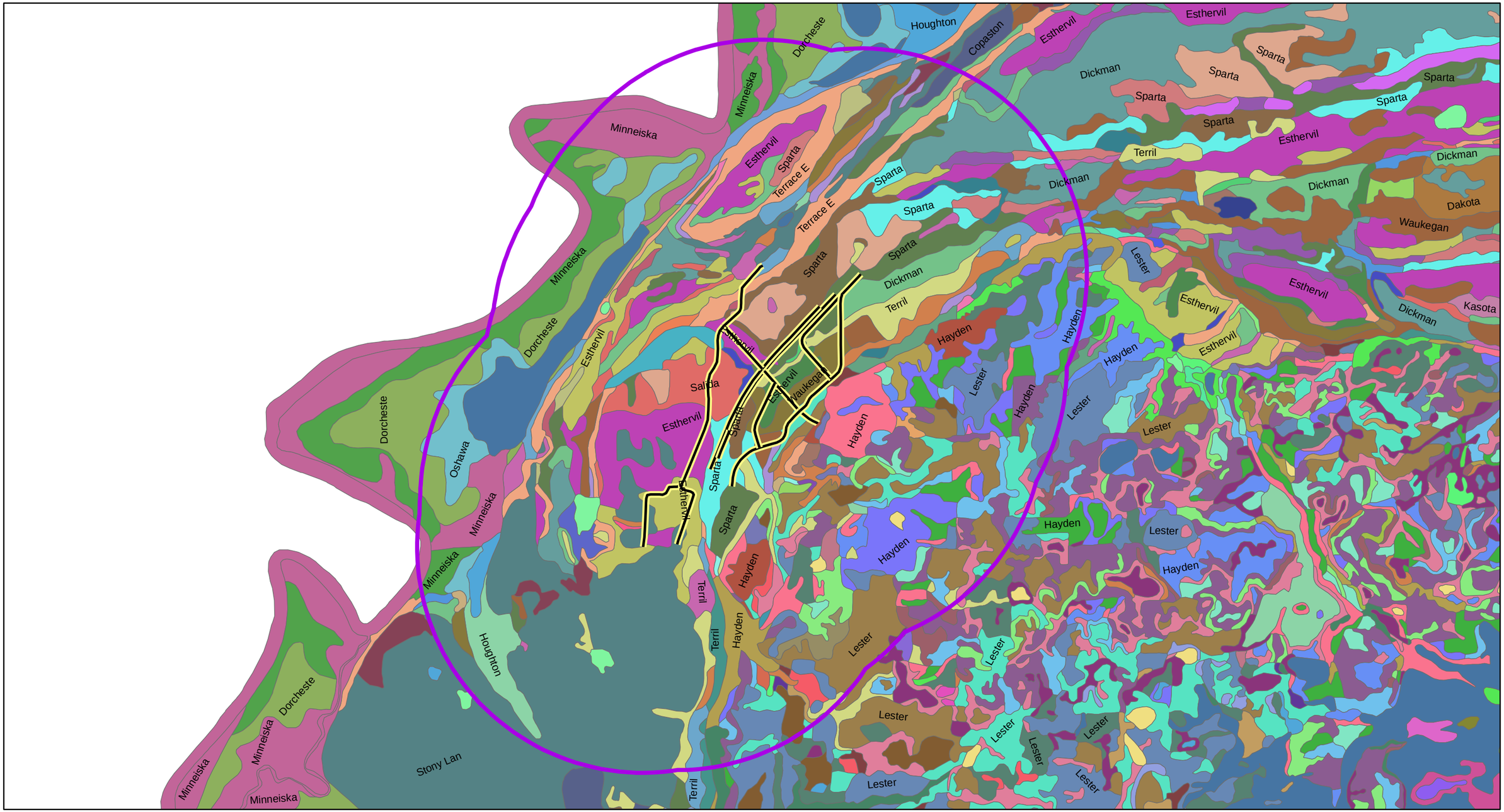
FIGURE 3 ZONING - ADJACENT PROPERTIES

Source: Scott County Zoning Administration
City of Shakopee

Hwy 169, TH 41, CSAH 78 Alignment

1 Mile Project Area

S:\gis\departments\commdev\environmentalhealth\projects\CPT169_TH41_CR78\Figure3_SurroundingLU.mxd



Scott County Community Services
Environmental Services
200 Fourth Avenue West
Shakopee, MN 55379

US 169/TH 41/CSAH 78 Interchange

N

10-1-15

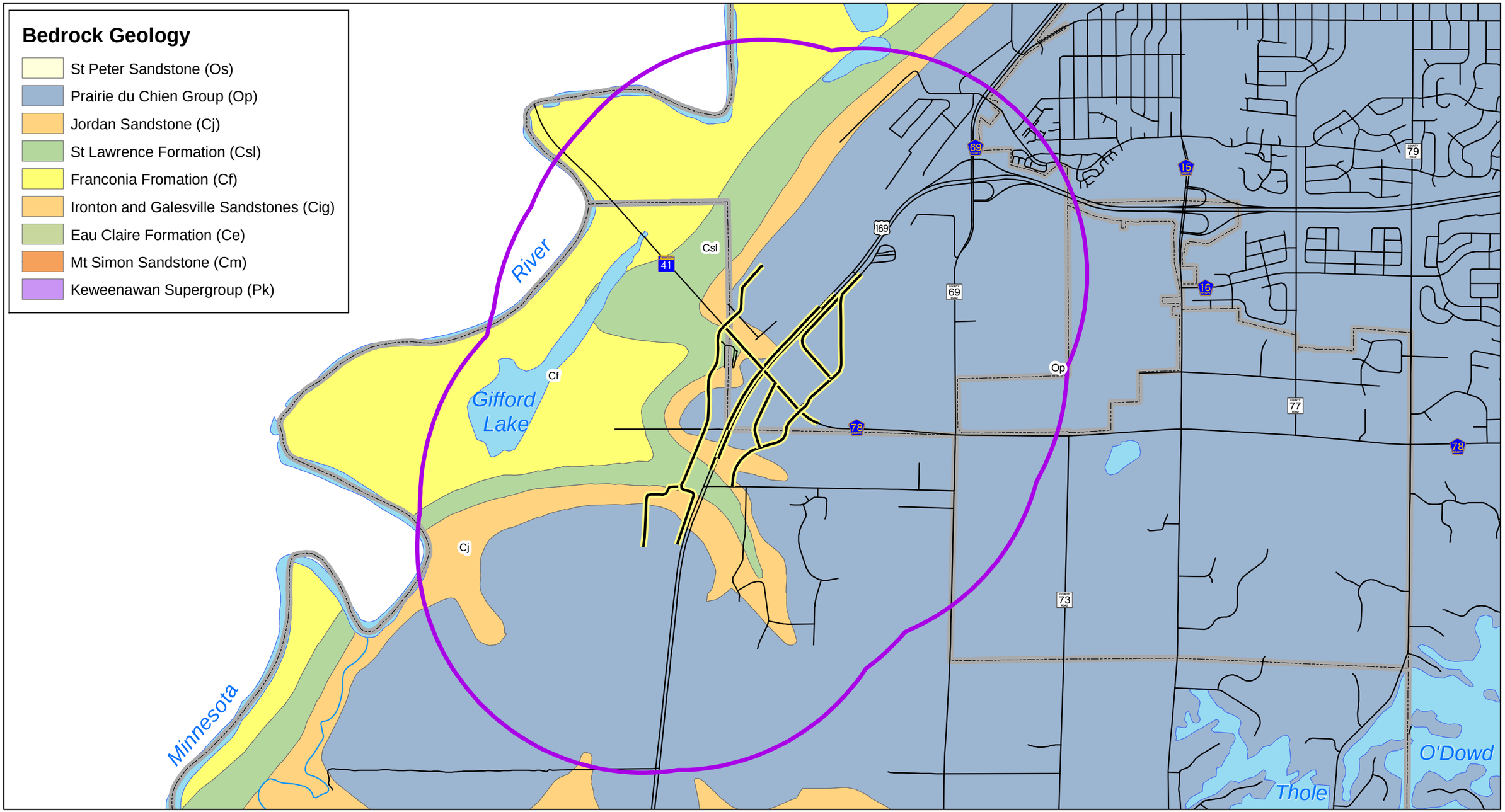
FIGURE 4: SOILS

Source: Soil Survey of Scott County

Hwy 169, TH 41, CSAH 78 Alignment

1 Mile Project Area

S:\gis\departments\commdev\environmentalhealth\projects\CPT169_TH41_CR78\Figure4_Soils.mxd



Scott County Community Services
Environmental Services
200 Fourth Avenue West
Shakopee, MN 55379

US 169/TH 41/CSAH 78 Interchange

N

10-1-15

FIGURE 5: GEOLOGY

Source: MN Geological Survey

Hwy 169, TH 41, CSAH 78 Alignment

1 Mile Project Area

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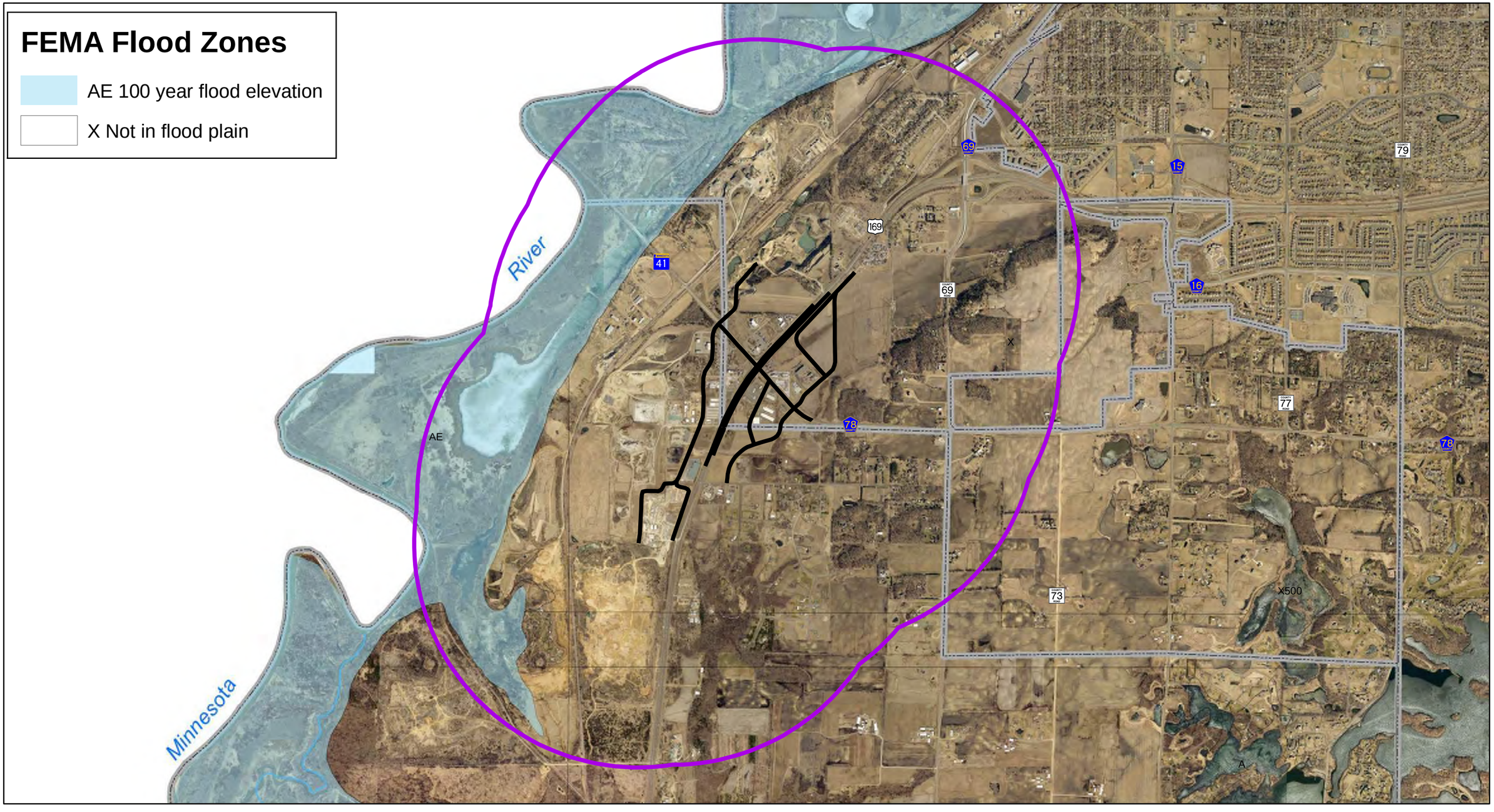

Scott County Community Services
Environmental Services
200 Fourth Avenue West
Shakopee, MN 55379

US 169/TH 41/CSAH 78 Interchange

N

10-1-15

FIGURE 6: FEMA

Source: FEMA

Hwy 169, TH 41, CSAH 78 Alignment

1 Mile Project Area

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Scott County
Physical Development Department
600 Country Trail East
Jordan, MN 55352

Figure 7

Preliminary Concept

US 169/TH 41/CSAH 78 Interchange
2015 TED Application

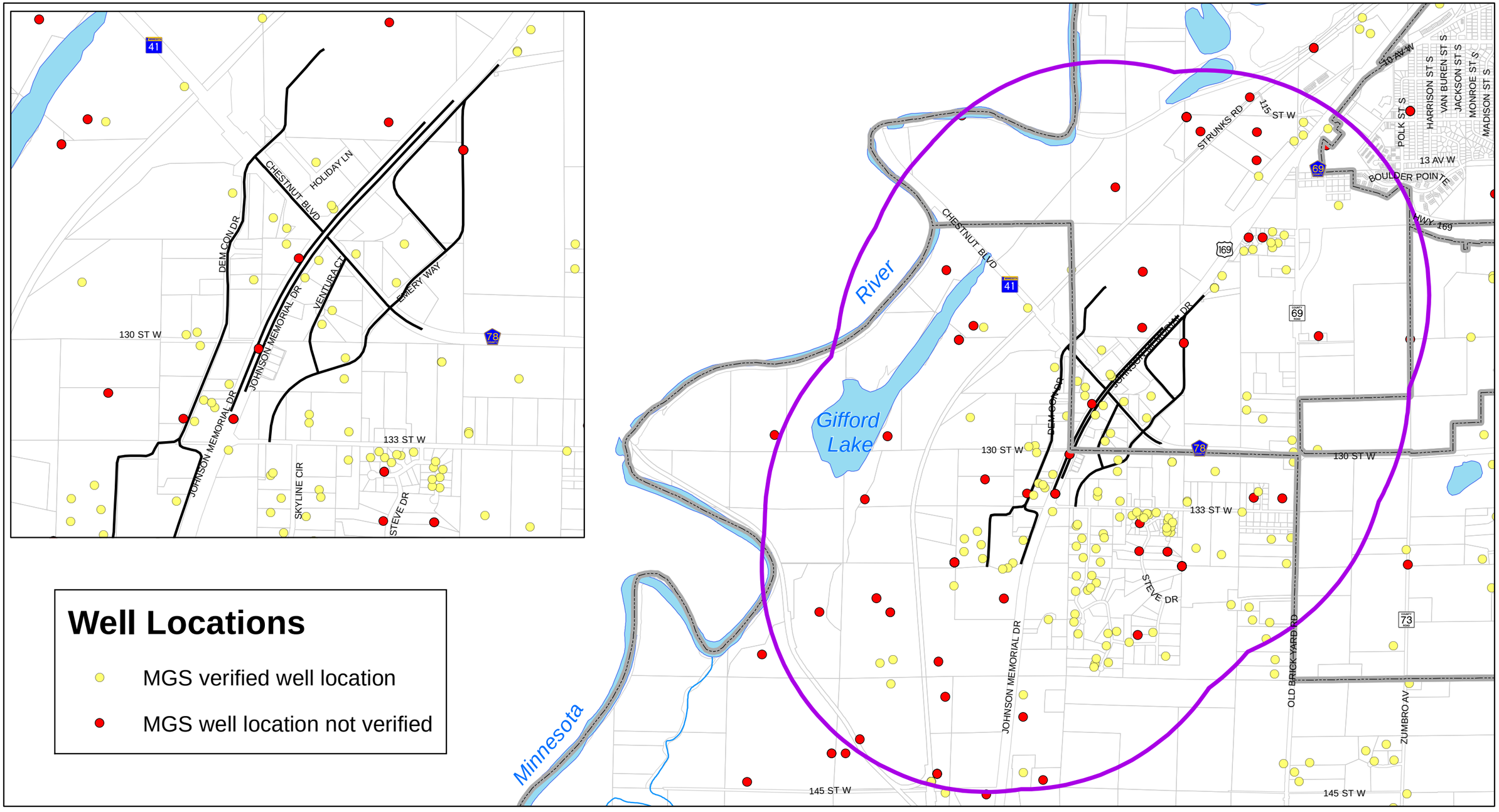
Scott County, MN
Township 115 North, Range 23 West

This map is intended for planning purposes only.
Road alignments are subject to change.
Delineations may not be exact.
Prepared 9-21-15, AJH.

S:\gis\departments\transportation\projects\CPT169-06ConceptTEDApp.mxd

Appendix B Record Review

Figure 8 Minnesota Department of Health Wells
Figure 9 Scott County Possible Septic System Locations
Figure 10 Federal, State, and County Search
Figure 11 Scott County Environmental Assessment Letter



Scott County Community Services
Environmental Services
200 Fourth Avenue West
Shakopee, MN 55379

US 169/TH 41/CSAH 78 Interchange

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10-1-15

FIGURE 8: WELLS

Source: MN Geological Survey

1 Mile Project Area

Hwy 169, TH 41, CSAH 78 Alignment

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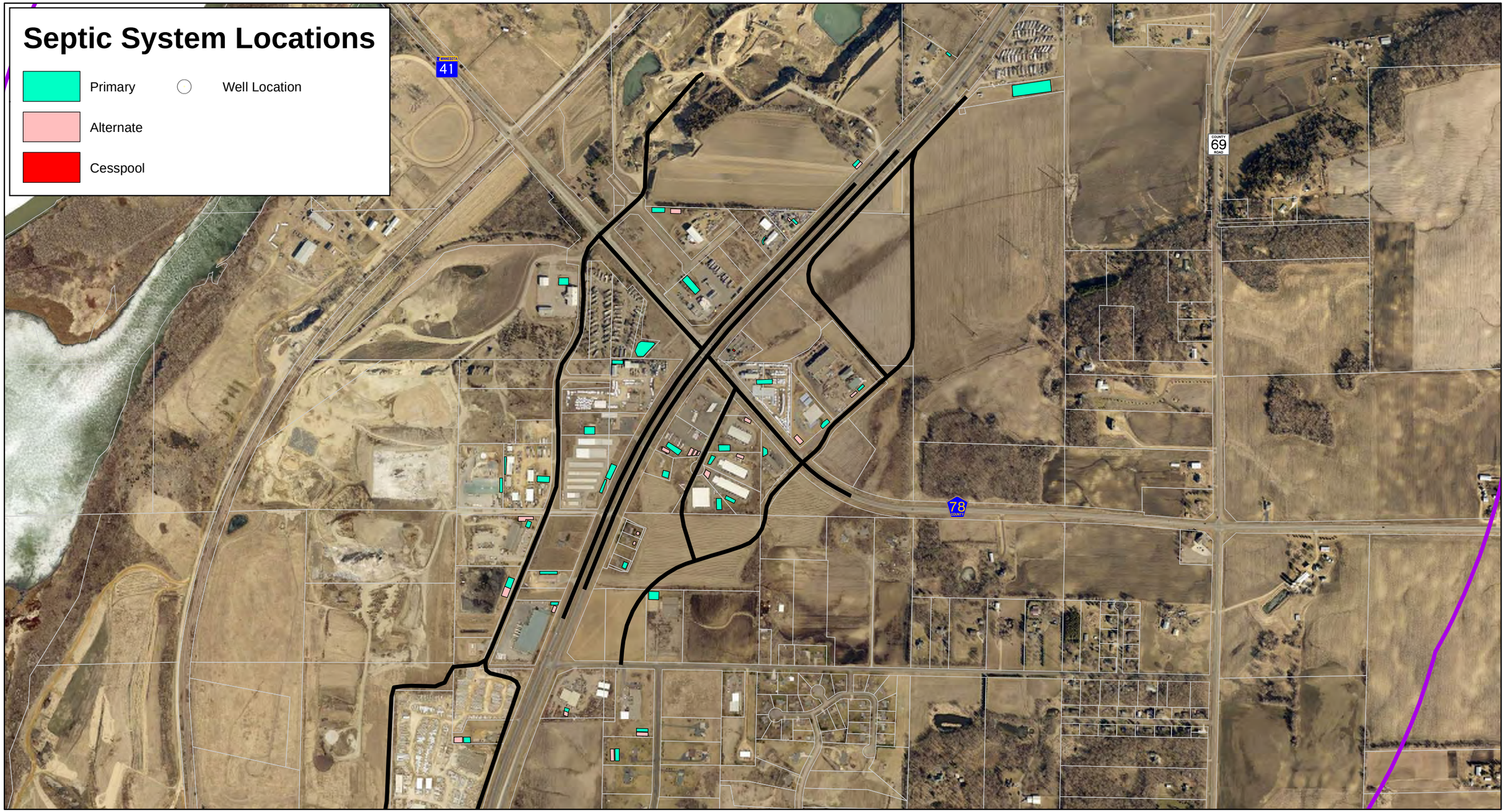

Scott County Community Services
Environmental Services
200 Fourth Avenue West
Shakopee, MN 55379

US 169/TH 41/CSAH 78 Interchange

N

10-1-15

FIGURE 9: SEPTIC LOCATIONS

Source: Scott County Environmental Health

Hwy 169, TH 41, CSAH 78 Alignment

1 Mile Project Area

S:\gis\departments\commdev\environmentalhealth\projects\CPT169_TH41_CR78\Figure9_SepticLocations.mxd

169 / 41 Intersection
US169 / MN41
Shakopee, MN 55379

Inquiry Number: 4424821.2s
September 29, 2015

The EDR Radius Map™ Report with GeoCheck®

EDR® Environmental Data Resources Inc

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

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Physical Setting Source Summary	A-2
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Physical Setting Source Records Searched	PSGR-1

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

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EXECUTIVE SUMMARY

A search of available environmental records was conducted by Environmental Data Resources, Inc (EDR). The report was designed to assist parties seeking to meet the search requirements of EPA's Standards and Practices for All Appropriate Inquiries (40 CFR Part 312), the ASTM Standard Practice for Environmental Site Assessments (E 1527-13) or custom requirements developed for the evaluation of environmental risk associated with a parcel of real estate.

TARGET PROPERTY INFORMATION

ADDRESS

US169 / MN41
SHAKOPEE, MN 55379

COORDINATES

Latitude (North):	44.7659000 - 44˚ 45' 57.24''
Longitude (West):	93.5786000 - 93˚ 34' 42.96''
Universal Tranverse Mercator:	Zone 15
UTM X (Meters):	454210.8
UTM Y (Meters):	4956891.0
Elevation:	804 ft. above sea level

USGS TOPOGRAPHIC MAP ASSOCIATED WITH TARGET PROPERTY

Target Property Map:	5964261 SHAKOPEE, MN
Version Date:	2013
South Map:	5964225 JORDAN EAST, MN
Version Date:	2013

AERIAL PHOTOGRAPHY IN THIS REPORT

Portions of Photo from:	20100702, 20100912, 20100913
Source:	USDA

MAPPED SITES SUMMARY

Target Property Address:
US169 / MN41
SHAKOPEE, MN 55379

Click on Map ID to see full detail.

MAP ID	SITE NAME	ADDRESS	DATABASE ACRONYMS	RELATIVE ELEVATION	DIST (ft. & mi.) DIRECTION
A1	THEIS AUTO REPAIR (O	12706 CHESTNUT BLVD	LUST, UST, VIC, SRS, LIENS, Financial Assurance,...	Lower	1 ft.
B2	QUALITY HEATING & AI	12912 VENTURA CT STE	WIMN	Higher	1 ft.
A3		12706 CHESTNUT BLVD	EDR US Hist Auto Stat	Lower	1 ft.
A4	MNDOT THEIS AUTO	12706 CHESTNUT BOULE	MN LS, WIMN	Lower	1 ft.
A5	THEIS REPAIR	12706 CHESTNUT BLVD	RCRA-CESQG, FINDS	Lower	1 ft.
A6	DALUMS UTILITY EQUIP	12716 CHESTNUT BLVD	RCRA-CESQG	Lower	1 ft.
A7	MINNESOTA VINYL & AL	12718 CHESTNUT BLVD	RCRA NonGen / NLR, FINDS, WIMN	Lower	1 ft.
B8	HERMAN DONNA DBA NO	12900 VENTURA CT	MDA LIS	Higher	1 ft.
A9	DUECO	12716 CHESTNUT BLVD	Financial Assurance, WIMN	Lower	1 ft.
A10	DUECO	12716 CHESTNUT BLVD	AST	Lower	1 ft.
C11	RUS LLC	3200 W 130TH ST	WIMN	Higher	1 ft.
C12		3186 130TH ST W	EDR US Hist Auto Stat	Higher	1 ft.
C13	3T REPAIR LLC	3186 130TH ST W	RCRA-CESQG, WIMN	Higher	1 ft.
A14	MNDOT	12550 CHESTNUT BLVD	LUST, Financial Assurance, TIER 2	Lower	1 ft.
D15	DUECO	12565 HIGHWAY 41 FRO	RCRA-CESQG	Higher	1 ft.
D16	DUECO	12565 HIGHWAY 41 FRO	WIMN	Higher	1 ft.
C17		3200 130TH ST W	EDR US Hist Auto Stat	Higher	1 ft.
C18	SOUTHWEST METRO TRUC	3200 130TH ST W	RCRA NonGen / NLR	Higher	1 ft.
C19	RBJ AUTO BODY	3196 130TH ST W	WIMN	Higher	1 ft.
C20		3196 130TH ST W	EDR US Hist Auto Stat	Higher	1 ft.
C21	RBJ AUTO BODY	3196 130TH ST W	RCRA-CESQG	Higher	1 ft.
B22	SUPERAMERICA #4439	12835 VENTURA CT	UST, Financial Assurance	Higher	1 ft.
B23	JOHNNY'S AUTO SALES	12832 VENTURA CT	WIMN	Higher	1 ft.
A24	BRYAN ROCK PRODUCTS	13040 DEM-CON DR	RCRA-CESQG	Higher	1 ft.
B25	SUPERAMERICA	12835 VENTURA CT	LUST, SPILLS, Financial Assurance, WIMN	Higher	1 ft.
A26	BRYAN ROCK PRODUCTS	13020 DEM CON DR	AST, Financial Assurance, MDA LIS, WIMN	Higher	1 ft.
E27	R & R MARINE INC	12827 CHESTNUT BLVD	RCRA-CESQG, FINDS	Lower	1 ft.
E28	PATRIOT AUTO SALES	12810 CHESTNUT BLVD	LUST, Financial Assurance, WIMN	Lower	1 ft.
E29	R & R MARINE INC	12827 CHESTNUT BLVD	Financial Assurance, WIMN	Lower	1 ft.
B30	MARINE BODYWORKS	12830 VENTURA CT	RCRA NonGen / NLR, FINDS, WIMN	Higher	1 ft.
E31	R & R MARINE	12827 CHESTNUT BLVD	AST	Lower	1 ft.
B32	SUPERAMERICA 4439	12835 VENTURA CT	RCRA-CESQG, FINDS	Higher	1 ft.
A33	HOLIDAY STATION	12681 CHESTNUT BLVD	EDR US Hist Auto Stat	Lower	1 ft.
A34	HOLIDAY STATIONSTORE	12681 CHESTNUT BLVD	AST	Lower	1 ft.
B35	FRITZ CABINETRY & FU	12900 VENTURA CT STE	RCRA NonGen / NLR, FINDS, WIMN	Higher	1 ft.
A36	CRYSTAL-PIERZ MARINE	12720 CHESTNUT BLVD	RCRA-CESQG, FINDS	Lower	1 ft.
37	ECONO USED CARS	12701 JOHNSON MEMORI	RCRA-CESQG, FINDS, WIMN	Higher	1 ft.
B38	DW AUTO/TRUCK SERVIC	12844 CHESTNUT BLVD	RCRA-CESQG, FINDS, WIMN	Higher	1 ft.
A39	DEM-CON LANDFILL LLC	13020 DEM-CON DR	RCRA-CESQG, FINDS	Higher	1 ft.

MAPPED SITES SUMMARY

Target Property Address:
US169 / MN41
SHAKOPEE, MN 55379

Click on Map ID to see full detail.

MAP ID	SITE NAME	ADDRESS	DATABASE ACRONYMS	RELATIVE ELEVATION	DIST (ft. & mi.) DIRECTION
A40	HOLIDAY STATIONSTORE	12681 CHESTNUT BLVD	LUST, SPILLS, Financial Assurance, WIMN	Lower	1 ft.
A41	HOLIDAY STATIONSTORE	12681 CHESTNUT BLVD	UST	Lower	1 ft.
B42		12850 CHESTNUT BLVD	EDR US Hist Auto Stat	Higher	1 ft.
C43	BODY BY BOB	3198 W 13TH ST	RCRA-CESQG, WIMN	Higher	1 ft.
F44	DEM CON MATERIALS RE	ADDRESS UNKNOWN	WIMN	Higher	1 ft.
F45	BARTON SAND & GRAVEL	12530 DEM CON DR.	UST, AST, FINDS, Financial Assurance, WIMN	Higher	1 ft.
G46	LANO EQUIPMENT - SHA	3021 W 133RD ST	RCRA-CESQG	Higher	1 ft.
G47	LANO EQUIPMENT	3021 W 133RD ST	SPILLS, FINDS, Financial Assurance, WIMN	Higher	1 ft.
G48	LANO EQUIPMENT INC	3021 W 133RD ST	AST	Higher	1 ft.
F49	PLEHAL BLACKTOPPING	13060 DEM CON DR	RCRA-CESQG, TIER 2, WIMN	Higher	1 ft.
C50	DEM-CON LANDFILL LLC	3601 130TH ST W	SWF/LF, Financial Assurance, MN LS, WIMN	Higher	1 ft.
C51	DEM-CON LANDFILL - L	SEE LOCATION DESCRIP	WIMN	Higher	1 ft.
H52	APPLIANCE SERVICE	13122 JOHNSON MEMORI	WIMN	Higher	1 ft.
F53	DEM-CON MATERIALS RE	13162 JOHNSON MEMORI	SWF/LF, Financial Assurance, WIMN	Higher	1 ft.
H54	APPLIANCE SERVICE	13122 JOHNSON MEMORI	RCRA-CESQG, FINDS	Higher	1 ft.
I55	BRYAN ROCK PRODUCTS	13580 JOHNSON MEMORI	SPILLS, Financial Assurance, WIMN	Lower	1 ft.
I56	BRYAN ROCK PRODUCTS	13580 JOHNSON MEMORI	RCRA-CESQG, FINDS	Lower	1 ft.
I57	BRYAN ROCK PRODUCTS		US MINES	Lower	1 ft.
I58	HARDRIVES INC		RCRA NonGen / NLR, US MINES, FINDS	Lower	1 ft.
I59	HARDRIVES INC	13680 JOHNSON MEMORI	WIMN	Lower	1 ft.
I60	BRYAN ROCK PRODUCTS	13580 JOHNSON MEMORI	UST, AST	Lower	1 ft.
J61	DIEMOLD TOOL INC	13340 JOHNSON MEMORI	WIMN	Higher	1 ft.
J62	DIEMOLD TOOL INC	13340 JOHNSON MEMORI	RCRA-CESQG, FINDS	Higher	1 ft.
K63	ANCHOR BLOCK CO	13450 JOHNSON MEMORI	LUST, UST, SPILLS, AIRS, Financial Assurance, TIER...	Lower	1 ft.
K64	ANCHOR BLOCK	13450 JOHNSON MEMORI	LUST, Financial Assurance, WIMN	Lower	1 ft.
K65	ANCHOR BLOCK CO	13450 JOHNSON MEMORI	RCRA-SQG, AST	Lower	1 ft.
C66	JACKSON HEIGHTS MOBI	12665 DEM-CON DR	WIMN	Higher	1 ft.
C67	WULF G L TRUCKING	3134 130TH ST W	RCRA-CESQG, WIMN	Higher	1 ft.
L68	R & R MARINE BODYWOR	12616 JOHNSON MEMORI	SPILLS, Financial Assurance, WIMN	Higher	1 ft.
L69	RB AUTO BODY	12616 JOHNSON MEMORI	RCRA NonGen / NLR, FINDS	Higher	1 ft.
L70	RB AUTO BODY	12616 JOHNSON MEMORI	WIMN	Higher	1 ft.
C71	APS AUTOWORKS	3136 130TH ST W	WIMN	Higher	1 ft.
C72	PT MAINTENANCE	3136 130TH ST W	EDR US Hist Auto Stat	Higher	1 ft.
L73	MIDWEST SPORT CENTER	12580 JOHNSON MEMORI	RCRA-CESQG, FINDS, WIMN	Higher	1 ft.
L74	INDY SPECIALTY	12540 JOHNSON MEMORI	RCRA-CESQG, FINDS, WIMN	Higher	1 ft.
L75	R & R MARINE BODYWOR	12616 JOHNSON MEMORI	RCRA NonGen / NLR, FINDS	Higher	1 ft.
C76	DU-AL CONSTRUCTION C	3136 W 130TH ST	AST	Higher	1 ft.
77	ACORN MINI STORAGE	3050 130 ST W	WIMN	Higher	1 ft.
C78	NITEHAWK EXPRESS INC	3122 W 130TH ST	UST, Financial Assurance, WIMN	Higher	1 ft.

MAPPED SITES SUMMARY

Target Property Address:
US169 / MN41
SHAKOPEE, MN 55379

Click on Map ID to see full detail.

MAP ID	SITE NAME	ADDRESS	DATABASE ACRONYMS	RELATIVE ELEVATION	DIST (ft. & mi.) DIRECTION
C79	DU-AL CONSTRUCTION C	3136 W 130TH ST	Financial Assurance, WIMN	Higher	1 ft.
C80	WILLIAM B FENSKE SHO	3120 130TH ST W	WIMN	Higher	1 ft.
C81		3122 130TH ST W	EDR US Hist Auto Stat	Higher	1 ft.
C82	VILLAGE MOBILE STORA	3186 W 130TH ST	UST, AST, Financial Assurance	Higher	1 ft.
C83	VILLAGE MOBILE STORA	3186 W 130TH ST	Financial Assurance, WIMN	Higher	1 ft.
M84	ALLEN ADVERTISING PR	12860 EMERY WAY	RCRA-CESQG, FINDS, WIMN	Higher	80, 0.015, SE
C85	RESOURCE RECOVERY TE	3230 130TH ST	AST	Higher	82, 0.016, SW
C86	SOUTH METRO SORT & R	3230 130TH ST	Financial Assurance, WIMN	Higher	82, 0.016, SW
C87	DEM-CON RECOVERY & R	3230 130TH ST W	SWF/LF, Financial Assurance, MN LS, WIMN	Higher	82, 0.016, SW
G88	UNIVERSAL STONE - CS	3019 W 133RD ST	WIMN	Higher	82, 0.016, South
M89	DITCH WITCH OF MINNE	12836 EMERY WAY	Financial Assurance, WIMN	Higher	137, 0.026, ESE
M90	DITCH WITCH OF MINNE	12836 EMERY WAY	AST	Higher	137, 0.026, ESE
N91	MOBILE MANOR PARK	12325 JOHNSON MEMORI	WIMN	Higher	157, 0.030, NE
M92	WITCH OF MINNESOTA I	12826 EMERY WAY	RCRA NonGen / NLR	Higher	160, 0.030, ESE
M93	DITCH WITCH OF MINNE	12826 EMERY WAY	RCRA-CESQG, FINDS, WIMN	Higher	160, 0.030, ESE
N94	SCOTT COUNTY SUBSTAT	12326 JOHNSON MEMORI	WIMN	Higher	198, 0.038, NE
O95	WESTIN MARINE SHAKOP	13727 JOHNSON MEMORI	RCRA-CESQG, FINDS	Lower	221, 0.042, SSW
O96	WESTIN MARINE SHAKOP	13727 JOHNSON MEMORI	SPILLS, Financial Assurance, WIMN	Lower	221, 0.042, SSW
97	MIDWEST ASPHALT CORP	12386 CHESTNUT BLVD	RCRA NonGen / NLR, FINDS, WIMN	Lower	300, 0.057, NW
N98	MOMS LANDSCAPING & D	12276 JOHNSON MEMORI	WIMN	Higher	474, 0.090, NE
P99	MID AMERICA FESTIVAL	12364 CHESTNUT BLVD	RCRA-CESQG, FINDS, WIMN	Lower	769, 0.146, WNW
Q100	ELANDER MECHANICAL I	2915 133RD ST W	LUST, AST, Financial Assurance, WIMN	Higher	791, 0.150, South
Q101	ALLEN PETER COMPANY	2915 133RD ST W	RCRA-CESQG	Higher	791, 0.150, South
102	WM. MUELLER & SONS I		US MINES	Higher	840, 0.159, NE
P103	COMMERCIAL ASPHALT C	12355 CHESTNUT BLVD	SPILLS, Financial Assurance, TIER 2, WIMN	Lower	965, 0.183, WNW
P104	COMMERCIAL ASPHALT C	12355 CHESTNUT BLVD	AST	Lower	965, 0.183, WNW
P105	MALKERSON SALES INC	12355 CHESTNUT BLVD	UST	Lower	965, 0.183, WNW
P106	COMMERCIAL ASPHALT C	12351 CHESTNUT BLVD	RCRA-CESQG, US AIRS, FINDS	Lower	1022, 0.194, WNW
P107	COMMERCIAL ASPHALT C	12355 CHESTNUT BLVD	LUST, SPILLS, AIRS, Financial Assurance, TIER 2	Lower	1022, 0.194, WNW
R108	PLEHAL BLACKTOPPING	3460 130TH ST W	WIMN	Higher	1131, 0.214, WSW
R109	PLEHAL BLACKTOPPING	3460 130TH ST W	RCRA NonGen / NLR, US MINES, FINDS, WIMN	Higher	1131, 0.214, WSW
R110	PLEHAL BLACKTOPPING	3460 130TH ST W	RCRA NonGen / NLR	Higher	1131, 0.214, WSW
R111	COMMERCIAL ASPHALT C	3460 W 130TH ST	AST	Higher	1143, 0.216, WSW
R112	COMMERCIAL ASPHALT C	3460 W 130TH ST	Financial Assurance, TIER 2, WIMN	Higher	1143, 0.216, WSW
R113	DUAL CONSTRUCTION CO	3468 130TH ST W	WIMN	Higher	1167, 0.221, WSW
R114	AM ROOFING SYSTEMS I	3470 130TH ST W	RCRA NonGen / NLR, FINDS, WIMN	Higher	1176, 0.223, WSW
R115	DU-AL CONSTRUCTION C	3468 W 130TH ST	RCRA NonGen / NLR, FINDS	Higher	1180, 0.223, WSW
116	TILLER CORP/BARTON S	12351 CHESTNUT BLVD	SWRCY	Lower	1206, 0.228, NNW
117	LOUISVILLE LANDFILL	3698 130TH ST W	LCP	Lower	1674, 0.317, WSW

MAPPED SITES SUMMARY

Target Property Address:
US169 / MN41
SHAKOPEE, MN 55379

Click on Map ID to see full detail.

MAP ID	SITE NAME	ADDRESS	DATABASE ACRONYMS	RELATIVE ELEVATION	DIST (ft. & mi.) DIRECTION
118	LOUISVILLE LANDFILL	BETWEEN THE CHICAGO	SHWS, SRS	Lower	1710, 0.324, SW
119	ED BREEGGEEMANN FARM	12355 OLD BRICKYARD	WIMN	Lower	2336, 0.442, ENE
120	MNDOT SHAKOPEE	12550 CHESTNUT BLVD	WIMN	Lower	2633, 0.499, WSW

EXECUTIVE SUMMARY

TARGET PROPERTY SEARCH RESULTS

The target property was not listed in any of the databases searched by EDR.

DATABASES WITH NO MAPPED SITES

No mapped sites were found in EDR's search of available ("reasonably ascertainable ") government records either on the target property or within the search radius around the target property for the following databases:

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

NPL ..... National Priority List
Proposed NPL ..... Proposed National Priority List Sites
NPL LIENS ..... Federal Superfund Liens

Federal Delisted NPL site list

Delisted NPL ..... National Priority List Deletions

Federal CERCLIS list

FEDERAL FACILITY ..... Federal Facility Site Information listing
CERCLIS ..... Comprehensive Environmental Response, Compensation, and Liability Information System

Federal CERCLIS NFRAP site List

CERC-NFRAP ..... CERCLIS No Further Remedial Action Planned

Federal RCRA CORRACTS facilities list

CORRACTS ..... Corrective Action Report

Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF ..... RCRA - Treatment, Storage and Disposal

Federal RCRA generators list

RCRA-LQG ..... RCRA - Large Quantity Generators

Federal institutional controls / engineering controls registries

LUCIS ..... Land Use Control Information System
US ENG CONTROLS ..... Engineering Controls Sites List
US INST CONTROL ..... Sites with Institutional Controls

Federal ERNS list

ERNS ..... Emergency Response Notification System

State- and tribal - equivalent NPL

MN PLP..... Permanent List of Priorities

State and tribal landfill and/or solid waste disposal site lists

UNPERM LF..... Unpermitted Facilities

State and tribal leaking storage tank lists

LAST..... Leaking Aboveground Storage Tanks
INDIAN LUST..... Leaking Underground Storage Tanks on Indian Land

State and tribal registered storage tank lists

FEMA UST..... Underground Storage Tank Listing
INDIAN UST..... Underground Storage Tanks on Indian Land

State and tribal institutional control / engineering control registries

INST CONTROL..... Site Remediation Section Database

State and tribal voluntary cleanup sites

INDIAN VCP..... Voluntary Cleanup Priority Listing

State and tribal Brownfields sites

BROWNFIELDS..... Petroleum Brownfields Program Sites

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS..... A Listing of Brownfields Sites

Local Lists of Landfill / Solid Waste Disposal Sites

INDIAN ODI..... Report on the Status of Open Dumps on Indian Lands
ODI..... Open Dump Inventory
DEBRIS REGION 9..... Torres Martinez Reservation Illegal Dump Site Locations

Local Lists of Hazardous waste / Contaminated Sites

US HIST CDL..... National Clandestine Laboratory Register
CDL..... Clandestine Drug Labs
MN DEL PLP..... Delisted Permanent List of Priorities
US CDL..... Clandestine Drug Labs

Local Land Records

LIENS..... Environmental Liens
LIENS 2..... CERCLA Lien Information

EXECUTIVE SUMMARY

Records of Emergency Release Reports

HMIRS	Hazardous Materials Information Reporting System
SPILLS	Spills Database
AGSPILLS	Department of Agriculture Spills
SPILLS 90	SPILLS 90 data from FirstSearch
SPILLS 80	SPILLS 80 data from FirstSearch

Other Ascertainable Records

FUDS	Formerly Used Defense Sites
DOD	Department of Defense Sites
SCRD DRYCLEANERS	State Coalition for Remediation of Drycleaners Listing
US FIN ASSUR	Financial Assurance Information
EPA WATCH LIST	EPA WATCH LIST
2020 COR ACTION	2020 Corrective Action Program List
TSCA	Toxic Substances Control Act
TRIS	Toxic Chemical Release Inventory System
SSTS	Section 7 Tracking Systems
ROD	Records Of Decision
RMP	Risk Management Plans
RAATS	RCRA Administrative Action Tracking System
PRP	Potentially Responsible Parties
PADS	PCB Activity Database System
ICIS	Integrated Compliance Information System
FTTS	FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
MLTS	Material Licensing Tracking System
COAL ASH DOE	Steam-Electric Plant Operation Data
COAL ASH EPA	Coal Combustion Residues Surface Impoundments List
PCB TRANSFORMER	PCB Transformer Registration Database
RADINFO	Radiation Information Database
HIST FTTS	FIFRA/TSCA Tracking System Administrative Case Listing
DOT OPS	Incident and Accident Data
CONSENT	Superfund (CERCLA) Consent Decrees
INDIAN RESERV	Indian Reservations
UMTRA	Uranium Mill Tailings Sites
LEAD SMELTERS	Lead Smelter Sites
US AIRS	Aerometric Information Retrieval System Facility Subsystem
FINDS	Facility Index System/Facility Registry System
AGVIC	Agricultural Voluntary Investigation & Cleanup Listing
AIRS	Permit Contact List
BULK	Bulk Facilities Database
COAL ASH	Coal Ash Disposal Site Listing
DRYCLEANERS	Registered Drycleaning Facilities
ENF	Generators Associated with Enforcement Logs
Financial Assurance	Financial Assurance Information Listing
MN HWS Permit	Active TSD Facilities
MANIFEST	Hazardous Waste Manifest Data
TIER 2	Tier 2 Facility Listing

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR MGP	EDR Proprietary Manufactured Gas Plants

EXECUTIVE SUMMARY

EDR US Hist Cleaners..... EDR Exclusive Historic Dry Cleaners

EDR RECOVERED GOVERNMENT ARCHIVES

Exclusive Recovered Govt. Archives

RGA HWS..... Recovered Government Archive State Hazardous Waste Facilities List
RGA LF..... Recovered Government Archive Solid Waste Facilities List
RGA LUST..... Recovered Government Archive Leaking Underground Storage Tank

SURROUNDING SITES: SEARCH RESULTS

Surrounding sites were identified in the following databases.

Elevations have been determined from the USGS Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified. Sites with an elevation equal to or higher than the target property have been differentiated below from sites with an elevation lower than the target property.
Page numbers and map identification numbers refer to the EDR Radius Map report where detailed data on individual sites can be reviewed.

Sites listed in ***bold italics*** are in multiple databases.

Unmappable (orphan) sites are not considered in the foregoing analysis.

STANDARD ENVIRONMENTAL RECORDS

Federal RCRA generators list

RCRA-SQG: RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Small quantity generators (SQGs) generate between 100 kg and 1,000 kg of hazardous waste per month.

A review of the RCRA-SQG list, as provided by EDR, and dated 06/09/2015 has revealed that there is 1 RCRA-SQG site within approximately 0.25 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
ANCHOR BLOCK CO	***13450 JOHNSON MEMORI***	***0 - 1/8 (0.000 mi.)***	***K65***	***290***

RCRA-CESQG: RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Conditionally exempt small quantity generators (CESQGs) generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month.

A review of the RCRA-CESQG list, as provided by EDR, and dated 06/09/2015 has revealed that there are 27 RCRA-CESQG sites within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
3T REPAIR LLC	***3186 130TH ST W***	***0 - 1/8 (0.000 mi.)***	***C13***	***48***

EXECUTIVE SUMMARY

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
DUECO	12565 HIGHWAY 41 FRO	0 - 1/8 (0.000 mi.)	D15	71
RBJ AUTO BODY	3196 130TH ST W	0 - 1/8 (0.000 mi.)	C21	75
BRYAN ROCK PRODUCTS	13040 DEM-CON DR	0 - 1/8 (0.000 mi.)	A24	91
SUPERAMERICA 4439	***12835 VENTURA CT***	***0 - 1/8 (0.000 mi.)***	***B32***	***119***
ECONO USED CARS	***12701 JOHNSON MEMORI***	***0 - 1/8 (0.000 mi.)***	***37***	***126***
DW AUTO/TRUCK SERVIC	***12844 CHESTNUT BLVD***	***0 - 1/8 (0.000 mi.)***	***B38***	***128***
DEM-CON LANDFILL LLC	***13020 DEM-CON DR***	***0 - 1/8 (0.000 mi.)***	***A39***	***130***
BODY BY BOB	***3198 W 13TH ST***	***0 - 1/8 (0.000 mi.)***	***C43***	***169***
LANO EQUIPMENT - SHA	3021 W 133RD ST	0 - 1/8 (0.000 mi.)	G46	191
PLEHAL BLACKTOPPING	***13060 DEM CON DR***	***0 - 1/8 (0.000 mi.)***	***F49***	***198***
APPLIANCE SERVICE	***13122 JOHNSON MEMORI***	***0 - 1/8 (0.000 mi.)***	***H54***	***230***
DIEMOLD TOOL INC	***13340 JOHNSON MEMORI***	***0 - 1/8 (0.000 mi.)***	***J62***	***261***
WULF G L TRUCKING	***3134 130TH ST W***	***0 - 1/8 (0.000 mi.)***	***C67***	***319***
MIDWEST SPORT CENTER	***12580 JOHNSON MEMORI***	***0 - 1/8 (0.000 mi.)***	***L73***	***324***
INDY SPECIALTY	***12540 JOHNSON MEMORI***	***0 - 1/8 (0.000 mi.)***	***L74***	***326***
ALLEN ADVERTISING PR	***12860 EMERY WAY***	***SE 0 - 1/8 (0.015 mi.)***	***M84***	***349***
DITCH WITCH OF MINNE	***12826 EMERY WAY***	***ESE 0 - 1/8 (0.030 mi.)***	***M93***	***374***
ALLEN PETER COMPANY	2915 133RD ST W	S 1/8 - 1/4 (0.150 mi.)	Q101	391

Lower Elevation	Address	Direction / Distance	Map ID	Page
THEIS REPAIR	***12706 CHESTNUT BLVD***	***0 - 1/8 (0.000 mi.)***	***A5***	***35***
DALUMS UTILITY EQUIP	12716 CHESTNUT BLVD	0 - 1/8 (0.000 mi.)	A6	37
R & R MARINE INC	***12827 CHESTNUT BLVD***	***0 - 1/8 (0.000 mi.)***	***E27***	***106***
CRYSTAL-PIERZ MARINE	***12720 CHESTNUT BLVD***	***0 - 1/8 (0.000 mi.)***	***A36***	***125***
BRYAN ROCK PRODUCTS	***13580 JOHNSON MEMORI***	***0 - 1/8 (0.000 mi.)***	***I56***	***236***
WESTIN MARINE SHAKOP	***13727 JOHNSON MEMORI***	***SSW 0 - 1/8 (0.042 mi.)***	***O95***	***376***
MID AMERICA FESTIVAL	***12364 CHESTNUT BLVD***	***WNW 1/8 - 1/4 (0.146 mi.)***	***P99***	***382***
COMMERCIAL ASPHALT C	***12351 CHESTNUT BLVD***	***WNW 1/8 - 1/4 (0.194 mi.)***	***P106***	***460***

State- and tribal - equivalent CERCLIS

SHWS: The Superfund Site Information Listing records are the states' equivalent to CERCLIS. These sites may or may not already be listed on the federal CERCLIS list. Priority sites planned for cleanup using state funds (state equivalent of Superfund) are identified along with sites where cleanup will be paid for by potentially responsible parties. The data come from the Minnesota Pollution Control's Superfund Permanent List of Priorities.

A review of the SHWS list, as provided by EDR, and dated 05/13/2015 has revealed that there is 1 SHWS site within approximately 1 mile of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
LOUISVILLE LANDFILL Facility Id: SR118	***BETWEEN THE CHICAGO***	***SW 1/4 - 1/2 (0.324 mi.)***	***118***	***537***

EXECUTIVE SUMMARY

State and tribal landfill and/or solid waste disposal site lists

SWF/LF: The Solid Waste Facilities/Landfill Sites records typically contain an inventory of solid waste disposal facilities or landfills in a particular state. The data come from the Minnesota Pollution Control's Permitted Solid Waste Disposal Facilities list.

A review of the SWF/LF list, as provided by EDR, and dated 08/01/2015 has revealed that there are 3 SWF/LF sites within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
DEM-CON LANDFILL LLC Facility Id: 2601	***3601 130TH ST W***	***0 - 1/8 (0.000 mi.)***	***C50***	***204***
DEM-CON MATERIALS RE Facility Id: 66158517	***13162 JOHNSON MEMORI***	***0 - 1/8 (0.000 mi.)***	***F53***	***227***
DEM-CON RECOVERY & R Facility Id: 14272	***3230 130TH ST W***	***SW 0 - 1/8 (0.016 mi.)***	***C87***	***355***

LCP: Minnesota closed lanfill sites undergoing cleanup.

A review of the LCP list, as provided by EDR, and dated 01/26/2015 has revealed that there is 1 LCP site within approximately 0.5 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
LOUISVILLE LANDFILL	3698 130TH ST W	WSW 1/4 - 1/2 (0.317 mi.)	117	536

State and tribal leaking storage tank lists

LUST: The Leaking Underground Storage Tank Incident Reports contain an inventory of reported leaking underground storage tank incidents. The data come from the Minnesota Pollution Control Agency's Leak Sites list.

A review of the LUST list, as provided by EDR, and dated 08/01/2015 has revealed that there are 9 LUST sites within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
SUPERAMERICA Complete Site Closed Date: 01/09/2003 00:00:00 Site Id: 36987 MNPCA ID: 230276	***12835 VENTURA CT***	***0 - 1/8 (0.000 mi.)***	***B25***	***92***
ELANDER MECHANICAL I Complete Site Closed Date: 09/30/1994 00:00:00 Site Id: 33398 MNPCA ID: 220161	***2915 133RD ST W***	***S 1/8 - 1/4 (0.150 mi.)***	***Q100***	***384***

Lower Elevation	Address	Direction / Distance	Map ID	Page
THEIS AUTO REPAIR (O Complete Site Closed Date: 04/28/2004 00:00:00	***12706 CHESTNUT BLVD***	***0 - 1/8 (0.000 mi.)***	***A1***	***8***

Site Id: 37076
MNPCA ID: 265917

MNDOT	***12550 CHESTNUT BLVD***	***0 - 1/8 (0.000 mi.)***	***A14***	***50***

Complete Site Closed Date: 08/18/1997 00:00:00
Site Id: 56420
MNPCA ID: 219807

PATRIOT AUTO SALES	***12810 CHESTNUT BLVD***	***0 - 1/8 (0.000 mi.)***	***E28***	***108***

Complete Site Closed Date: 02/02/2004 00:00:00
Site Id: 248873
MNPCA ID: 275274

HOLIDAY STATIONSTORE	***12681 CHESTNUT BLVD***	***0 - 1/8 (0.000 mi.)***	***A40***	***132***

Complete Site Closed Date: 08/01/2013 00:00:00
Complete Site Closed Date: 04/02/1996 00:00:00
Complete Site Closed Date: 04/25/2005 00:00:00
Site Id: 224168
MNPCA ID: 64981560
MNPCA ID: 220484
MNPCA ID: 298123

ANCHOR BLOCK CO	***13450 JOHNSON MEMORI***	***0 - 1/8 (0.000 mi.)***	***K63***	***262***

Complete Site Closed Date: 07/29/1992 00:00:00
Site Id: 7748
MNPCA ID: 217450

ANCHOR BLOCK	***13450 JOHNSON MEMORI***	***0 - 1/8 (0.000 mi.)***	***K64***	***284***

Complete Site Closed Date: 06/20/1996 00:00:00
Site Id: 7748
MNPCA ID: 220683

COMMERCIAL ASPHALT C	***12355 CHESTNUT BLVD***	***WNW 1/8 - 1/4 (0.194 mi.)***	***P107***	***462***

Complete Site Closed Date: 11/13/1996 00:00:00
Site Id: 1985
MNPCA ID: 219661

State and tribal registered storage tank lists

UST: The Underground Storage Tank database contains registered USTs. USTs are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA). The data come from the Minnesota Pollution Control's Underground Storage Tank File.

A review of the UST list, as provided by EDR, and dated 08/01/2015 has revealed that there are 9 UST sites within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
SUPERAMERICA #4439	***12835 VENTURA CT***	***0 - 1/8 (0.000 mi.)***	***B22***	***77***

Tank Status: Active
Program Interest Id: 206480

BARTON SAND & GRAVEL	***12530 DEM CON DR.***	***0 - 1/8 (0.000 mi.)***	***F45***	***171***

Tank Status: Removed
Program Interest Id: 193897

NITEHAWK EXPRESS INC	***3122 W 130TH ST***	***0 - 1/8 (0.000 mi.)***	***C78***	***332***

Tank Status: Removed

Program Interest Id: 193830				
VILLAGE MOBILE STORA	***3186 W 130TH ST***	***0 - 1/8 (0.000 mi.)***	***C82***	***340***
Tank Status: Closed In-Place				
Program Interest Id: 193831				

Lower Elevation	Address	Direction / Distance	Map ID	Page
THEIS AUTO REPAIR (O	***12706 CHESTNUT BLVD***	***0 - 1/8 (0.000 mi.)***	***A1***	***8***
Tank Status: Removed				
Program Interest Id: 269794				
HOLIDAY STATIONSTORE	12681 CHESTNUT BLVD	0 - 1/8 (0.000 mi.)	A41	147
Tank Status: Active				
Tank Status: Tank Site Deleted				
Program Interest Id: 203048				
Program Interest Id: 302815				
BRYAN ROCK PRODUCTS	***13580 JOHNSON MEMORI***	***0 - 1/8 (0.000 mi.)***	***I60***	***249***
Tank Status: Removed				
Program Interest Id: 205349				
ANCHOR BLOCK CO	***13450 JOHNSON MEMORI***	***0 - 1/8 (0.000 mi.)***	***K63***	***262***
Tank Status: Removed				
Program Interest Id: 193852				
MALKERSON SALES INC	12355 CHESTNUT BLVD	WNW 1/8 - 1/4 (0.183 mi.)	P105	450
Tank Status: Removed				
Program Interest Id: 204530				

AST: The Aboveground Storage Tank database contains registered ASTs. The data come from the Minnesota Pollution Control's Aboveground Storage Tank File.

A review of the AST list, as provided by EDR, and dated 08/01/2015 has revealed that there are 15 AST sites within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
BRYAN ROCK PRODUCTS	***13020 DEM CON DR***	***0 - 1/8 (0.000 mi.)***	***A26***	***98***
Tank Status: 3				
Program Interest Id: 281737				
BARTON SAND & GRAVEL	***12530 DEM CON DR.***	***0 - 1/8 (0.000 mi.)***	***F45***	***171***
Tank Status: 3				
Tank Status: 5				
Program Interest Id: 193897				
LANO EQUIPMENT INC	3021 W 133RD ST	0 - 1/8 (0.000 mi.)	G48	196
Tank Status: 3				
Program Interest Id: 210604				
DU-AL CONSTRUCTION C	3136 W 130TH ST	0 - 1/8 (0.000 mi.)	C76	330
Tank Status: 4				
Program Interest Id: 209647				
VILLAGE MOBILE STORA	***3186 W 130TH ST***	***0 - 1/8 (0.000 mi.)***	***C82***	***340***
Tank Status: 3				
Program Interest Id: 193831				
Program Interest Id: 210899				
RESOURCE RECOVERY TE	3230 130TH ST	SW 0 - 1/8 (0.016 mi.)	C85	351

Tank Status: 5 Program Interest Id: 298295				
DITCH WITCH OF MINNE Tank Status: 3 Program Interest Id: 227117	12836 EMERY WAY	ESE 0 - 1/8 (0.026 mi.)	M90	370
ELANDER MECHANICAL I Tank Status: 3 Program Interest Id: 210802	***2915 133RD ST W***	***S 1/8 - 1/4 (0.150 mi.)***	***Q100***	***384***
COMMERCIAL ASPHALT C Tank Status: 5 Program Interest Id: 209536	3460 W 130TH ST	WSW 1/8 - 1/4 (0.216 mi.)	R111	521

Lower Elevation	Address	Direction / Distance	Map ID	Page
DUECO Tank Status: 3 Program Interest Id: 209919 Program Interest Id: 210862	12716 CHESTNUT BLVD	0 - 1/8 (0.000 mi.)	A10	42
R & R MARINE Tank Status: 3 Program Interest Id: 211071	12827 CHESTNUT BLVD	0 - 1/8 (0.000 mi.)	E31	116
HOLIDAY STATIONSTORE Tank Status: 3 Program Interest Id: 203048	12681 CHESTNUT BLVD	0 - 1/8 (0.000 mi.)	A34	121
BRYAN ROCK PRODUCTS Tank Status: 3 Tank Status: 5 Program Interest Id: 205349	***13580 JOHNSON MEMORI***	***0 - 1/8 (0.000 mi.)***	***I60***	***249***
ANCHOR BLOCK CO Tank Status: 5 Tank Status: 3 Program Interest Id: 193852	***13450 JOHNSON MEMORI***	***0 - 1/8 (0.000 mi.)***	***K65***	***290***
COMMERCIAL ASPHALT C Tank Status: 3 Tank Status: 5 Program Interest Id: 208367 Program Interest Id: 211194	12355 CHESTNUT BLVD	WNW 1/8 - 1/4 (0.183 mi.)	P104	435

State and tribal voluntary cleanup sites

VIC: This is the Minnesota Pollution Control Agency's Voluntary Investigation and Cleanup Program list.

A review of the VIC list, as provided by EDR, and dated 05/13/2015 has revealed that there is 1 VIC site within approximately 0.5 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
THEIS AUTO REPAIR (O Facility Id: VP17830	***12706 CHESTNUT BLVD***	***0 - 1/8 (0.000 mi.)***	***A1***	***8***

EXECUTIVE SUMMARY

ADDITIONAL ENVIRONMENTAL RECORDS

Local Lists of Landfill / Solid Waste Disposal Sites

SWRCY: A listing of companies that accept commercial quantities of recyclable materials.

A review of the SWRCY list, as provided by EDR, and dated 02/14/2013 has revealed that there is 1 SWRCY site within approximately 0.5 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
TILLER CORP/BARTON S	12351 CHESTNUT BLVD	NNW 1/8 - 1/4 (0.228 mi.)	116	536

Local Lists of Hazardous waste / Contaminated Sites

SRS: The database contains site information for sites monitored by the Site Remediation Section.

A review of the SRS list, as provided by EDR, and dated 05/13/2015 has revealed that there are 2 SRS sites within approximately 0.5 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
THEIS AUTO REPAIR (O Facility Id: VP17830	***12706 CHESTNUT BLVD***	***0 - 1/8 (0.000 mi.)***	***A1***	***8***
LOUISVILLE LANDFILL Facility Id: SR118	***BETWEEN THE CHICAGO***	***SW 1/4 - 1/2 (0.324 mi.)***	***118***	***537***

Other Ascertainable Records

RCRA NonGen / NLR: RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Non-Generators do not presently generate hazardous waste.

A review of the RCRA NonGen / NLR list, as provided by EDR, and dated 06/09/2015 has revealed that there are 13 RCRA NonGen / NLR sites within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
SOUTHWEST METRO TRUC	3200 130TH ST W	0 - 1/8 (0.000 mi.)	C18	73
MARINE BODYWORKS	***12830 VENTURA CT***	***0 - 1/8 (0.000 mi.)***	***B30***	***114***
FRITZ CABINETRY & FU	***12900 VENTURA CT STE***	***0 - 1/8 (0.000 mi.)***	***B35***	***123***
RB AUTO BODY	***12616 JOHNSON MEMORI***	***0 - 1/8 (0.000 mi.)***	***L69***	***322***
R & R MARINE BODYWOR	***12616 JOHNSON MEMORI***	***0 - 1/8 (0.000 mi.)***	***L75***	***328***
WITCH OF MINNESOTA I	12826 EMERY WAY	ESE 0 - 1/8 (0.030 mi.)	M92	373
PLEHAL BLACKTOPPING	***3460 130TH ST W***	***WSW 1/8 - 1/4 (0.214 mi.)***	***R109***	***512***
PLEHAL BLACKTOPPING	3460 130TH ST W	WSW 1/8 - 1/4 (0.214 mi.)	R110	520
AM ROOFING SYSTEMS I	***3470 130TH ST W***	***WSW 1/8 - 1/4 (0.223 mi.)***	***R114***	***532***
DU-AL CONSTRUCTION C	***3468 W 130TH ST***	***WSW 1/8 - 1/4 (0.223 mi.)***	***R115***	***534***

Lower Elevation	Address	Direction / Distance	Map ID	Page
MINNESOTA VINYL & AL	***12718 CHESTNUT BLVD***	***0 - 1/8 (0.000 mi.)***	***A7***	***38***

EXECUTIVE SUMMARY

Lower Elevation	Address	Direction / Distance	Map ID	Page
HARDRIVES INC		***0 - 1/8 (0.000 mi.)***	***I58***	***243***
MIDWEST ASPHALT CORP	***12386 CHESTNUT BLVD***	***NW 0 - 1/8 (0.057 mi.)***	***97***	***380***

US MINES: Mines Master Index File. The source of this database is the Dept. of Labor, Mine Safety and Health Administration.

A review of the US MINES list, as provided by EDR, and dated 05/14/2015 has revealed that there are 4 US MINES sites within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
WM. MUELLER & SONS I		NE 1/8 - 1/4 (0.159 mi.)	102	393
PLEHAL BLACKTOPPING	***3460 130TH ST W***	***WSW 1/8 - 1/4 (0.214 mi.)***	***R109***	***512***

Lower Elevation	Address	Direction / Distance	Map ID	Page
BRYAN ROCK PRODUCTS		0 - 1/8 (0.000 mi.)	I57	237
HARDRIVES INC		***0 - 1/8 (0.000 mi.)***	***I58***	***243***

MDA LIS: Information provided lists all individuals or companies who hold licenses, certificates and/or permits required by state law and regulated by the Department. Additionally, the LIS lists all companies who must register products with the Department before being used or sold in commercial channels within our state.

A review of the MDA LIS list, as provided by EDR, and dated 08/10/2015 has revealed that there are 2 MDA LIS sites within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
HERMAN DONNA DBA NO License Num: 20107947	12900 VENTURA CT	0 - 1/8 (0.000 mi.)	B8	40
BRYAN ROCK PRODUCTS License Num: 20161349	***13020 DEM CON DR***	***0 - 1/8 (0.000 mi.)***	***A26***	***98***

MN LS: The List of Sites includes: Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS), No Further Remedial Action Planned (NFRAP), National Priorities List (NPL), Permanent List of Priorities (PLP), Sites delisted from the Permanent List of Priorities (DPLP), Hazardous Waste Permit Unit Project Facilities (HW PERM), List of Permitted Solid Waste Facilities (SW PERM), 1980 Metropolitan Area Waste Disposal Site Inventory,1980 Statewide Outstate Dump Inventory (ODI), Voluntary and Investigation Program (VIC), and Closed Landfill Sites Undergoing Cleanup (LCP). The List of Sites comes from Minnesota Pollution Control

A review of the MN LS list, as provided by EDR, and dated 04/22/2009 has revealed that there are 3 MN LS sites within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
DEM-CON LANDFILL LLC MPCA Id: SW-290 Link ID: 2744	***3601 130TH ST W***	***0 - 1/8 (0.000 mi.)***	***C50***	***204***
DEM-CON RECOVERY & R	***3230 130TH ST W***	***SW 0 - 1/8 (0.016 mi.)***	***C87***	***355***

MPCA Id: SW-555
Link ID: 5064

Lower Elevation	Address	Direction / Distance	Map ID	Page
MNDOT THEIS AUTO MPCA Id: VP17830 Link ID: 5843	***12706 CHESTNUT BOULE***	***0 - 1/8 (0.000 mi.)***	***A4***	***34***

WIMN: Since 2003, the PCA's "What's in My Neighborhood?" database provides information about air quality, hazardous waste, remediation, solid waste, tanks and leaks, and water quality around Minnesota.

A review of the WIMN list, as provided by EDR, and dated 06/08/2015 has revealed that there are 65 WIMN sites within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
QUALITY HEATING & AI MPCA Id: MNS000166058 Status: Active	12912 VENTURA CT STE	0 - 1/8 (0.000 mi.)	B2	34
RUS LLC MPCA Id: MND982213613 Status: Active	3200 W 130TH ST	0 - 1/8 (0.000 mi.)	C11	47
3T REPAIR LLC MPCA Id: MND985743855 Status: Active	***3186 130TH ST W***	***0 - 1/8 (0.000 mi.)***	***C13***	***48***
DUECO MPCA Id: MNS000151175 Status: Active	12565 HIGHWAY 41 FRO	0 - 1/8 (0.000 mi.)	D16	72
RBJ AUTO BODY MPCA Id: MND985767417 Status: Active	3196 130TH ST W	0 - 1/8 (0.000 mi.)	C19	74
JOHNNY'S AUTO SALES MPCA Id: MNS000205765 Status: Active	12832 VENTURA CT	0 - 1/8 (0.000 mi.)	B23	91
SUPERAMERICA MPCA Id: Multiple Activities Status: Active	***12835 VENTURA CT***	***0 - 1/8 (0.000 mi.)***	***B25***	***92***
BRYAN ROCK PRODUCTS MPCA Id: MND985678614 MPCA Id: MNS000102855 Status: Active	***13020 DEM CON DR***	***0 - 1/8 (0.000 mi.)***	***A26***	***98***
MARINE BODYWORKS MPCA Id: MN0000692228 Status: Active	***12830 VENTURA CT***	***0 - 1/8 (0.000 mi.)***	***B30***	***114***
FRITZ CABINETRY & FU MPCA Id: MNR000019653 Status: Active	***12900 VENTURA CT STE***	***0 - 1/8 (0.000 mi.)***	***B35***	***123***
ECONO USED CARS MPCA Id: MN0000341271	***12701 JOHNSON MEMORI***	***0 - 1/8 (0.000 mi.)***	***37***	***126***

Status: Active				
DW AUTO/TRUCK SERVIC MPCA Id: MNR000105510 Status: Active	***12844 CHESTNUT BLVD***	***0 - 1/8 (0.000 mi.)***	***B38***	***128***
BODY BY BOB MPCA Id: MN0000016758 Status: Active	***3198 W 13TH ST***	***0 - 1/8 (0.000 mi.)***	***C43***	***169***
DEM CON MATERIALS RE MPCA Id: C00035822 Status: Active	ADDRESS UNKNOWN	0 - 1/8 (0.000 mi.)	F44	171
BARTON SAND & GRAVEL MPCA Id: 4479 Status: Active	***12530 DEM CON DR.***	***0 - 1/8 (0.000 mi.)***	***F45***	***171***
LANO EQUIPMENT MPCA Id: Multiple Activities Status: Active	***3021 W 133RD ST***	***0 - 1/8 (0.000 mi.)***	***G47***	***193***
PLEHAL BLACKTOPPING MPCA Id: MNS000102731 Status: Active	***13060 DEM CON DR***	***0 - 1/8 (0.000 mi.)***	***F49***	***198***
DEM-CON LANDFILL LLC MPCA Id: Multiple Activities MPCA Id: SW290 Status: Active	***3601 130TH ST W***	***0 - 1/8 (0.000 mi.)***	***C50***	***204***
DEM-CON LANDFILL - L MPCA Id: C00018320 Status: Active	SEE LOCATION DESCRIP	0 - 1/8 (0.000 mi.)	C51	227
APPLIANCE SERVICE MPCA Id: MND082520461 Status: Active	13122 JOHNSON MEMORI	0 - 1/8 (0.000 mi.)	H52	227
DEM-CON MATERIALS RE MPCA Id: PBR001011 Status: Active	***13162 JOHNSON MEMORI***	***0 - 1/8 (0.000 mi.)***	***F53***	***227***
DIEMOLD TOOL INC MPCA Id: MND985687144 Status: Inactive	13340 JOHNSON MEMORI	0 - 1/8 (0.000 mi.)	J61	260
JACKSON HEIGHTS MOBI MPCA Id: MN0057967 Status: Active	12665 DEM-CON DR	0 - 1/8 (0.000 mi.)	C66	318
WULF G L TRUCKING MPCA Id: MND985770049 Status: Active	***3134 130TH ST W***	***0 - 1/8 (0.000 mi.)***	***C67***	***319***
R & R MARINE BODYWOR MPCA Id: MND985746841 Status: Active	***12616 JOHNSON MEMORI***	***0 - 1/8 (0.000 mi.)***	***L68***	***320***
RB AUTO BODY MPCA Id: MND985767607 Status: Active	12616 JOHNSON MEMORI	0 - 1/8 (0.000 mi.)	L70	323
APS AUTOWORKS MPCA Id: MNS000159673	3136 130TH ST W	0 - 1/8 (0.000 mi.)	C71	324

Status: Active				
MIDWEST SPORT CENTER MPCA Id: MN0000289363 Status: Active	***12580 JOHNSON MEMORI***	***0 - 1/8 (0.000 mi.)***	***L73***	***324***
INDY SPECIALTY MPCA Id: MN0000124636 Status: Active	***12540 JOHNSON MEMORI***	***0 - 1/8 (0.000 mi.)***	***L74***	***326***
ACORN MINI STORAGE MPCA Id: C00025152 Status: Active	3050 130 ST W	0 - 1/8 (0.000 mi.)	77	332
NITEHAWK EXPRESS INC MPCA Id: 4407 Status: Inactive	***3122 W 130TH ST***	***0 - 1/8 (0.000 mi.)***	***C78***	***332***
DU-AL CONSTRUCTION C MPCA Id: 52204 Status: Inactive	***3136 W 130TH ST***	***0 - 1/8 (0.000 mi.)***	***C79***	***337***
WILLIAM B FENSKE SHO MPCA Id: PW5103027232 Status: Inactive	3120 130TH ST W	0 - 1/8 (0.000 mi.)	C80	339
VILLAGE MOBILE STORA MPCA Id: Multiple Activities Status: Active	***3186 W 130TH ST***	***0 - 1/8 (0.000 mi.)***	***C83***	***347***
ALLEN ADVERTISING PR MPCA Id: Multiple Activities Status: Active	***12860 EMERY WAY***	***SE 0 - 1/8 (0.015 mi.)***	***M84***	***349***
SOUTH METRO SORT & R MPCA Id: 123688 Status: Inactive	***3230 130TH ST***	***SW 0 - 1/8 (0.016 mi.)***	***C86***	***353***
DEM-CON RECOVERY & R MPCA Id: A00006401 MPCA Id: SW555 MPCA Id: C00009144 Status: Inactive Status: Active	***3230 130TH ST W***	***SW 0 - 1/8 (0.016 mi.)***	***C87***	***355***
UNIVERSAL STONE - CS MPCA Id: C00019363 Status: Inactive	3019 W 133RD ST	S 0 - 1/8 (0.016 mi.)	G88	368
DITCH WITCH OF MINNE MPCA Id: 119741 Status: Active	***12836 EMERY WAY***	***ESE 0 - 1/8 (0.026 mi.)***	***M89***	***368***
MOBILE MANOR PARK MPCA Id: MN0056197 Status: Active	12325 JOHNSON MEMORI	NE 0 - 1/8 (0.030 mi.)	N91	372
DITCH WITCH OF MINNE MPCA Id: MNR000077263 Status: Active	***12826 EMERY WAY***	***ESE 0 - 1/8 (0.030 mi.)***	***M93***	***374***
SCOTT COUNTY SUBSTAT MPCA Id: C00038127 Status: Active	12326 JOHNSON MEMORI	NE 0 - 1/8 (0.038 mi.)	N94	376
MOMS LANDSCAPING & D	12276 JOHNSON MEMORI	NE 0 - 1/8 (0.090 mi.)	N98	382

MPCA Id: MNS000159657 Status: Active				
ELANDER MECHANICAL I MPCA Id: Multiple Activities Status: Active	***2915 133RD ST W***	***S 1/8 - 1/4 (0.150 mi.)***	***Q100***	***384***
PLEHAL BLACKTOPPING MPCA Id: MND022824502 Status: Inactive	3460 130TH ST W	WSW 1/8 - 1/4 (0.214 mi.)	R108	512
PLEHAL BLACKTOPPING MPCA Id: MND985744564 Status: Inactive	***3460 130TH ST W***	***WSW 1/8 - 1/4 (0.214 mi.)***	***R109***	***512***
COMMERCIAL ASPHALT C MPCA Id: 51995 Status: Inactive	***3460 W 130TH ST***	***WSW 1/8 - 1/4 (0.216 mi.)***	***R112***	***528***
DUAL CONSTRUCTION CO MPCA Id: MND981527070 Status: Inactive	3468 130TH ST W	WSW 1/8 - 1/4 (0.221 mi.)	R113	532
AM ROOFING SYSTEMS I MPCA Id: MND981790421 Status: Inactive	***3470 130TH ST W***	***WSW 1/8 - 1/4 (0.223 mi.)***	***R114***	***532***

Lower Elevation	Address	Direction / Distance	Map ID	Page
THEIS AUTO REPAIR (O MPCA Id: Multiple Activities Status: Active	***12706 CHESTNUT BLVD***	***0 - 1/8 (0.000 mi.)***	***A1***	***8***
MNDOT THEIS AUTO MPCA Id: VP17830 Status: Inactive	***12706 CHESTNUT BOULE***	***0 - 1/8 (0.000 mi.)***	***A4***	***34***
MINNESOTA VINYL & AL MPCA Id: MNR000065656 Status: Active	***12718 CHESTNUT BLVD***	***0 - 1/8 (0.000 mi.)***	***A7***	***38***
DUECO MPCA Id: 54629 MPCA Id: Multiple Activities Status: Active	***12716 CHESTNUT BLVD***	***0 - 1/8 (0.000 mi.)***	***A9***	***40***
PATRIOT AUTO SALES MPCA Id: 15522 Status: Inactive	***12810 CHESTNUT BLVD***	***0 - 1/8 (0.000 mi.)***	***E28***	***108***
R & R MARINE INC MPCA Id: Multiple Activities Status: Active	***12827 CHESTNUT BLVD***	***0 - 1/8 (0.000 mi.)***	***E29***	***112***
HOLIDAY STATIONSTORE MPCA Id: Multiple Activities Status: Active	***12681 CHESTNUT BLVD***	***0 - 1/8 (0.000 mi.)***	***A40***	***132***
BRYAN ROCK PRODUCTS MPCA Id: Multiple Activities Status: Active	***13580 JOHNSON MEMORI***	***0 - 1/8 (0.000 mi.)***	***I55***	***232***
HARDRIVES INC MPCA Id: MND981201114	13680 JOHNSON MEMORI	0 - 1/8 (0.000 mi.)	I59	249

Status: Inactive				
ANCHOR BLOCK MPCA Id: Multiple Activities Status: Active	***13450 JOHNSON MEMORI***	***0 - 1/8 (0.000 mi.)***	***K64***	***284***
WESTIN MARINE SHAKOP MPCA Id: MNR000052795 Status: Active	***13727 JOHNSON MEMORI***	***SSW 0 - 1/8 (0.042 mi.)***	***O96***	***378***
MIDWEST ASPHALT CORP MPCA Id: MND982070419 Status: Inactive	***12386 CHESTNUT BLVD***	***NW 0 - 1/8 (0.057 mi.)***	***97***	***380***
MID AMERICA FESTIVAL MPCA Id: MNR000043661 Status: Active	***12364 CHESTNUT BLVD***	***WNW 1/8 - 1/4 (0.146 mi.)***	***P99***	***382***
COMMERCIAL ASPHALT C MPCA Id: Multiple Activities Status: Active	***12355 CHESTNUT BLVD***	***WNW 1/8 - 1/4 (0.183 mi.)***	***P103***	***397***
ED BREEGGEEMANN FARM MPCA Id: 13961019 Status: Active	12355 OLD BRICKYARD	ENE 1/4 - 1/2 (0.442 mi.)	119	542
MNDOT SHAKOPEE MPCA Id: Multiple Activities Status: Active	12550 CHESTNUT BLVD	WSW 1/4 - 1/2 (0.499 mi.)	120	543

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR US Hist Auto Stat: EDR has searched selected national collections of business directories and has collected listings of potential gas station/filling station/service station sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include gas station/filling station/service station establishments. The categories reviewed included, but were not limited to gas, gas station, gasoline station, filling station, auto, automobile repair, auto service station, service station, etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

A review of the EDR US Hist Auto Stat list, as provided by EDR, has revealed that there are 8 EDR US Hist Auto Stat sites within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
Not reported	3186 130TH ST W	0 - 1/8 (0.000 mi.)	C12	47
Not reported	3200 130TH ST W	0 - 1/8 (0.000 mi.)	C17	72
Not reported	3196 130TH ST W	0 - 1/8 (0.000 mi.)	C20	75
Not reported	12850 CHESTNUT BLVD	0 - 1/8 (0.000 mi.)	B42	168
PT MAINTENANCE	3136 130TH ST W	0 - 1/8 (0.000 mi.)	C72	324
Not reported	3122 130TH ST W	0 - 1/8 (0.000 mi.)	C81	340

Lower Elevation	Address	Direction / Distance	Map ID	Page
Not reported	12706 CHESTNUT BLVD	0 - 1/8 (0.000 mi.)	A3	34

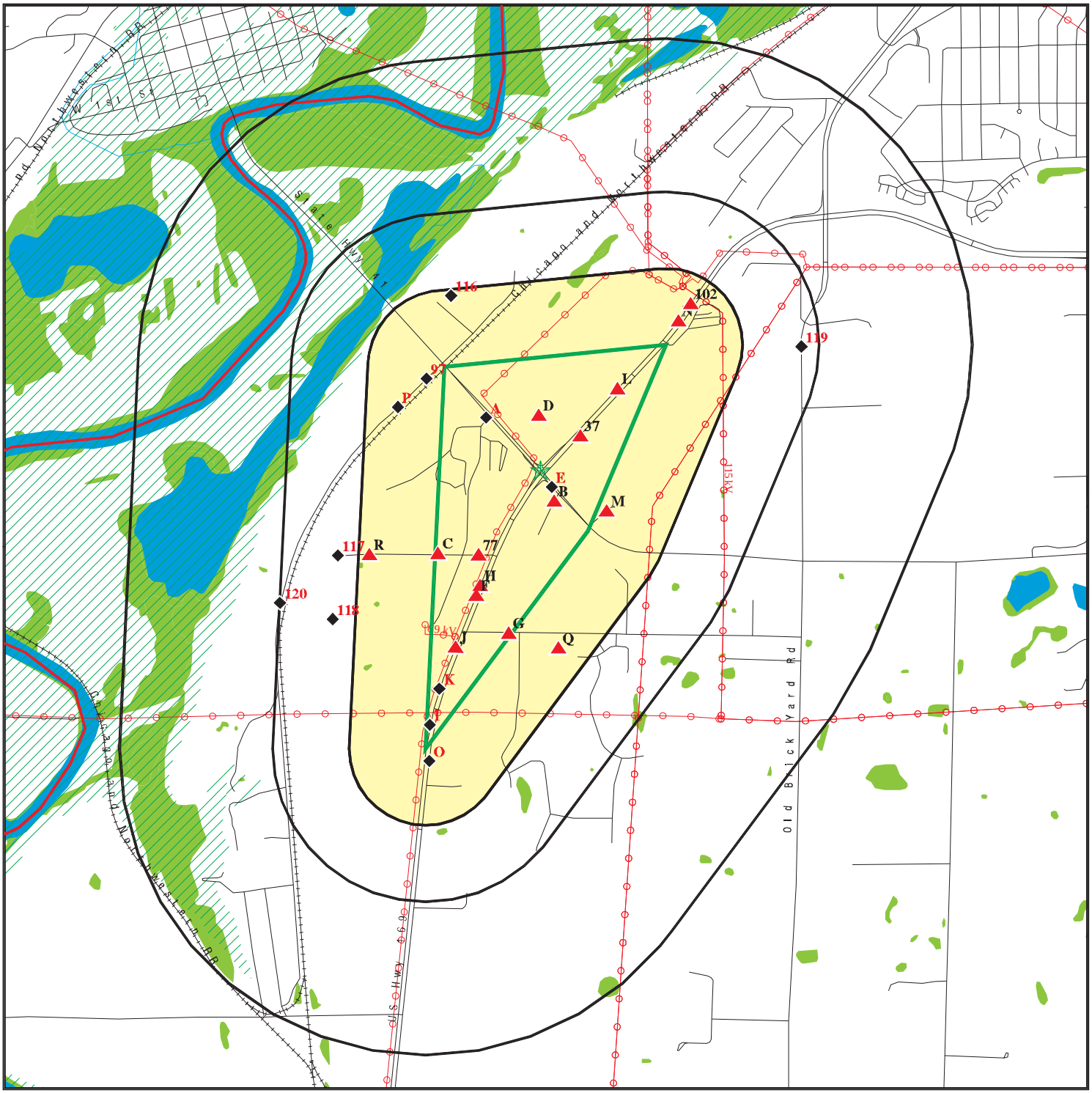
EXECUTIVE SUMMARY

Lower Elevation	Address	Direction / Distance	Map ID	Page
HOLIDAY STATION	12681 CHESTNUT BLVD	0 - 1/8 (0.000 mi.)	A33	121

EXECUTIVE SUMMARY

There were no unmapped sites in this report.

OVERVIEW MAP - 4424821.2S



Target Property

Sites at elevations higher than or equal to the target property

Sites at elevations lower than the target property

Manufactured Gas Plants

National Priority List Sites

Dept. Defense Sites

0 1/4 1/2 1 Miles

Indian Reservations BIA

County Boundary

Power transmission lines

100-year flood zone

500-year flood zone

National Wetland Inventory

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME: 169 / 41 Intersection	CLIENT: Scott County Environmental Health
ADDRESS: US169 / MN41	CONTACT: Richard Jones
Shakopee MN 55379	INQUIRY #: 4424821.2s
LAT/LONG: 44.7659 / 93.5786	DATE: September 29, 2015 5:12 pm

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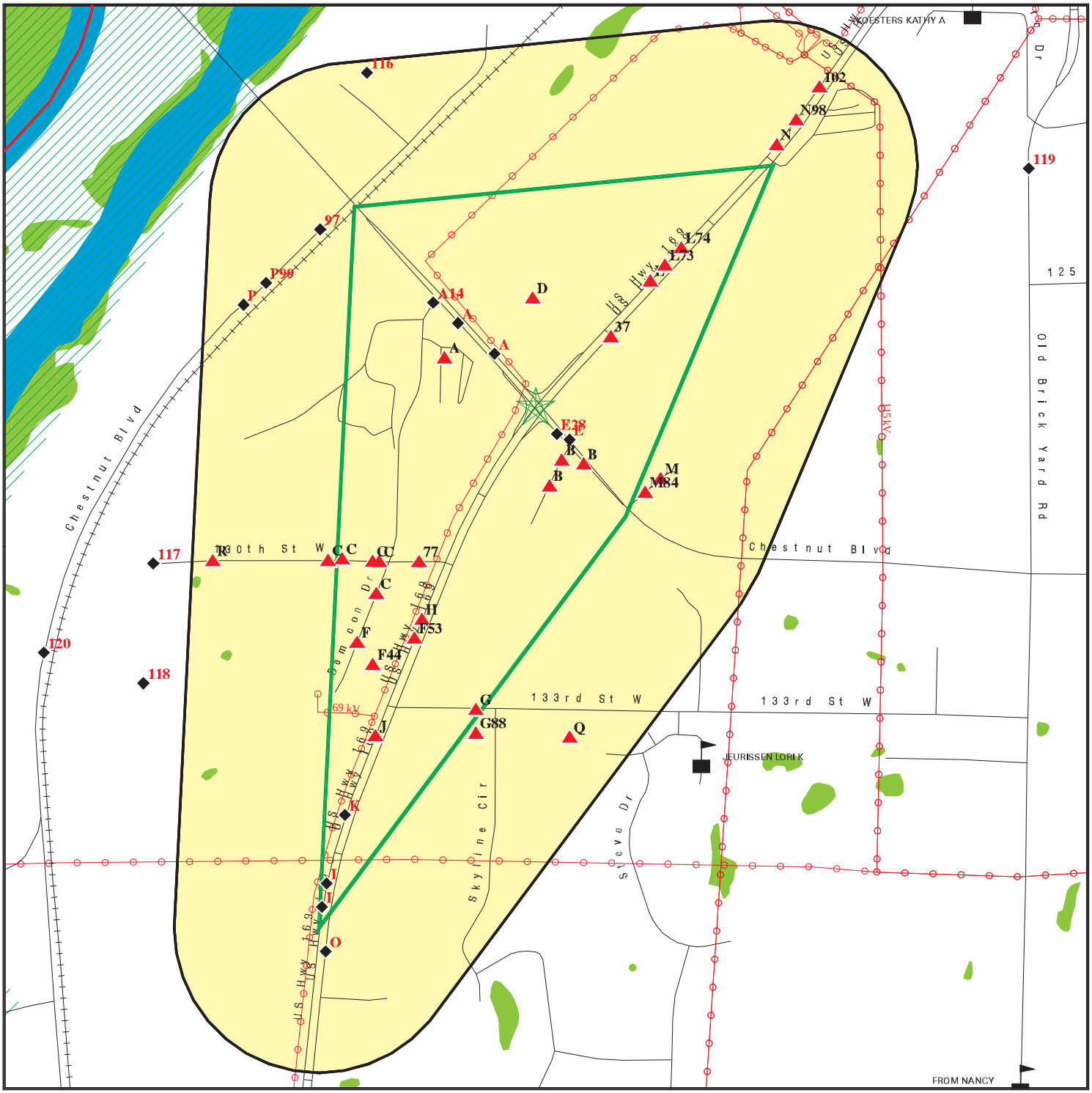
DETAIL MAP - 4424821.2S



Target Property

Sites at elevations higher than or equal to the target property

Sites at elevations lower than the target property

Manufactured Gas Plants

Sensitive Receptors

National Priority List Sites

Dept. Defense Sites

Indian Reservations BIA

County Boundary

Power transmission lines

100-year flood zone

500-year flood zone

National Wetland Inventory

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME: 169 / 41 Intersection	CLIENT: Scott County Environmental Health
ADDRESS: US169 / MN41	CONTACT: Richard Jones
Shakopee MN 55379	INQUIRY #: 4424821.2s
LAT/LONG: 44.7659 / 93.5786	DATE: September 29, 2015 5:14 pm

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MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
STANDARD ENVIRONMENTAL RECORDS								
Federal NPL site list								
NPL	1.000		0	0	0	0	NR	0
Proposed NPL	1.000		0	0	0	0	NR	0
NPL LIENS	TP		NR	NR	NR	NR	NR	0
Federal Delisted NPL site list								
Delisted NPL	1.000		0	0	0	0	NR	0
Federal CERCLIS list								
FEDERAL FACILITY	0.500		0	0	0	NR	NR	0
CERCLIS	0.500		0	0	0	NR	NR	0
Federal CERCLIS NFRAP site List								
CERC-NFRAP	0.500		0	0	0	NR	NR	0
Federal RCRA CORRACTS facilities list								
CORRACTS	1.000		0	0	0	0	NR	0
Federal RCRA non-CORRACTS TSD facilities list								
RCRA-TSDF	0.500		0	0	0	NR	NR	0
Federal RCRA generators list								
RCRA-LQG	0.250		0	0	NR	NR	NR	0
RCRA-SQG	0.250		1	0	NR	NR	NR	1
RCRA-CESQG	0.250		24	3	NR	NR	NR	27
Federal institutional controls / engineering controls registries								
LUCIS	0.500		0	0	0	NR	NR	0
US ENG CONTROLS	0.500		0	0	0	NR	NR	0
US INST CONTROL	0.500		0	0	0	NR	NR	0
Federal ERNS list								
ERNS	TP		NR	NR	NR	NR	NR	0
State- and tribal - equivalent NPL								
MN PLP	1.000		0	0	0	0	NR	0
State- and tribal - equivalent CERCLIS								
SHWS	1.000		0	0	1	0	NR	1
State and tribal landfill and/or solid waste disposal site lists								
SWF/LF	0.500		3	0	0	NR	NR	3
UNPERM LF	0.500		0	0	0	NR	NR	0
LCP	0.500		0	0	1	NR	NR	1
State and tribal leaking storage tank lists								
LAST	0.500		0	0	0	NR	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
LUST	0.500		7	2	0	NR	NR	9
INDIAN LUST	0.500		0	0	0	NR	NR	0
State and tribal registered storage tank lists								
FEMA UST	0.250		0	0	NR	NR	NR	0
UST	0.250		8	1	NR	NR	NR	9
AST	0.250		12	3	NR	NR	NR	15
INDIAN UST	0.250		0	0	NR	NR	NR	0
State and tribal institutional control / engineering control registries								
INST CONTROL	0.500		0	0	0	NR	NR	0
State and tribal voluntary cleanup sites								
VIC	0.500		1	0	0	NR	NR	1
INDIAN VCP	0.500		0	0	0	NR	NR	0
State and tribal Brownfields sites								
BROWNFIELDS	0.500		0	0	0	NR	NR	0
ADDITIONAL ENVIRONMENTAL RECORDS								
Local Brownfield lists								
US BROWNFIELDS	0.500		0	0	0	NR	NR	0
Local Lists of Landfill / Solid Waste Disposal Sites								
SWRCY	0.500		0	1	0	NR	NR	1
INDIAN ODI	0.500		0	0	0	NR	NR	0
ODI	0.500		0	0	0	NR	NR	0
DEBRIS REGION 9	0.500		0	0	0	NR	NR	0
Local Lists of Hazardous waste / Contaminated Sites								
US HIST CDL	TP		NR	NR	NR	NR	NR	0
SRS	0.500		1	0	1	NR	NR	2
CDL	TP		NR	NR	NR	NR	NR	0
MN DEL PLP	1.000		0	0	0	0	NR	0
US CDL	TP		NR	NR	NR	NR	NR	0
Local Land Records								
LIENS	TP		NR	NR	NR	NR	NR	0
LIENS 2	TP		NR	NR	NR	NR	NR	0
Records of Emergency Release Reports								
HMIRS	TP		NR	NR	NR	NR	NR	0
SPILLS	TP		NR	NR	NR	NR	NR	0
AGSPILLS	TP		NR	NR	NR	NR	NR	0
SPILLS 90	TP		NR	NR	NR	NR	NR	0
SPILLS 80	TP		NR	NR	NR	NR	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
Other Ascertainable Records								
RCRA NonGen / NLR	0.250		9	4	NR	NR	NR	13
FUDS	1.000		0	0	0	0	NR	0
DOD	1.000		0	0	0	0	NR	0
SCRD DRYCLEANERS	0.500		0	0	0	NR	NR	0
US FIN ASSUR	TP		NR	NR	NR	NR	NR	0
EPA WATCH LIST	TP		NR	NR	NR	NR	NR	0
2020 COR ACTION	0.250		0	0	NR	NR	NR	0
TSCA	TP		NR	NR	NR	NR	NR	0
TRIS	TP		NR	NR	NR	NR	NR	0
SSTS	TP		NR	NR	NR	NR	NR	0
ROD	1.000		0	0	0	0	NR	0
RMP	TP		NR	NR	NR	NR	NR	0
RAATS	TP		NR	NR	NR	NR	NR	0
PRP	TP		NR	NR	NR	NR	NR	0
PADS	TP		NR	NR	NR	NR	NR	0
ICIS	TP		NR	NR	NR	NR	NR	0
FTTS	TP		NR	NR	NR	NR	NR	0
MLTS	TP		NR	NR	NR	NR	NR	0
COAL ASH DOE	TP		NR	NR	NR	NR	NR	0
COAL ASH EPA	0.500		0	0	0	NR	NR	0
PCB TRANSFORMER	TP		NR	NR	NR	NR	NR	0
RADINFO	TP		NR	NR	NR	NR	NR	0
HIST FTTS	TP		NR	NR	NR	NR	NR	0
DOT OPS	TP		NR	NR	NR	NR	NR	0
CONSENT	1.000		0	0	0	0	NR	0
INDIAN RESERV	1.000		0	0	0	0	NR	0
UMTRA	0.500		0	0	0	NR	NR	0
LEAD SMELTERS	TP		NR	NR	NR	NR	NR	0
US AIRS	TP		NR	NR	NR	NR	NR	0
US MINES	0.250		2	2	NR	NR	NR	4
FINDS	TP		NR	NR	NR	NR	NR	0
AGVIC	0.500		0	0	0	NR	NR	0
AIRS	TP		NR	NR	NR	NR	NR	0
BULK	0.250		0	0	NR	NR	NR	0
COAL ASH	0.500		0	0	0	NR	NR	0
DRYCLEANERS	0.250		0	0	NR	NR	NR	0
ENF	TP		NR	NR	NR	NR	NR	0
Financial Assurance	TP		NR	NR	NR	NR	NR	0
MN HWS Permit	1.000		0	0	0	0	NR	0
MANIFEST	0.250		0	0	NR	NR	NR	0
MDA LIS	0.250		2	0	NR	NR	NR	2
MN LS	0.500		3	0	0	NR	NR	3
TIER 2	TP		NR	NR	NR	NR	NR	0
WIMN	0.500		55	8	2	NR	NR	65
EDR HIGH RISK HISTORICAL RECORDS								
EDR Exclusive Records								
EDR MGP	1.000		0	0	0	0	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
EDR US Hist Auto Stat	0.250		8	0	NR	NR	NR	8
EDR US Hist Cleaners	0.250		0	0	NR	NR	NR	0
EDR RECOVERED GOVERNMENT ARCHIVES								
Exclusive Recovered Govt. Archives								
RGA HWS	TP		NR	NR	NR	NR	NR	0
RGA LF	TP		NR	NR	NR	NR	NR	0
RGA LUST	TP		NR	NR	NR	NR	NR	0
- Totals --		0	136	24	5	0	0	165

NOTES:

TP = Target Property

NR = Not Requested at this Search Distance

Sites may be listed in more than one database

SCOTT COUNTY
COMMUNITY SERVICES DIVISION
ENVIRONMENTAL SERVICES
200 FOURTH AVENUE WEST
SHAKOPEE, MN 55379-1220
(952) 496-8475 Fax: (952) 496-8496
Website: www.co.scott.mn.us

October 19, 2015

Kate Sedlacek
Environmental Services Supervisor
Scott County Environmental Services
200 4th Ave W
Shakopee MN 55379

Dear Ms. Sedlacek:

This letter regards your request for information on environmental concerns within ½ mile of the County Road 41 and U. S. Highway 169 project in Jackson and Louisville Townships as outlined in the map that you provided me. The concerns we know about are as follows:

1. Enclosed is a list of hazardous waste generators licensed by Scott County in this area. There may be additional generators of hazardous waste in this area, but they are not licensed by the County at this time.

2. For information on above-ground and underground storage tanks, call the Minnesota Pollution Control Agency (MPCA) at 651-296-6300.

3. Hazardous material or petroleum spills:

   A. In 1992, we received a complaint that there was a release of an estimated 20-40 gallons of solvent at 3136 130 St. W. in Louisville Township. The company operating there, Rub-R-Wall, used a product that contained xylene and other solvents. The release was reported to the MPCA, and the company later excavated a 10 x 15 foot area (an average of about six inches deep) and stockpiled it for testing. However, the company moved and the soil pile was found to be missing during an inspection in 1993. The inspector speculated that the contaminated soil may have been thin spread on the property, but we were never able to definitively determine what happened to the contaminated soil.

   B. We received "no action" letters from the MPCA regarding petroleum tank releases for the following businesses:

      - Anchor Block and Johnson Block/RW Concrete at 13450 Johnson Memorial Dr. in Louisville Twp.:
        - Johnson Block/RW Concrete closure letter dated July 29, 1992. The MPCA site ID# is LEAK00004755.
        - Anchor Block closure letter dated June 20, 1996. The MPCA site ID# is LEAK00008096.

      - Commercial Asphalt at 12355 Chestnut Blvd. in Louisville Twp. (closure letter dated November 13, 1996). The MPCA site ID# is LEAK00007036.

      - Elander Mechanical at 2915 133rd St. W. in Louisville Twp. (closure letter dated September 30, 1994). The MPCA site ID# is LEAK00007549.

- Holiday Station Store at 12681 Chestnut Blvd. in Jackson Twp.
  - Closure letter dated April 2, 1996. The MPCA site ID# is LEAK00007887.
  - Closure letter dated April 25, 2005. The MPCA site ID# is LEAK00015811.
  - Closure letter dated August 1, 2013. The MPCA site ID# is LEAK00019058.

- Mark Weller at 12810 Chestnut Blvd. in Jackson Twp. (closure letter dated February 2, 2004). The MPCA site ID# is LEAK000015522. The property was acquired as part of the MnDOT reconstruction of Highways 41 and 169.

- MnDOT Truck Station at 12550 Dem Con Dr. in Louisville Twp. (closure letter dated August 18, 1997). The MPCA site ID# is LEAK00007185.

- Super America at 12835 Ventura Ct. in Jackson Twp. (closure letter dated January 9, 2003). MPCA site ID# LEAK00014045.

- Theis Repair at 12706 Chestnut Blvd. in Jackson Twp. (closure letter dated April 28, 2004). The MPCA site ID# is LEAK000015254. The property was acquired as part of the MnDOT reconstruction of Highways 41 and 169.

Please contact the MPCA at 651-296-6300 for more information on tanks/releases in this area.

4. Hazardous material storage: Call the Shakopee Fire Chief at 952-233-9300, or the Minnesota Emergency Response Commission at 651-297-7372.

5. Hazardous waste disposal sites: No licensed hazardous waste disposal facility has ever operated in this area.

6. Solid waste landfills and dumps:

   A. Dem-Con landfill is currently licensed by this Department as a demolition-construction landfill. It is located at 13020 Dem Con Dr. in Louisville Twp.

   B. Louisville Landfill is a closed municipal solid waste landfill property (directly adjacent to Dem Con Landfill at 3601 130th St. W.). The landfill was active until 1990 and is now being managed by the MPCA as a Closed Landfill.

   C. Anchor Block and Concrete at 13450 Johnson Memorial Dr. in Louisville Twp. had a dump consisting of solid waste and a minor amount of hazardous waste in the early 1990s. The County required that some of the waste be removed, but most of it (primarily concrete) was simply covered with soil. We are not aware of any groundwater contamination that resulted from the dump.

7. Soil or groundwater contamination: I have enclosed a map from the Minnesota Geological Survey delineating the areas in Scott County most susceptible to bedrock aquifer contamination. As you can see, this property lies in one of the zones that is most susceptible to contamination.

The information provided herein is based on Department records and staff recall since 1978. There is very little information on file regarding problems of this nature prior to 1978. The Jackson Township clerk, Rose Menke (952-445-6495), and the Louisville Township clerk, Cheryl Doucette (952-445-8715), may be able to provide you with more information.
Please contact me at 952-496-8352 or pschmitt@co.scott.mn.us if you have any questions.

Sincerely,

Peter M. Schmitt
Scott County Environmental Health

Enclosures

SCOTT COUNTY LICENSED HAZARDOUS WASTE GENERATORS AND WASTES FOR ENVIRONMENTAL SITE ASSESSMENT

The list of generators below are in order by generator name. Township, Range and Sectional information is located immediately above each generator name - the site address is below the name. Waste amounts are either actual amounts reportedly generated for calendar year 2014, or estimated annual amounts if the generator was first licensed in 2015. The list no longer contains generators that are "Minimal Generators" because they are not required to submit an annual report (except Minimal Generators will list in their first registration year).

115N 23W 21 **Parcel #** 79210050

ANCHOR BLOCK COMPANY

13450 JOHNSON MEMORIAL DR

H6	0	Gallons	BURNISHED BLOCK SEALER/LIQUID
N2	0	Gallons	SPRAY BOOTH FILTERS

115N 23W 15 **Parcel #** 79160010

COMMERCIAL ASPHALT CO PLANT 911

12355 CHESTNUT BLVD

H1	266	Gallons	PARTS WASHING SOLVENT
H3	5	Units	FLUORESCENT LAMPS
H5	163	Gallons	USED OIL
O1	15	Units	USED OIL/FUEL FILTERS

115N 23W 15 **Parcel #** 60170030

FRITZ CABINETRY

12900 VENTURA CT SUITE 2

H1	1290	Pounds	PAINT RELATED MATERIAL
H2	100	Pounds	PAINT BOOTH FILTERS & RAGS

115N 23W 15 **Parcel #** 69150444

JOHNNY'S AUTO SALES & REPAIR

12832 VENTURA CT

H1	25	Gallons	PARTS WASHER
H2	100	Gallons	USED ANTIFREEZE
H3	40	Units	LEAD ACID BATTERIES
H4	0	Gallons	PAINT WASTE
H5	0	Gallons	PAINT BOOTH FILTERS & RAGS
O1	400	Gallons	USED OIL
O2	55	Gallons	USED OIL FILTERS
O3	55	Gallons	OIL DRY & RAGS

115N 23W 21 **Parcel #** 70320010

PLEHAL BLACKTOPPING INC

13060 DEM CON DR

H1	0	Gallons	AQUEOUS PARTS WASHER
H2	25	Units	LEAD ACID BATTERIES
H3	0	Units	FLUORESCENT/HID LAMPS
H4	50	Gallons	USED ANTIFREEZE
O1	700	Gallons	USED OIL
O2	110	Gallons	USED OIL FILTERS

115N 23W 15 **Parcel #** 69150344

R & R MARINE

12827 CHESTNUT BLVD

H1	100	Gallons	PARTS WASHER
H2	10	Gallons	WASTE WATER
H3	210	Units	LEAD ACID BATTERIES
H4	25	Gallons	USED FUEL
H5	60	Units	FLUORESCENT LAMPS
O1	1050	Gallons	USED OIL
O2	400	Units	USED OIL FILTERS

115N 23W 16 **Parcel #** 79160150

RUS LLC

3200 130 ST W

H1	5	Gallons	PAINT WASTE
H3	15	Units	FLUORESCENT LAMPS
H4	50	Units	LEAD ACID BATTERIES
H5	20	Units	PAINT BOOTH ARRESTORS
O1	120	Gallons	USED MOTOR OIL
O2	20	Units	USED OIL FILTERS
O3	5	Pounds	OIL SOAKED ABSORBANTS

115N 23W 15 **Parcel #** 69150400

TMBC SHAKOPEE

12720 DEM CON DR

H1	5	Gallons	PARTS WASHER
H2	20	Units	FLUORESCENT LAMPS
H3	50	Units	LEAD ACID BATTERIES
H4	10	Gallons	USED GASOLINE
O1	40	Gallons	MOTOR OIL
O2	50	Units	USED OIL FILTERS
O3	20	Units	OILY RAGS

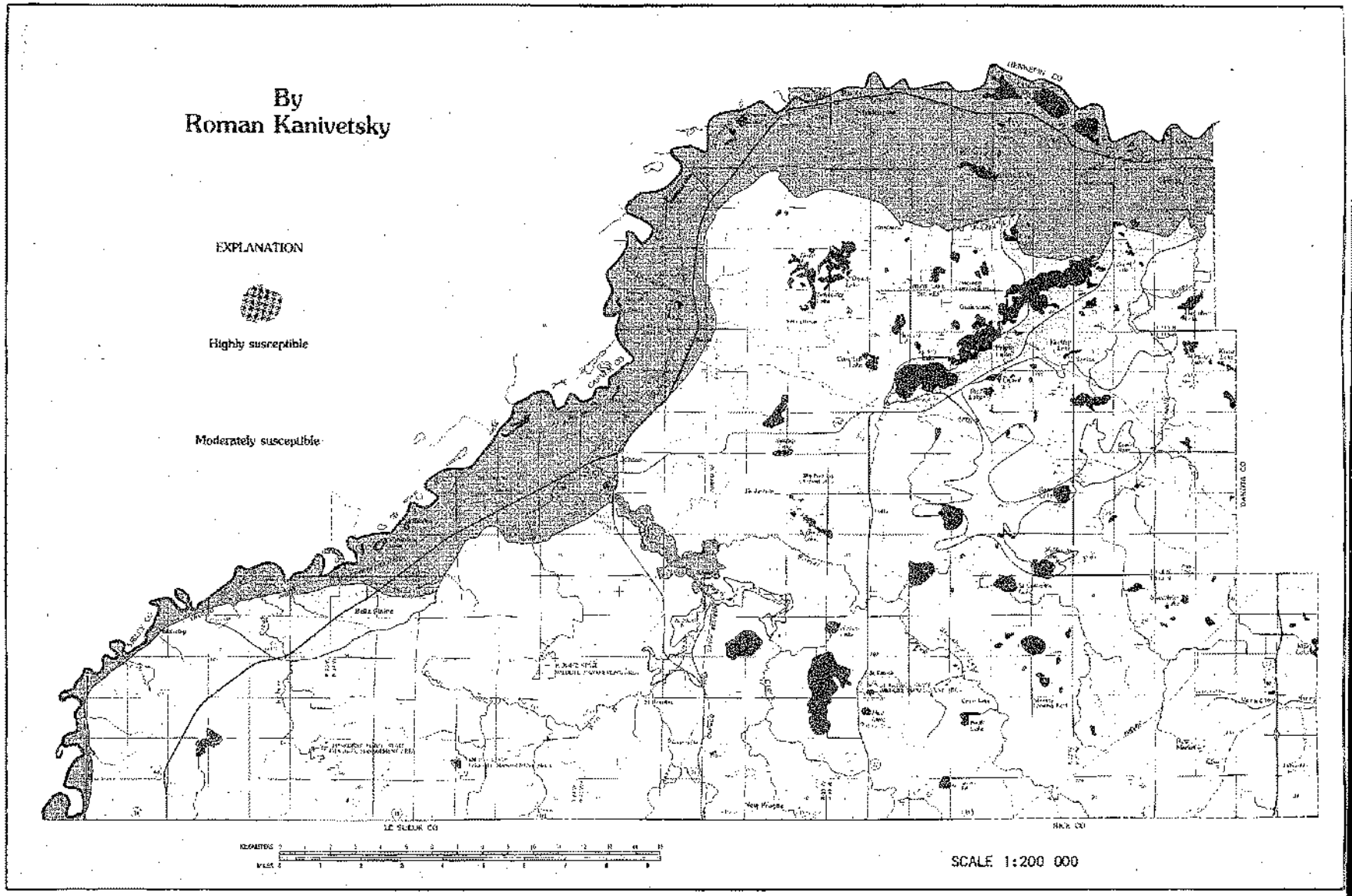


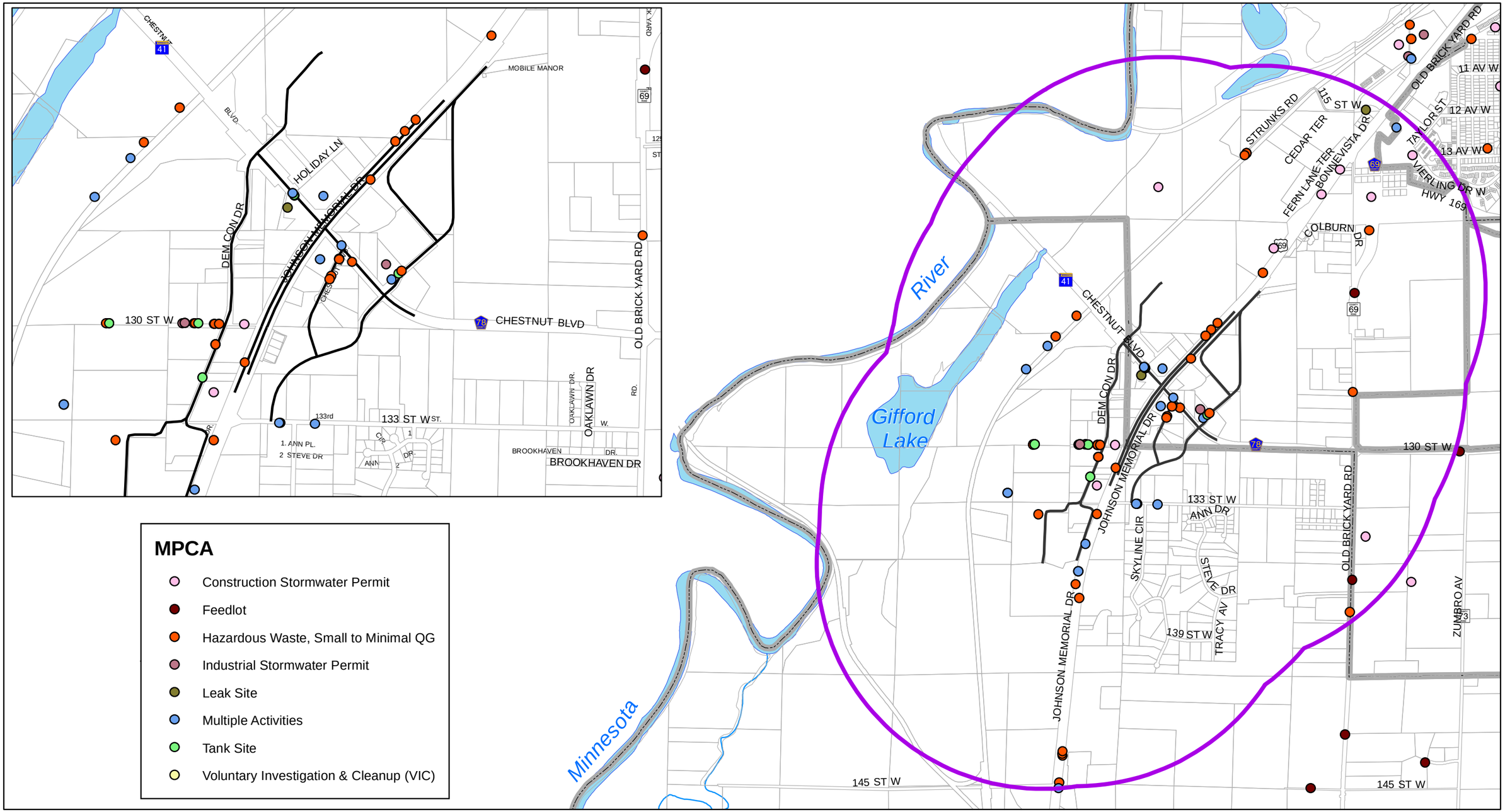
FIGURE 3—SUSCEPTIBILITY OF BEDROCK AQUIFERS TO CONTAMINATION

In Scott County the ability of surface contaminants to enter the bedrock formations that can serve as sources of water supply depends mainly on the permeability and thickness of the overlying unconsolidated materials and the depth to the water table. Outwash and ice-contact deposits of sand and gravel are highly permeable because water moves readily through spaces between grains and pebbles. Silt and clay particles fill the spaces between coarser grains in glacial till, and till is therefore relatively compact and impermeable.

The areas most susceptible to contamination are along the Minnesota River and the lower part of Sand Creek, where the water table is near the land surface and the unconsolidated materials are both thin and highly permeable.

The area in Helena, Prior Lake, and Spring Lake Townships is moderately susceptible because the overlying unconsolidated materials are fairly permeable, although the water table there is generally about 70 to 100 feet below the surface.

The bedrock of the rest of the county has a thick cover of glacial till which has a low permeability. For most practical purposes, these bedrock aquifers are not considered susceptible to short-term contamination.



Scott County Community Services
Environmental Services
200 Fourth Avenue West
Shakopee, MN 55379

US 169/TH 41/CSAH 78 Interchange

N

10-1-15

FIGURE 12: MPCA SITES

Source: MN Pollution Control Agency

1 Mile Project Area

Hwy 169, TH 41, CSAH 78 Alignment

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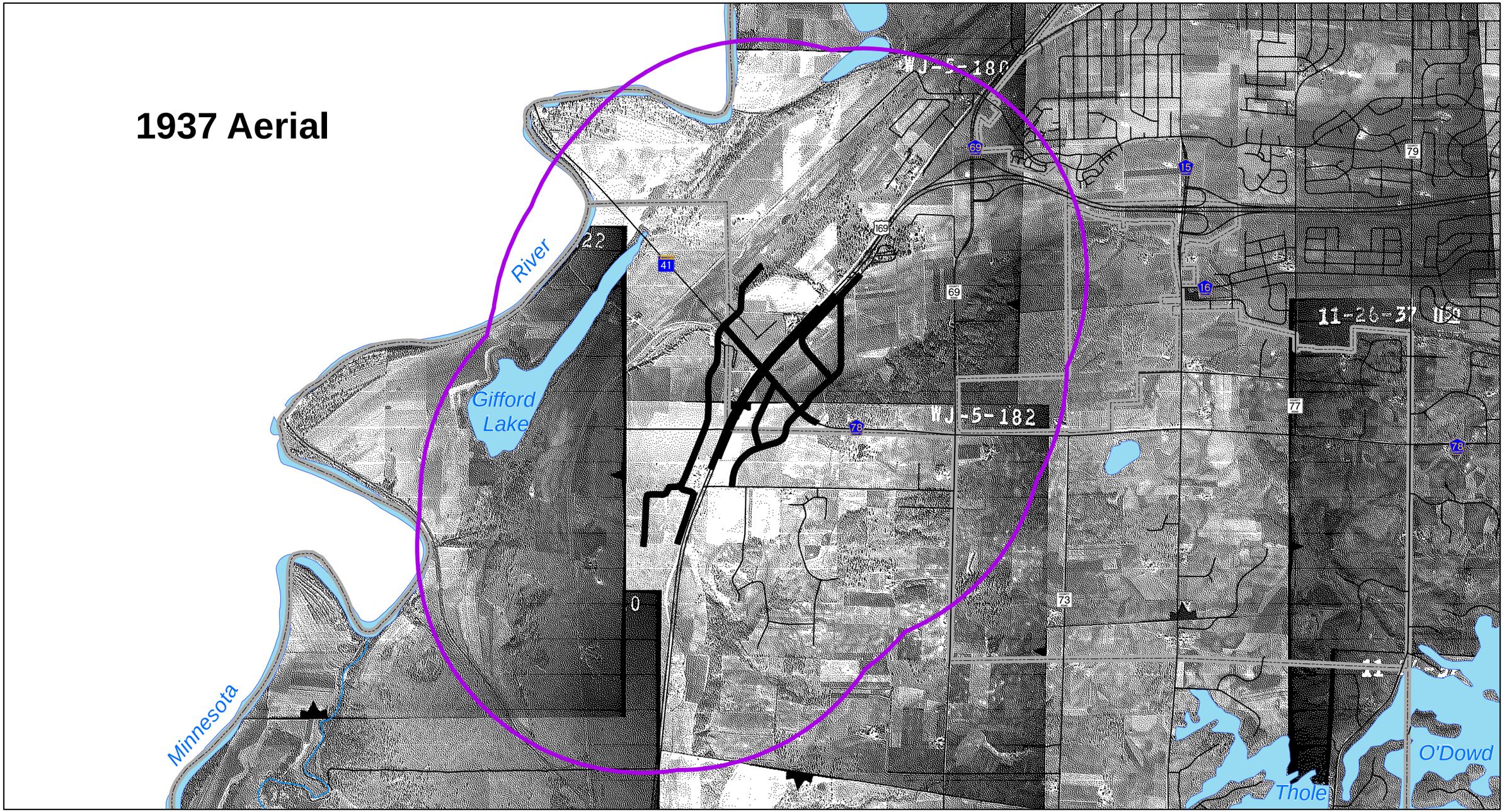
Appendix C Aerial Photographs

1937
1957
1964
1970
1980
1990
2000
2005
2015

1937 Aerial



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US 169/TH 41/CSAH 78 Interchange

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10-1-15

AERIAL PHOTO

Hwy 169, TH 41, CSAH 78 Alignment

1 Mile Project Area

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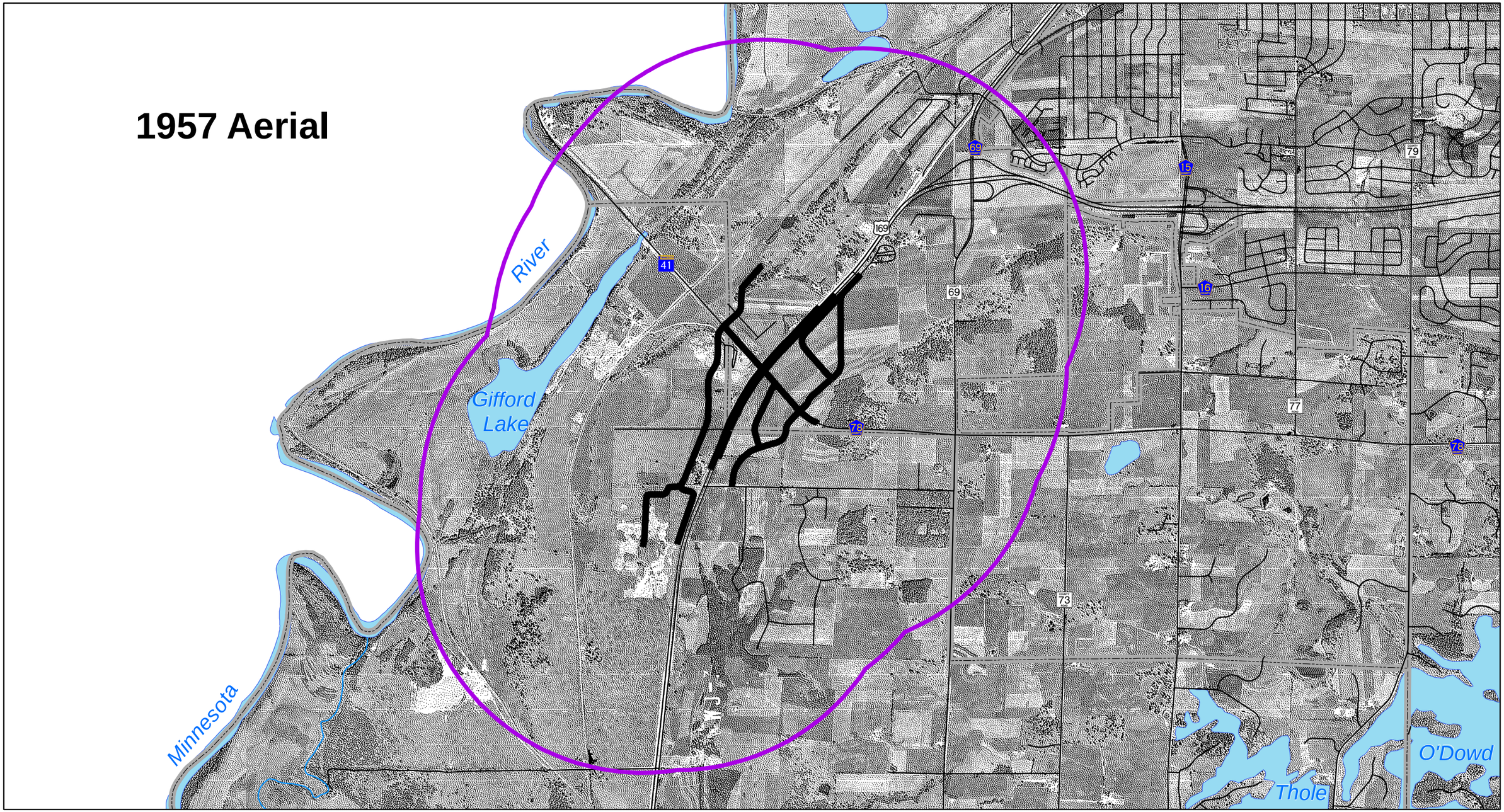
1957 Aerial



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US 169/TH 41/CSAH 78 Interchange

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AERIAL PHOTO

Hwy 169, TH 41, CSAH 78 Alignment
1 Mile Project Area

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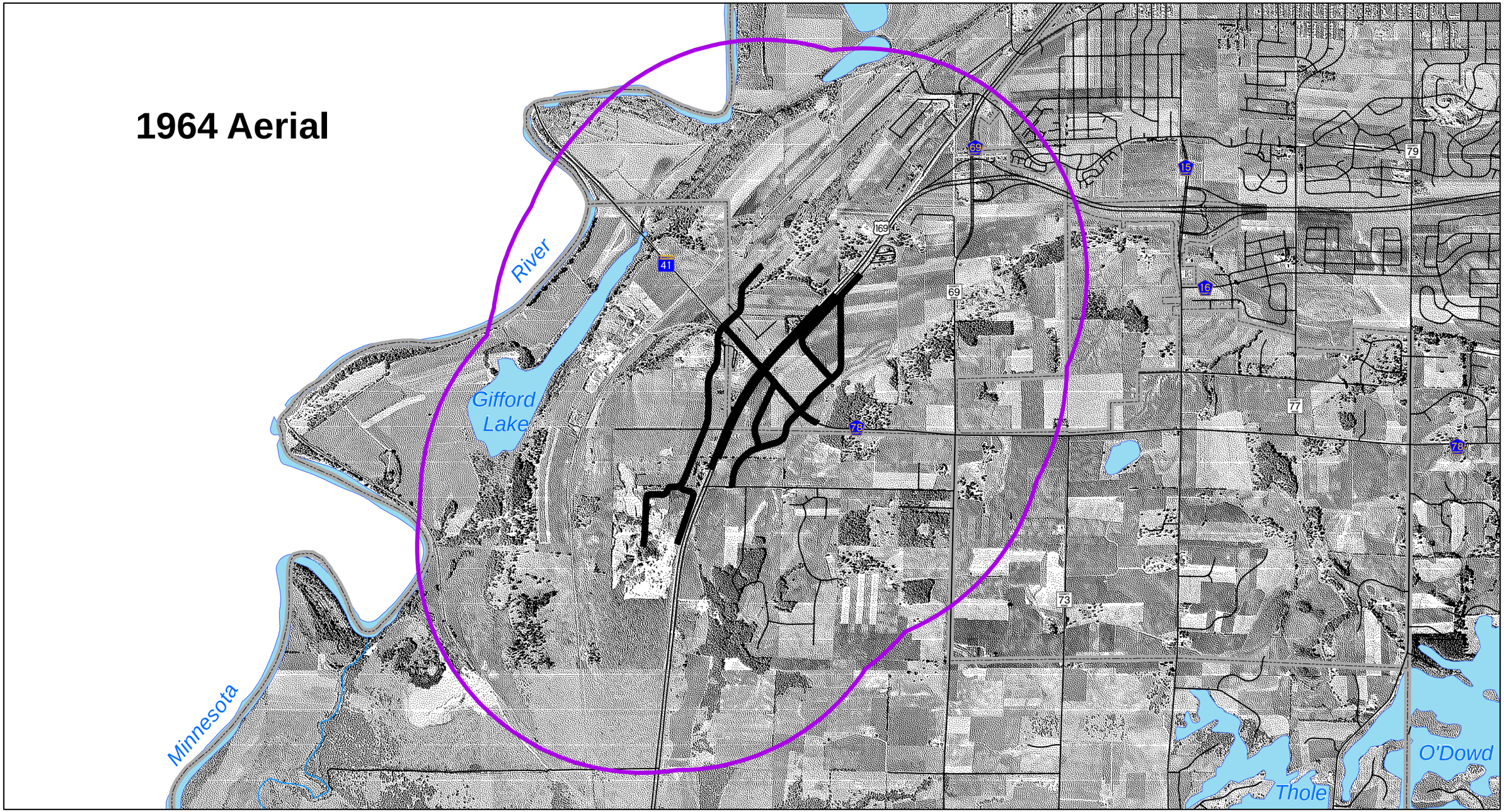
1964 Aerial



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Shakopee, MN 55379

US 169/TH 41/CSAH 78 Interchange

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10-1-15

AERIAL PHOTO

Hwy 169, TH 41, CSAH 78 Alignment
1 Mile Project Area

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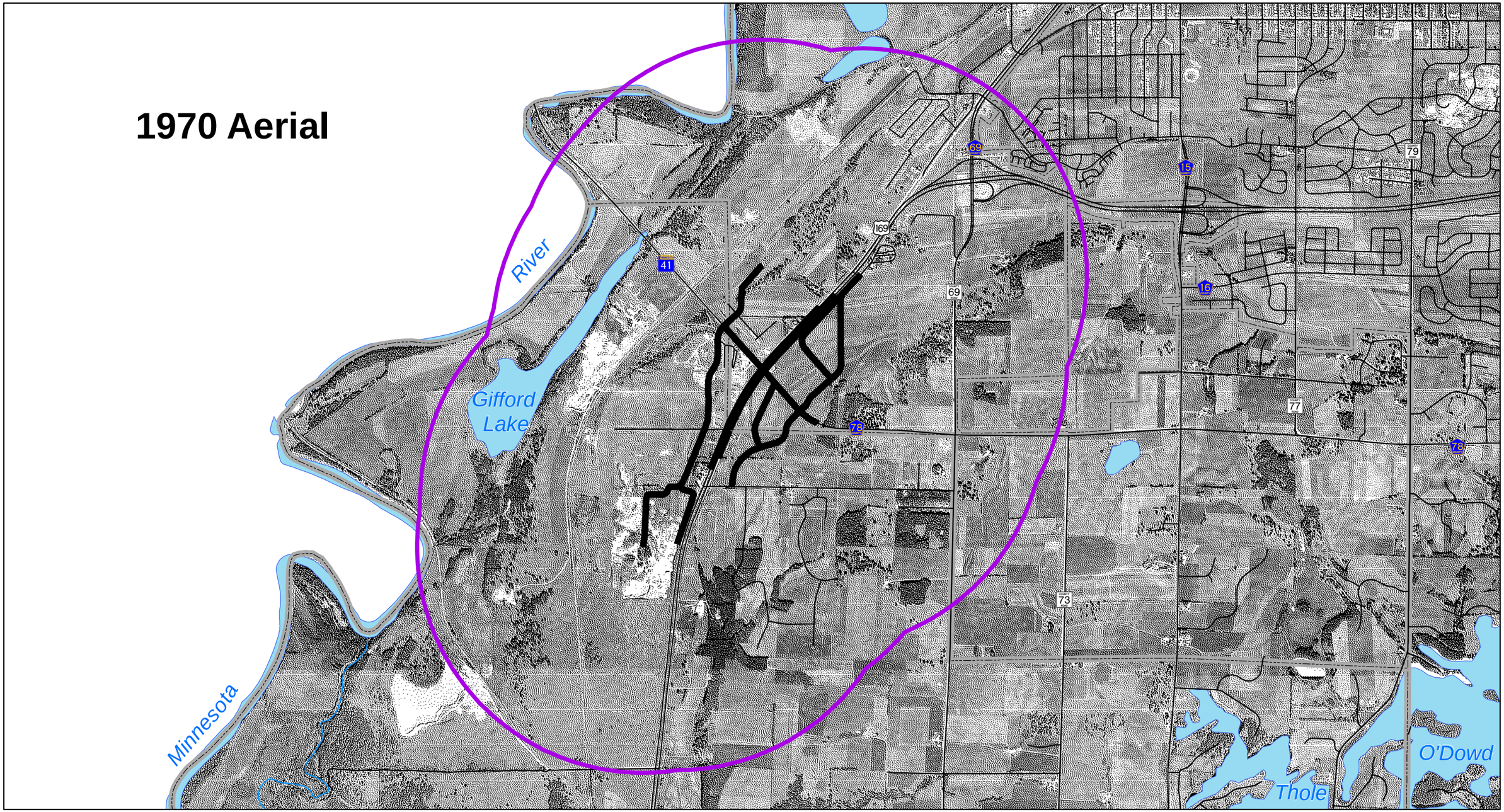
1970 Aerial



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US 169/TH 41/CSAH 78 Interchange

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10-1-15

AERIAL PHOTO

Hwy 169, TH 41, CSAH 78 Alignment
1 Mile Project Area

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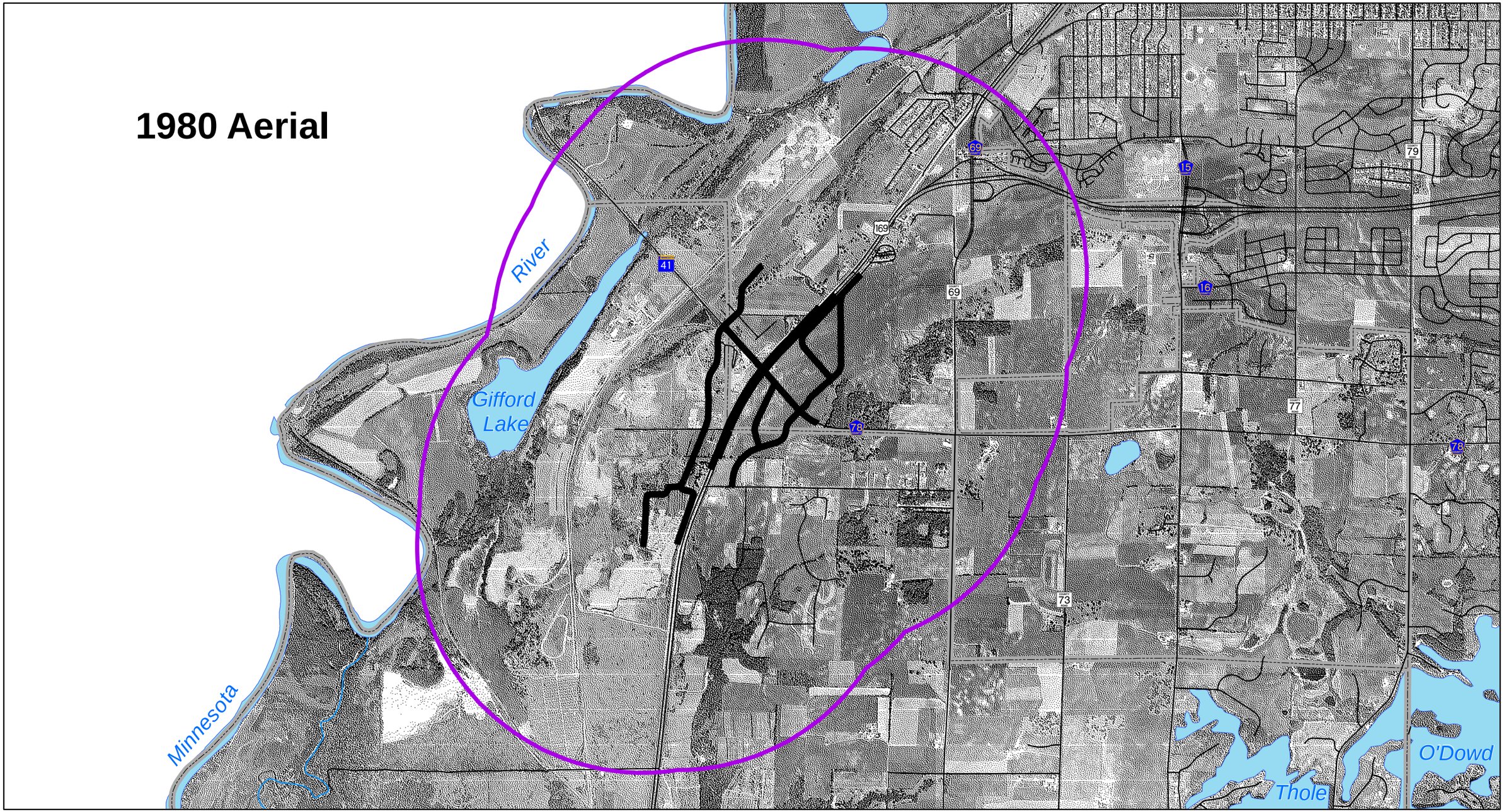
1980 Aerial



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Shakopee, MN 55379

US 169/TH 41/CSAH 78 Interchange

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10-1-15

AERIAL PHOTO

Hwy 169, TH 41, CSAH 78 Alignment

1 Mile Project Area

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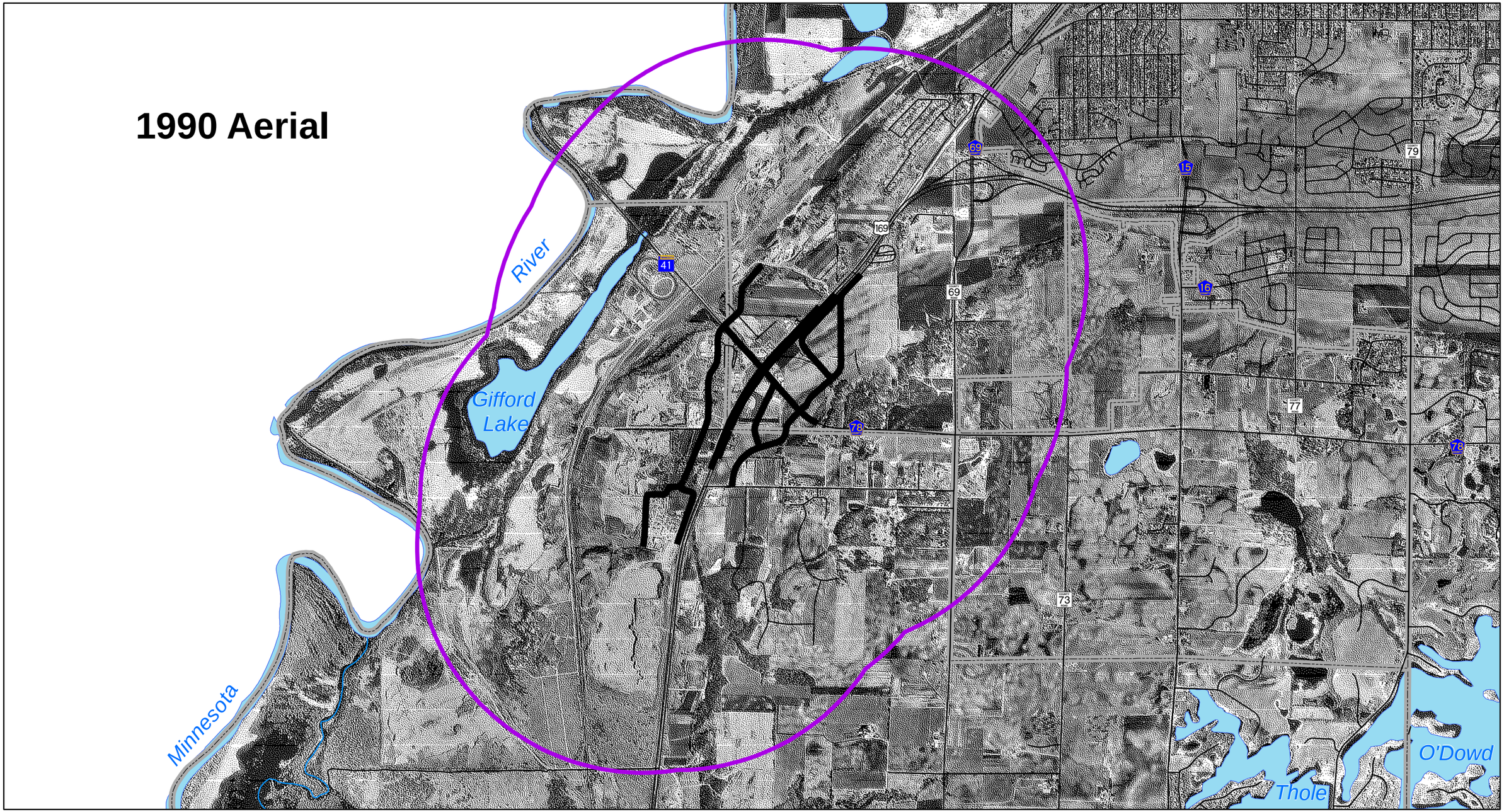
1990 Aerial



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US 169/TH 41/CSAH 78 Interchange

N

10-1-15

AERIAL PHOTO

Hwy 169, TH 41, CSAH 78 Alignment
1 Mile Project Area

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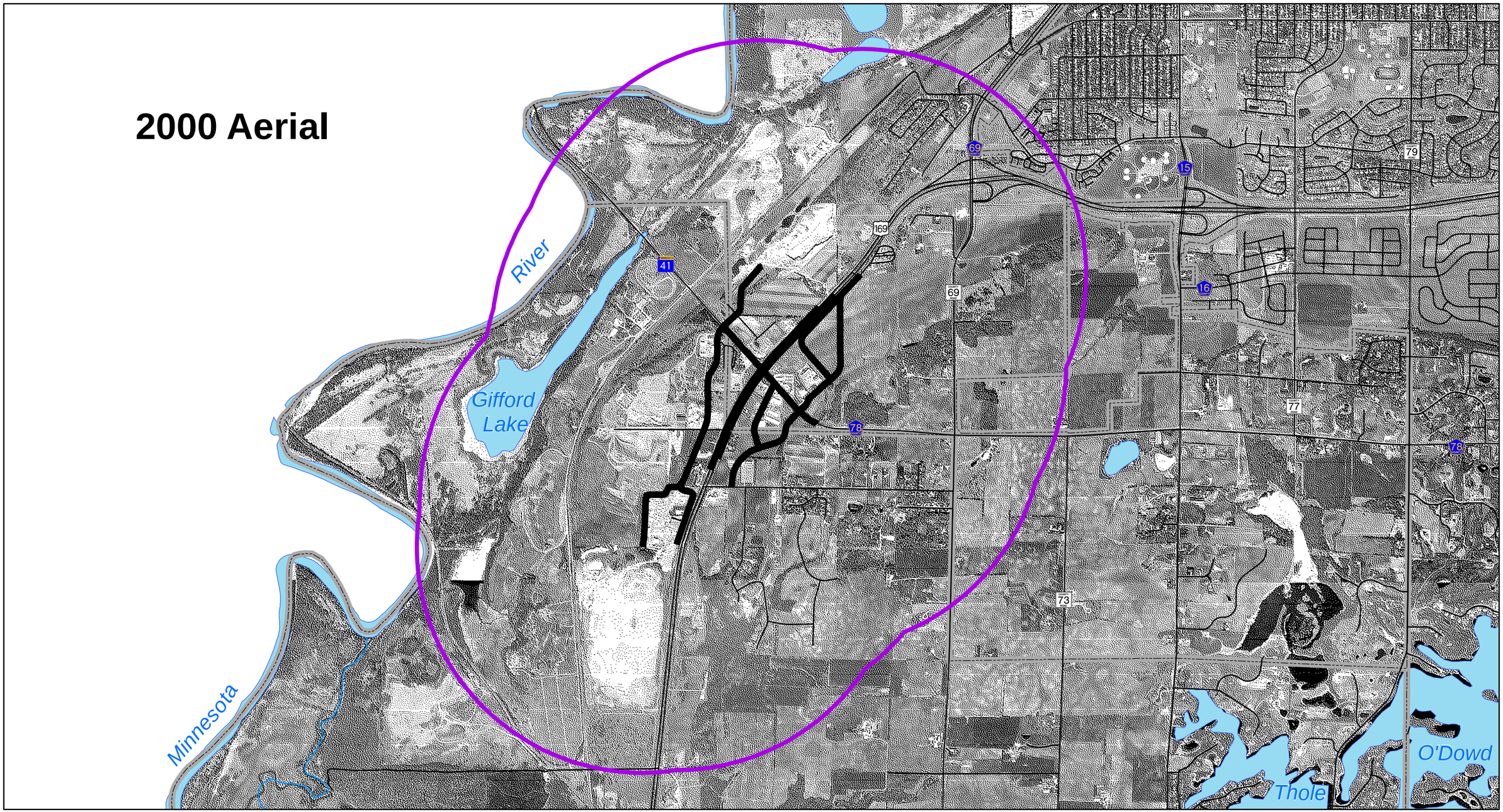
2000 Aerial



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10-1-15

AERIAL PHOTO

Hwy 169, TH 41, CSAH 78 Alignment
1 Mile Project Area

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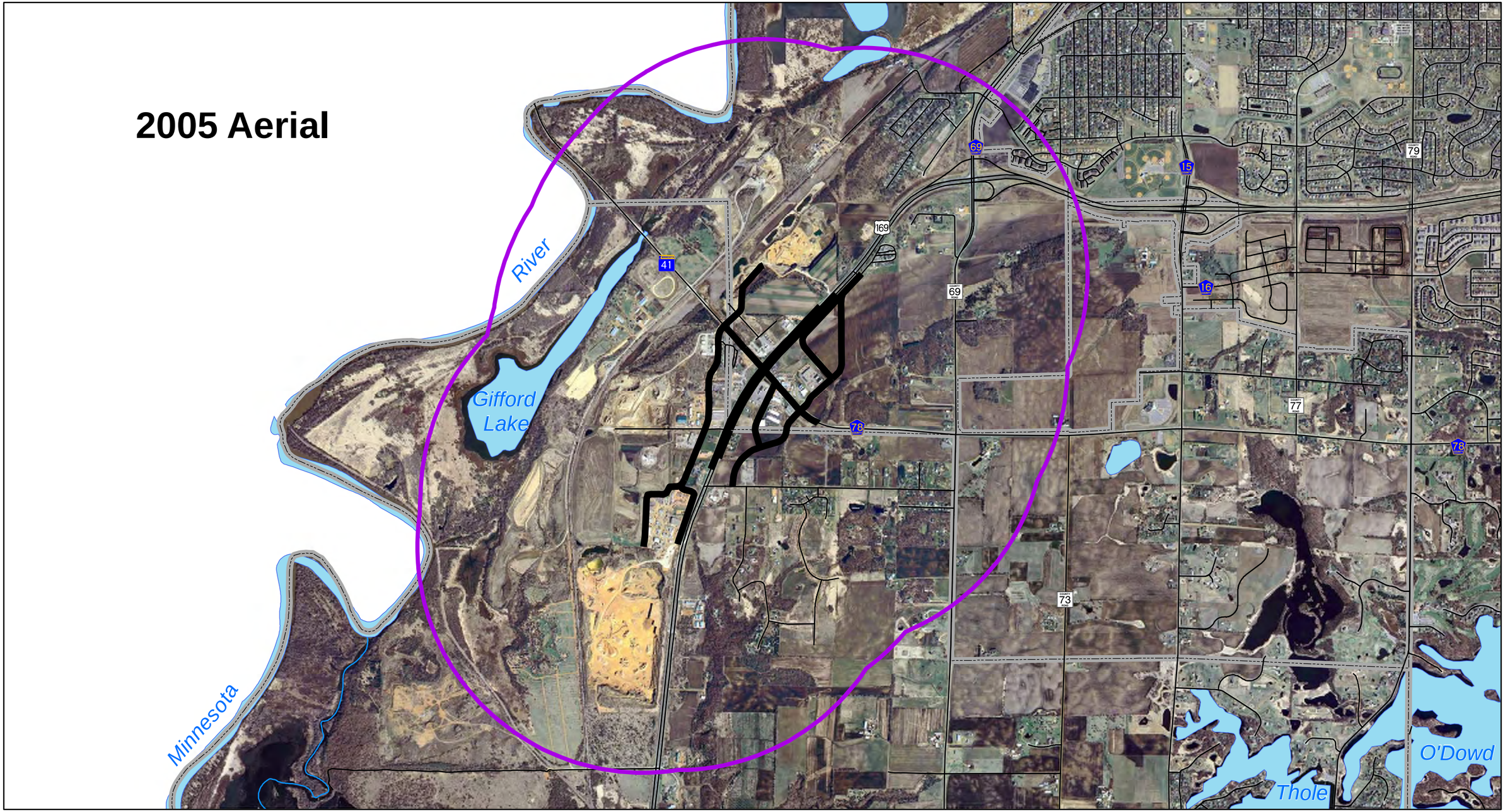
2005 Aerial



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AERIAL PHOTO

Hwy 169, TH 41, CSAH 78 Alignment
1 Mile Project Area

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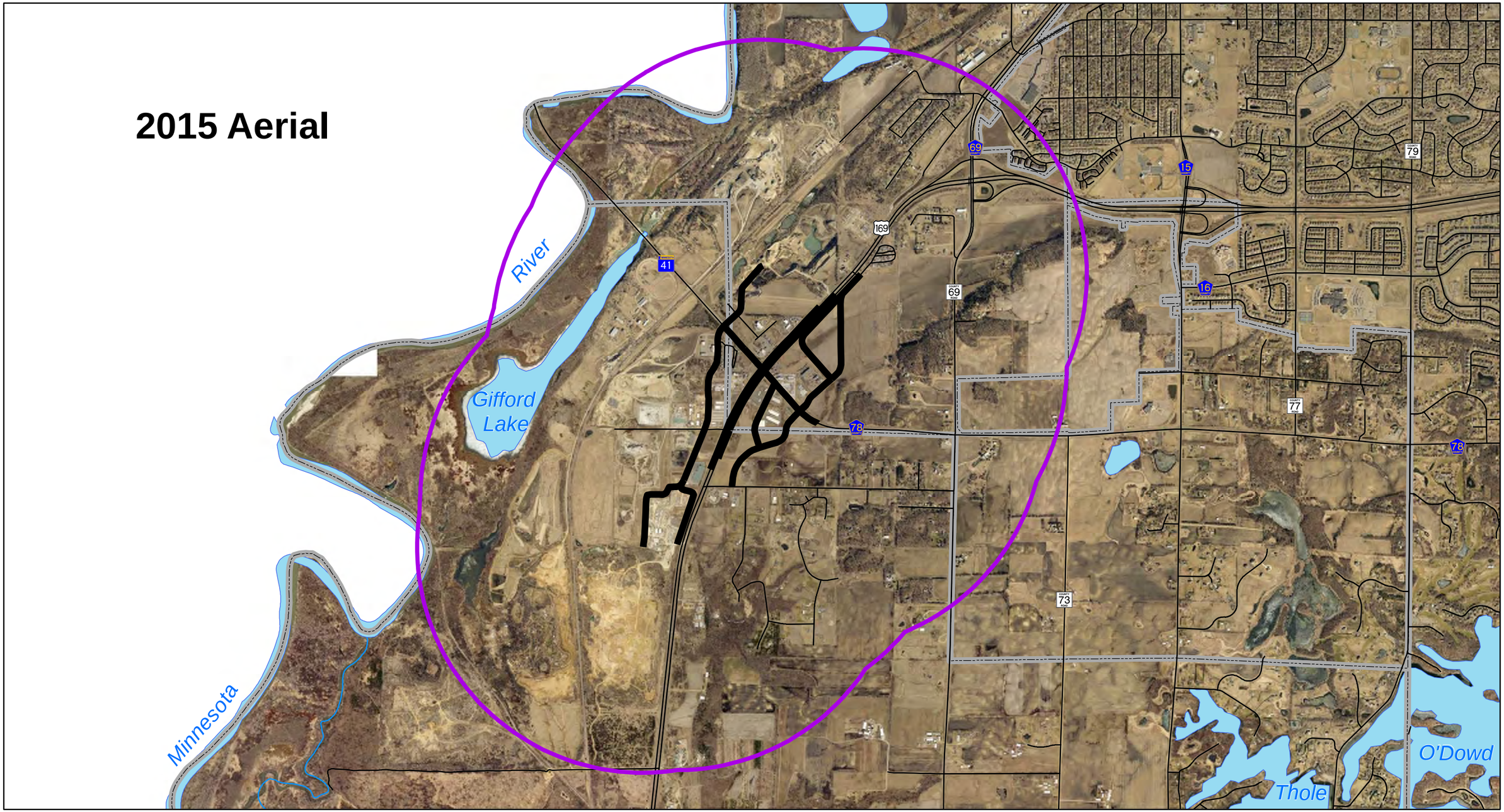
2015 Aerial



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10-1-15

AERIAL PHOTO

Hwy 169, TH 41, CSAH 78 Alignment
1 Mile Project Area

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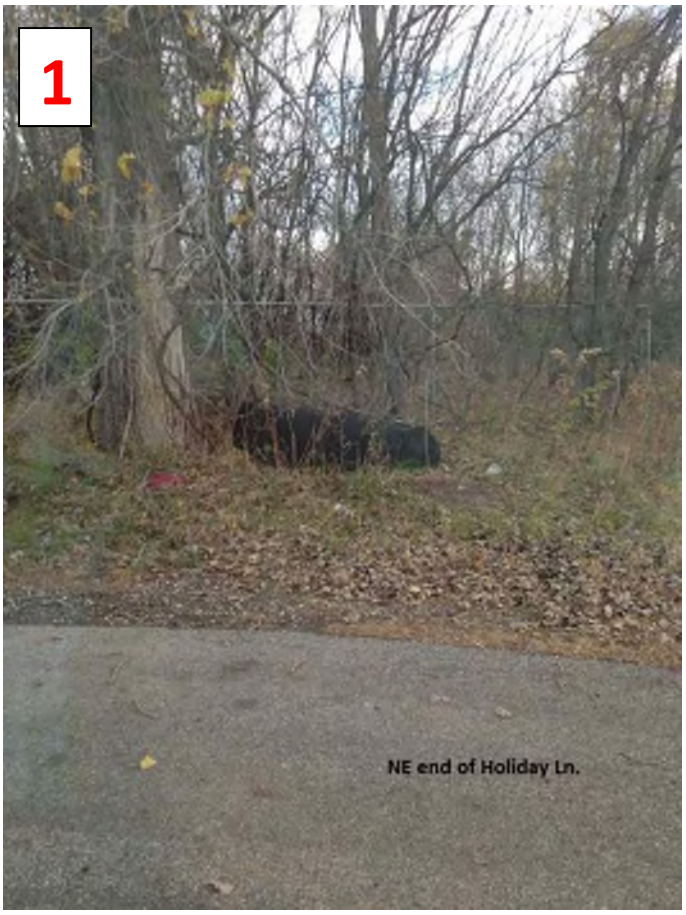
Appendix D Reconnaissance Photos

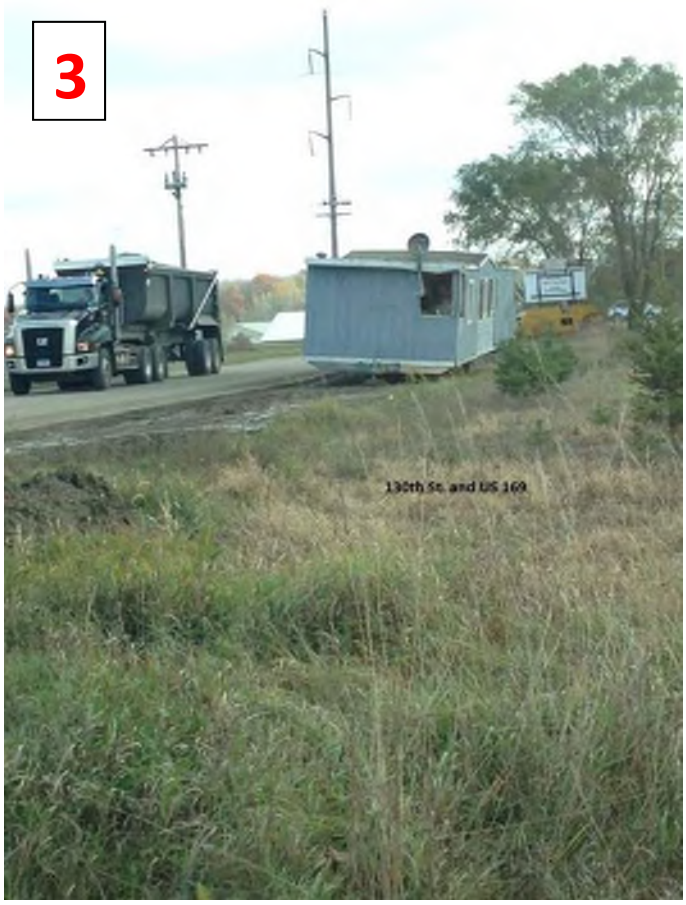
Appendix – D

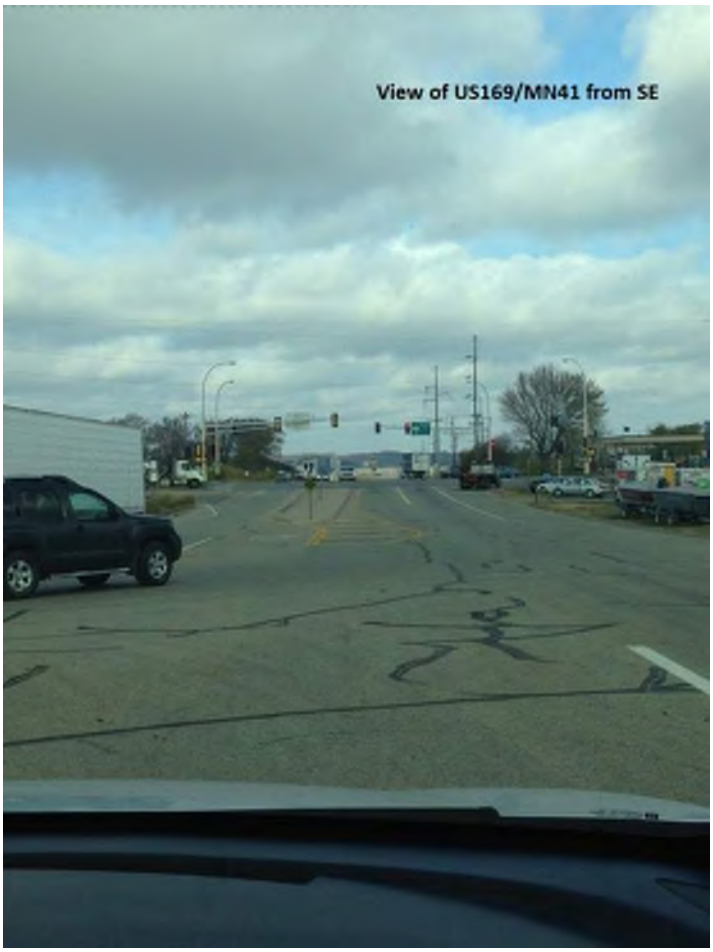
Reconnaissance photos


1
NE end of Holiday Ln.

1
NE end of Holiday Ln.

2
North side of entrance to
12720 Dem Con Dr.


3
130th St. and US 169


View of US169/MN41 from SE

View of US169 from 133 st. W

SUPPLEMENTAL LIMITED PHASE I ENVIRONMENTAL SITE ASSESSMENT
CPT169-14
US169 / CH14 Interchange
City of Shakopee, MN

Prepared for:
Scott County Highway Department
And
Minnesota Department of Transportation

Prepared by:

SCOTT COUNTY
SCOTT COUNTY GOVERNMENT CENTER
200 FOURTH AVENUE WEST
SHAKOPEE, MINNESOTA 55379

September 7, 2016

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APPENDICIES

Appendix A

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Figure 5 Bedrock Geology
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Figure 8 Minnesota Department of Health Wells
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Figure 10 Federal, State, and County Search (EDR)
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Figure 12 MPCA Tank Map and Report
Figure 13 Anchor Block Concrete Dump Site Location
Figure 14 Hollander Auto Salvage Dump Site Location
Figure 15 MN Valley Wholesale Dump Site Location
Figure 16 Potential Recognized Environmental Concern (REC) Locations

Appendix C Aerial Photographs

1937
1957
1964
1970
1980
1990
2000
2005
2015

Appendix D Reconnaissance

Site Worksheets
Photos

1.0 EXECUTIVE SUMMARY

Scott County Public Works is starting the concept development for improvements at the US Highway/Trunk 169 and County Highway (CH) 14 intersection, adjacent to the south of the US 169/TH 41 project. The proposed project will identify and develop Highway intersection improvements that address safety, mobility, freight, accessibility, and connectivity needs while minimizing impacts to residents, businesses, and natural resources. A number of intersection designs, including interchanges, and a connected frontage road system will be developed and explored. This Limited Phase I Environmental Site Assessment was conducted for the preliminary concept interchange and frontage roads area, see Figure 7. The concept interchange and frontage roads are subject to change as the project is further studied and refined. If the project limits expand beyond the area covered in this Phase I, a Phase I update will be completed.

A Limited Phase I Environmental Site Assessment (ESA) was conducted in conformance with the scope and limitations of the Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process, American Society of Testing Materials Designation E 1527-05 and Minnesota Department of Transportation standards for CPT169-14. The location of the road improvement project CPT169-14 is shown on Figure 1 Location Map. Potential contamination sites were identified based on our review of environmental databases, historical records, interviews with persons familiar with the project area, and a reconnaissance of the project area. In addition, Environmental Data Resources Inc. was retained to conduct a database search of government records.

This assessment has revealed four sites for high potential contamination.

- Flood Brothers Auto at 15870 Johnson Memorial Highway. (VP21340) Closed 11/01/11. (RCRA1139) Inactive.
- Anchor Block and Concrete at 13450 Johnson Memorial Highway.
- Hollander Auto Salvage at 13901 Johnson Memorial Highway.
- Minnesota Valley Landscaping at 14505 Johnson Memorial Highway.

A Phase II may be warranted if further study determines that road construction will occur at or near these locations of high potential for contamination.

A complete list of the recognized environmental conditions (RECs) and recommendations is presented in Section 7.

2.0 INTRODUCTION

2.1 Purpose

The objective of this Phase I Environmental Site Assessment is to identify, to the extent feasible pursuant to the processes prescribed herein, recognized environmental conditions in connection with the project area.

The purpose of the records review, site reconnaissance, and interviews is to obtain and review records and information and that will help identify recognized environmental conditions in connection with the project area.

A record search and search area according to ASTM E 1527-05 (Standard Environmental Record Sources) was completed. The minimum search area for additional information was determined by (1) the density (for example, urban, rural, or suburban) of the setting in which the project area is located; (2) the distance that the hazardous substances or petroleum products are likely to migrate based on local geologic or hydrogeologic conditions; (3) the project area, (4) existing or past uses of surrounding properties, and (5) other reasonable factors.

Search Type	Search Area	Justification for Adjustment
EDR (Federal NPL site list and Federal RCRA TSD list.) see EDR report for search areas	1 mile	Standard ASTM search area
Minnesota Pollution Control Agency tank database Leak Site Underground Storage Tanks	1/4 mile	Reduced search area because (1) project area is rural and (2) the distance of possible hazardous substances to migrate to the project area is low
Minnesota Pollution Control Agency tank database Leak Site Aboveground Storage Tanks	1/2 mile	Reduced search area because (1) project area is rural and (2) the distance of possible hazardous substances to migrate to the project area is low
Minnesota Pollution Control Agency tank database Tank site Aboveground Storage Tanks	1 mile	Standard ASTM search area
Minnesota Pollution Control Agency tank database Tanks site Underground Storage Tanks	1 mile	Standard ASTM search area
Minnesota Pollution Control Agency What's In My Neighborhood	1 mile	Standard ASTM search area
Scott County Environmental Concern Database	1/2 mile	Reduced search area because (1) project area is rural and (2) the distance of possible hazardous substances to migrate to the project area is low

RECs within 100 foot radius of the Project Area are hightlighted in bold as they maybe of greater concern due to proximity.

2.2 Scope of Work

The scope of this work included the following tasks:

- Review historical aerial photographs.
- Interview County and City staff regarding the project.
- Conduct an on-site reconnaissance of the project.
- Rank/classify all identified REC within the project area in accordance with high, medium, or low potential for contamination.
- Prepare a report to include an executive summary and a summary of all project preparation and data collection activities undertaken.
- Review EDR Report, Review on-line Minnesota Pollution Control Agency (MPCA) and Minnesota Department of Agriculture (MDA) Databases.

2.3 Significant Assumptions

The following were beyond the scope of the assessment:

- Sampling and analysis of radon, lead in water, soil and groundwater samples, and the evaluation of indoor and outdoor air quality, regulatory compliance, industrial hygiene, or noise impacts are beyond the scope of this evaluation.
- Evaluations of buildings within the road corridor or construction limits are beyond the scope of the evaluation.
- The identification of geological or geotechnical hazards were beyond the scope of the assessment.

It is possible that even with the proper application of the methodologies followed in performing this ESA, there may exist conditions that could not be identified within the scope of the review or which were not reasonably identifiable from available information.

The information obtained from our review of environmental databases, historical records, interviews concerning the project, and information obtained from the reconnaissance is reliable. However, this ESA cannot and does not warrant or guarantee that the information provided by these sources is accurate or complete. The methodologies of this assessment are not intended to produce all inclusive or comprehensive results, but rather provide the Scott County Highway Department and Minnesota Department of Transportation (MnDOT) with information relating to the project.

2.4 Limitations and Exceptions of Assessment

The report was compiled based on information available from Federal, State, City and County information in the public domain. The conclusions and opinions herein are based on the information compiled in the report.

No environmental site assessment can wholly eliminate uncertainty regarding the potential for contamination in connection with a property or project. Performance of this ESA is intended to reduce, but not eliminate, uncertainty regarding the potential for identifying possible sources of contamination in connection with the project. Other limitations to this project include the following:

- We did not access individual parcels within the project area except for a reconnaissance inspection of the 169 / 14 interchange.
- Individual parcel owners were not interviewed.
- It is possible that surrounding properties used fuel oil in the past. Spills, leaks, releases of petroleum products could generate contamination.
- Contamination could have occurred on surrounding properties, where there are/were aboveground or underground storage tanks that are/were not registered with the Federal, State, and County, or where hazardous petroleum products and maintenance/cleaning chemicals are/were stored or used.

2.5 Special Terms and Conditions

Recognized environmental conditions (RECs) were ranked as having high, medium, or low potential for contamination. This ranking system the the ranking system used by MnDOT. The ranking is used to help the reviewers of this document understand RECs that are of greater concern compared to others. The rankings are defined as follows:

- High Potential for Contamination – All active and inactive Voluntary Investigation and Cleanup (VIC) and Minnesota Environmental Response and Liability ACT (MERLA) / Superfund sites, all active and inactive dump sites, all dry cleaner sites, all active Leaking Underground Storage Tank (LUST) sites, and bulk oil facilities, all active ag releases, and historical industrial/chemical use.
- Medium Potential for Contamination – All closed LUST sites, all sites with Underground Storage Tanks (USTs) or Aboveground Storage Tanks (ASTs), and salvage yards.
- Low Potential for Contamination – All licensed and inspected hazardous waste generator sites and possibly some commercial and farmstead sites with poor housekeeping practices.

2.6 Reliance

This Limited Phase I ESA has been prepared for the exclusive use of Scott County and MnDOT. The scope and classification of Recognized Environmental Concerns (RECs) has been completed to the satisfaction of Scott County for evaluation of potential risk. Reliance on this report by other parties may result in assumptions that are incorrect and misinterpreted. Therefore no other parties, unless given consent by Scott County, should rely upon this Limited Phase I ESA to evaluate risk.

Scott County assumes no responsibility for the accuracy of information obtained from other sources, including other regulatory and governmental agencies, persons interviewed for this project or vendors of public data.

3.0 PROJECT DESCRIPTION

3.1 Location

The road interchange project is located to the west of the City of Shakopee, in Scott County Minnesota in Louisville Township. The road improvement project CPT169-14 includes approximately 4500 feet north on US169, 1700 feet south on US169, 1200 feet east of US169, and 1000 feet west of CH 14. All distances measured from the intersection of US 169 and CH 14 based on Figure 7 Preliminary Concept Map. This is adjacent to the south of the US 169/TH 41 project.

Twp 115N, Range 23W, Section 28 and 33.

Project Name: CPT169-14

3.2 Current Use and Past Uses of the Project Area

Aerial photographs, a site visit, and interviews with Scott County Environmental Health staff confirm that the current use of the project site is a roadway through adjoining industrial and agricultural property. Historical photographs and interviews with Scott County Environmental Health staff confirm that the project area was agricultural with farmsteads up to 1980. Anchor Block started operating around the 1950's. In the 1970's MN Valley Wholesale opened . Hollander Auto Salvage operated from approximately 1950s until the mid 1980's. The Mulch Store opened up in the 2000's; please see Appendix C Historical Photos.

Scott County Public Works was contacted on the history of the roadway.

3.3 Description of Structures, Roads, Other Improvements on the Site

History of the road and railroad is provided above in 3.2. The road improvement corridor is bounded by commercial businesses, such as Anchor Block, Minnesota Valley Landscape, and The Mulch Store.

4.0 RECORDS REVIEW

4.1 Physical Setting Sources Review of Available Soil, Bedrock, Groundwater, and Floodplain Information

Soils: Listed below are the soil types within a 100 foot buffer of the road improvement corridor obtained from the Natural Resources Conservation Services Soil Survey. Please see Figure 4 Soil Classification.

TcA	Terril silt loam, 0 to 2 percent slopes
Sc	Stoney Land
Cc	Comfrey Silty Clay Loam
CdA	Copas Silt Loam, 0 to 2 percent slopes
CdB	Copas Silt Loam, 2 to 6 percent slopes
Dd	Dorcherster Silty Clay Loam
Ab	Alluvial Land, frequent overflow, 0 to 6 percent slopes
HdB	Hubbard fine sand, 2 to 6 percent slopes
HeB	Hubbard loamy fine sand, 2 to 6 percent slopes
TcA	Terril silt loam, 0 to 2 percent slopes

Bedrock: The US169-14 interchange project is located over the Prairie du Chien Group formation and the Jordan Sandstone bedrock formation.

The westerly portion of the project area is above the Prairie du Chien Group and underlying bedrock formations.

The depth to the bedrock is typically less than 50 feet throughout the project area. The Prairie du Chien Group is typically 140 to 190 feet thick where past erosion has not diminished the thickness of the unit. In the project area the bedrock may be 25-70 feet thick due to past erosion of the uppermost portion of this bedrock unit.

Underlying the Prairie du Chien Group is the Jordan Sandstone. The Jordan Sandstone is approximately 80 to 120 feet thick within the project area. The Jordan is underlain by the St Lawrence Formation, the Tunnel City Group (formerly known as the Franconia Formation), the Wonewoc Sandstone (formerly known as the Ironton and Galesville Sandstones), and the Eau Claire Formation.

In some areas of the project the Prairie du Chien Group has eroded completely and the project is located directly over the Jordan Sandstone formation.

Please see Figure 5 Bedrock Geology.

Groundwater:

The project area is underlain by several bedrock aquifer systems; the Prairie du Chien-Jordan aquifer is the uppermost aquifer. The underlying St. Lawrence Formation is considered a regional confining bed hydraulically separating the overlying Prairie du Chien-Jordan aquifer from the underlying Tunnel City-Wonewoc (Franconia-Ironton-Galesville) aquifer. The Eau Claire Formation; a shale, siltstone, and very fine-grained sandstone, averaging about 75 feet in thickness acts as a confining layer hydraulically separating the overlying Wonewoc from the underlying Mt. Simon-Hinckley aquifer. In addition to the bedrock aquifers, sand layers in the glacial drift may be used as a source of water supply. The groundwater beneath the project site flows north west toward the Minnesota River. The depth to groundwater varies from 30 feet at the south end of the project to 100 feet on the north.

Well Record Review & Wellhead Protection Areas:

Well records from the Minnesota Department of Health (MDH) County Well index were reviewed. Please see Figure 8 for wells found in the MDH CWI database. The project site is not located in a Shakopee Municipal Wellhead Protection Area.

Septic:

Septic systems records from the Scott County database were reviewed. Please see Figure 9 for septic system locations.

Floodplain:

Federal Emergency Management Agency (FEMA) maps were reviewed. The flood plain is 370ft to the west of the project area. Please see Figure 6 FEMA.

4.2 Database Search

A search of various federal, state, and local databases for sites located within a one mile, half mile, or 100 foot radius of the project was performed. The search was performed by EDR. The various databases searched are listed and described in Figure 10.

A regulatory information search of the project area was obtained from EDR. The EDR report is a compilation of records of facilities that are included on current federal and state environmental regulatory databases. Environmental Health staff reviewed the EDR report to identify records that indicate known or potential environmental hazards. Environmental Health staff also reviewed select files available on the MPCA based upon information found from the What's In My Neighborhood (WIMN) website. There were sites that are listed on the County review that are not present on the EDR database due to a small difference in search area between EDR and the County database and also direct County knowledge of the area. These are listed on Figure 11 Scott County Environmental Assessment letter.

All the MPCA files related to the project area was formally requested.

4.3 Historical Use Information

The history of the corridor and adjoining areas was examined by reviewing sources likely to be useful in developing historical uses of the road improvement corridor. Sources we reviewed include the following: Topographic maps Appendix A Figure 2, aerial photographs Appendix C, and FEMA maps Appendix A Figure 6.

Aerial Photograph Review
Aerial photographs that include the project area for the following years were examined:1937,1957,1964,1970,1980,1990,2000, 2005, 2015.
The aerial photographs are included in Appendix C Historical Photographs.

4.4 Additional Record Sources

Fire Insurance Maps were not obtained / ordered for this location. Aerial photos dating back to 1937 were used in lieu of Fire Insurance Maps, which often do not provide information in rural areas.

Recorded Land Records will be collected and reviewed by the Scott Count Highway Department.

5.0 PROPERTY RECONNAISSANCE

Richard Jones (Environmentalist II) and Nick Reishus (Environmentalist II) of Scott County Environmental Health conducted a reconnaissance of the project area on 8/5/16. The site reconnaissance consisted of a visual inspection of the proposed road improvement project to determine the presence of RECs. Descriptions of what was observed during the site reconnaissance is included with the photographs, and on the site reconnaissance worksheets in Appendix D.

6.0 INFORMATION FROM INTERVIEWS

An inquiry letter was sent to Louisville Township, the area Fire Marshal, and the Scott County Environmental Health Department. Responses to inquiry are below:

Peter Schmitt – Scott County Community Development Div. – Environmental Health Dept.
Peter Schmitt Scott County Environmentalist III (34 years) was interviewed. Please see Figure 11 Scott County Environmental Assessment letter regarding any investigations and complaints.

Tom Pitschneider – Fire Marshal Shakopee Fire Department
Tom Pitschneider responded with knowledge of a fire at MN Valley Landscaping 14505 Johnson Memorial Highway, but unsure of the year.

John Weckman – Louisville Township Chairman
John Weckman responded with knowledge that approximately 10 years ago Specialized Environmental Technologies (S.E.T aka The Mulch Store) at 14800 Johnson Memorial Highway possibly was receiving creosote treated lumber. Also mentioned dump sites at both Flood brothers Auto at 15870 Johnson Memorial Highway and Hollander Auto Salvage at 13901 Johnson Memorial Highway confirming Scott County's findings in Figure 11 Scott County Enviromental Assessment letter.

7.0 FINDINGS

7.1 Database Review

The Limited Phase I ESA was conducted to identify, to the extent possible, potential contamination in the road improvement corridor. A total of 5 high potential, 6 moderate potential and 6 low potential

sites were identified during the ESA. The Scott County Environmental Health Database was verified to be current and correct. Potential sites that are within 100 feet of the road improvement project are highlighted in **bold** in the High and Moderate potential sites due to close proximity to road improvements in this project. The EDR report in Figure 10 was also referred to identify REC's. Note that a site could be listed under one or all of the following for potential contamination based upon search criteria. The potential sites are listed in Figure 16.

High Potential Sites

Criteria for sites ranked as high potential for contamination include all active and inactive Voluntary Investigation and Cleanup (VIC) and Minnesota Environmental Response and Liability ACT (MERLA) sites, all active and inactive dump sites, all drycleaner sites, and all active Leaking Underground Storage Tank (LUST) sites, and any solid waste abandonment.

Voluntary Investigation and Clean up:

- Flood Brothers Auto at 15870 Johnson Memorial Highway. (VP21340) Closed 11/01/11

MERLA/Superfund:

- None

Solid Waste Landfills:

- None

Active and inactive dump sites:

- Flood Brothers Auto at 15870 Johnson Memorial Highway. (RCRA1139). Inactive
- **Anchor Block and Concrete at 13450 Johnson Memorial Highway. Dump location at the NE and NW end of the property. See Figure 13 Anchor Block Dump Site for approximate location.**
- **Hollander Auto Salvage operated at 13901 Johnson Memorial Highway. See Figure 14 Hollander Auto Salvage Dump Site for approximate location.**
- **Minnesota Valley Landscaping at 14505 Johnson Memorial Highway. See Figure 15 Minnesota Valley Landscaping Dump Site for approximate location.**

All Active LUST sites:

- None

Medium Potential Sites

Criteria for sites ranked as medium potential for contamination include all closed LUST sites, all sites with Underground Storage Tanks (USTs) or Aboveground Storage Tanks (ASTs), and a salvage yard.

Closed LUST sites within ¼ mile (MPCA Database):

- **MN Valley Wholesale at 14505 Johnson Memorial Highway. (LEAK00011241). Closed 5/06/99**
- **Johnson Block / RW Concrete (inactive) at 13450 Johnson Memorial Highway. (LEAK0004755). Closed 7/29/92**

- **Anchor Block at 13450 Johnson Memorial Highway. (LEAK0008096). Closed 6/20/96**

Closed LAST sites within 1/2 mile:

- Flood Brothers Auto at 15870 Johnson Memorial Highway. (LEAK00017318) Closed 5/05/11

All Active UST and AST within 1 mile project area (MPCA Database):

Business Name	Street	City	County	TankCount
MN Valley Wholesale	**14505 Johnson Memorial Hwy.**	**Shakopee**	**Scott**	**2 UST Removed**
S.E.T (aka Mulch Store)	**14800 Johnson Memorial Hwy.**	**Shakopee**	**Scott**	**3 AGT Active**
MN Valley Wholesale	**14505 Johnson Memorial Hwy.**	**Shakopee**	**Scott**	**2 AGT Active**
Shakopee Sand LLC	**15566 Johnson Memorial Hwy.**	**Shakopee**	**Scott**	**2 AGT Active**

Active Salvage Yard: None Found

Low Potential Sites

Criteria for sites ranked as low potential for contamination include all hazardous waste generator sites and possibly some commercial and farmstead sites, and the EDR database search that resulted in closed or inactive sites.

Generator Name	Site Address	PID	Generator Size
MID AMERICA FESTIVALS	12364 CHESTNUT BLVD	79210190	Minimal Generator
ANCHOR BLOCK COMPANY	13450 JOHNSON MEMORIAL DR	79210050	Small Quantity Generator
BRYAN ROCK PRODUCTS INC.	13580 JOHNSON MEMORIAL DR	79210080	Minimal Generator
LANO EQUIPMENT INC	3021 133 ST W	79210210	Minimal Generator
MINNESOTA VALLEY WHOLESALE	**14505 JOHNSON MEMORIAL DR**	**79280040**	**Minimal Generator**
SHAKOPEE SAND, LLC	**15566 JOHNSON MEMORIAL DR**	**70290010**	**Minimal Generator**

Since the low potential sites listed above are all licensed or registered by Scott County Environmental Health as Hazardous Waste Generators and are routinely inspected to ensure that they remain in compliance with Federal, State, and County regulations, they are not identified as RECs of significant concern.

Abandoned Solid Waste:

- **Abandoned minor solid waste found at 3525 145st W. during site reconnaissance.**
- **Abandoned large solid waste found at 15030 Smith Dr. during site reconnaissance.**

Misc: EDR Database Search

- **Spill at NRG Shakopee Compost Site (inactive) at 14800 Johnson Memorial Highway. Closed 6/18/04**
- **Spills at SOI (inactive) at 14800 Johnson Memorial Highway. Closed 5/30/96 and 6/30/00**
- **Spill at MN Valley Wholesale at 14505 Johnson Memorial Highway. Closed 1/01/96**
- **Ag Spill at MN Valley Wholesale at 14505 Johnson Memorial Highway. (Facility ID 920031). Closed 1/14/93**

- **Ag Spill at 3232 W 150th St. (Facility ID FY77I033). Closed 1/06/78**

7.2 Property Reconnaissance

The reconnaissance did locate some areas of minor solid waste abandonment at 3525 145st W and large solid waste abandonment at 15030 Smith Dr. Steve Steuber, Environmentalist II and Scott County's Solid Waste Inspector will contact these property owners for removal of solid waste. A monitoring well just south of 145st W and a rental or possible abandoned building at 14801 US 169 N. These areas are labeled A-E. See Appendix D Reconnaissance Photos.

8.0 SIGNATURES, QUALIFICATIONS, AND RESUMES

We declare that, to the best of our professional knowledge and belief, we meet the definition of Environmental Professional as defined in §312.10 of 40 CFR 312 and we have the specific qualifications based on education, training, and experience to assess a property of the nature, history, and setting of the project area.

Environmental Professional means:

(1) a person who possesses sufficient specific education, training, and experience necessary to exercise professional judgment to develop opinions and conclusions regarding conditions indicative of releases or threatened releases (see § 312.1(c)) on, at, in, or to a property, sufficient to meet the objectives and performance factors in § 312.20(e) and (f).

(2) Such a person must:

(i) Hold a current Professional Engineer's or Professional Geologist's license or registration from a state, tribe, or U.S. territory (or the Commonwealth of Puerto Rico) and have the equivalent of three (3) years of full-time relevant experience; or

(ii) Be licensed or certified by the federal government, a state, tribe, or U.S. territory (or the Commonwealth of Puerto Rico) to perform environmental inquiries as defined in §312.21 and have the equivalent of three (3) years of full-time relevant experience; or

(iii) Have a Baccalaureate or higher degree from an accredited institution of higher education in a discipline of engineering or science and the equivalent of five (5) years of full time relevant experience; or

(iv) Have the equivalent of ten (10) years of full-time relevant experience.

(3) An environmental professional should remain current in his or her field through participation in continuing education or other activities.

(4) The definition of environmental professional provided above does not preempt state professional licensing or registration requirements such as those for a professional geologist, engineer, or site remediation professional. Before commencing work, a person should determine the applicability of state professional licensing or registration laws to the activities to be undertaken as part of the inquiry identified in 312.21(b).

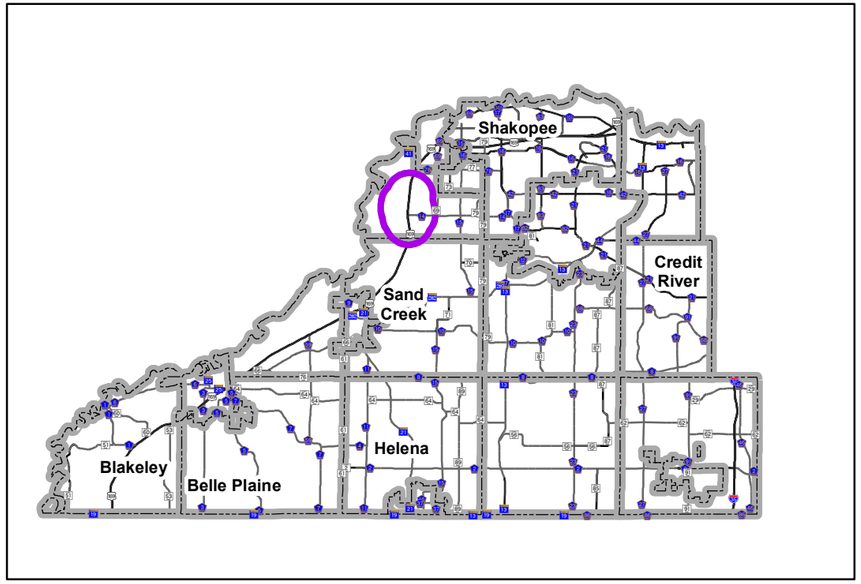
(5) A person who does not qualify as an environmental professional under the foregoing definition may assist in the conduct of all appropriate inquiries in accordance with this part if such person is under the supervision or responsible charge of a person meeting the definition of an environmental professional provided above when conducting such activities.

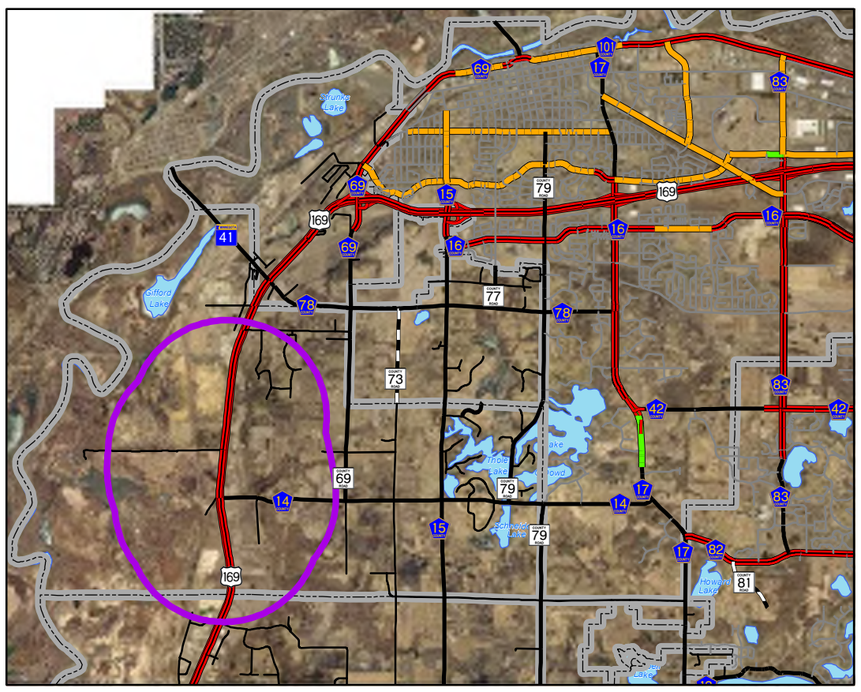
Relevant experience, as used in the definition of environmental professional in this section, means: participation in the performance of all appropriate inquiries investigations, environmental site assessments, or other site investigations that may include environmental analyses, investigations, and remediation which involve the understanding of surface and subsurface environmental conditions and the processes used to evaluate these conditions and for which professional judgment was used to develop opinions regarding conditions indicative of releases or threatened releases (see 312.1(c)) to the subject property.

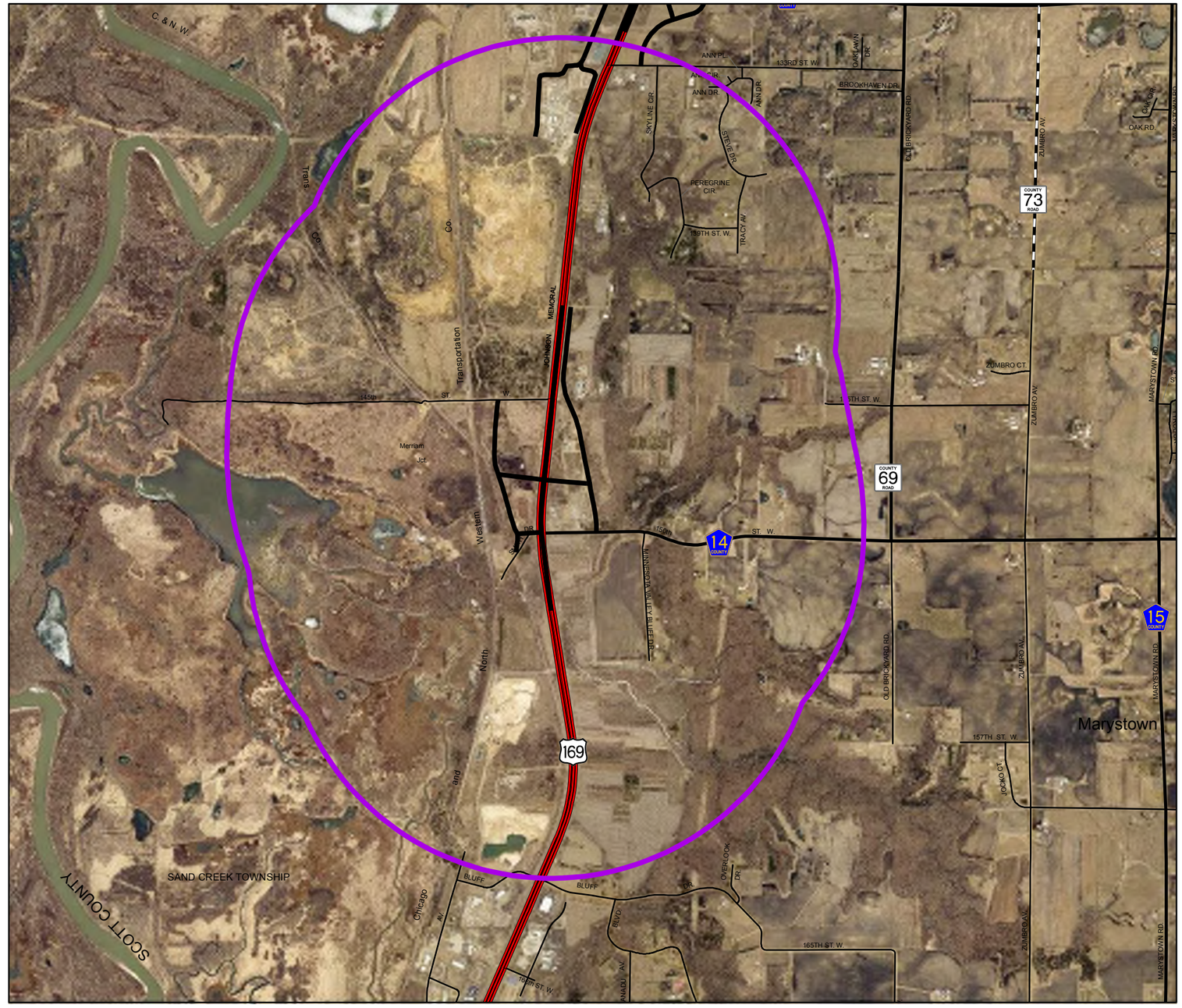
CERTIFICATIONS AND SIGNATURE

Kate Sedlacek B.S. Environmental Science
Environmental Health and Waste Programs Supervisor
MN Registered Environmental Health Specialist/Sanitarian
MPCA Trained, Qualified and Experienced Hazardous Waste Inspector
MN Subsurface Sewage Treatment Systems Certified Advanced Inspector
OSHA 1910.120 Hazardous Materials Handling 24 Hour Hazwopper Training with annual refreshers

Richard Jones B.S. Ecology
Environmentalist II
Qualified and Experienced Hazardous Waste Inspector
MN Subsurface Sewage Treatment Systems Certified Inspector
OSHA 1910.120 Hazardous Materials Handling 24 Hour Hazwopper Training and annual refreshers







Scott County Community Services
Environmental Services
200 Fourth Avenue West
Shakopee, MN 55379

US 169/CSAH 14 Interchange

N

FIGURE 1 LOCATION MAP
8-11-16

1 Mile Project Area
Hwy 169, CSAH 14 Alignment

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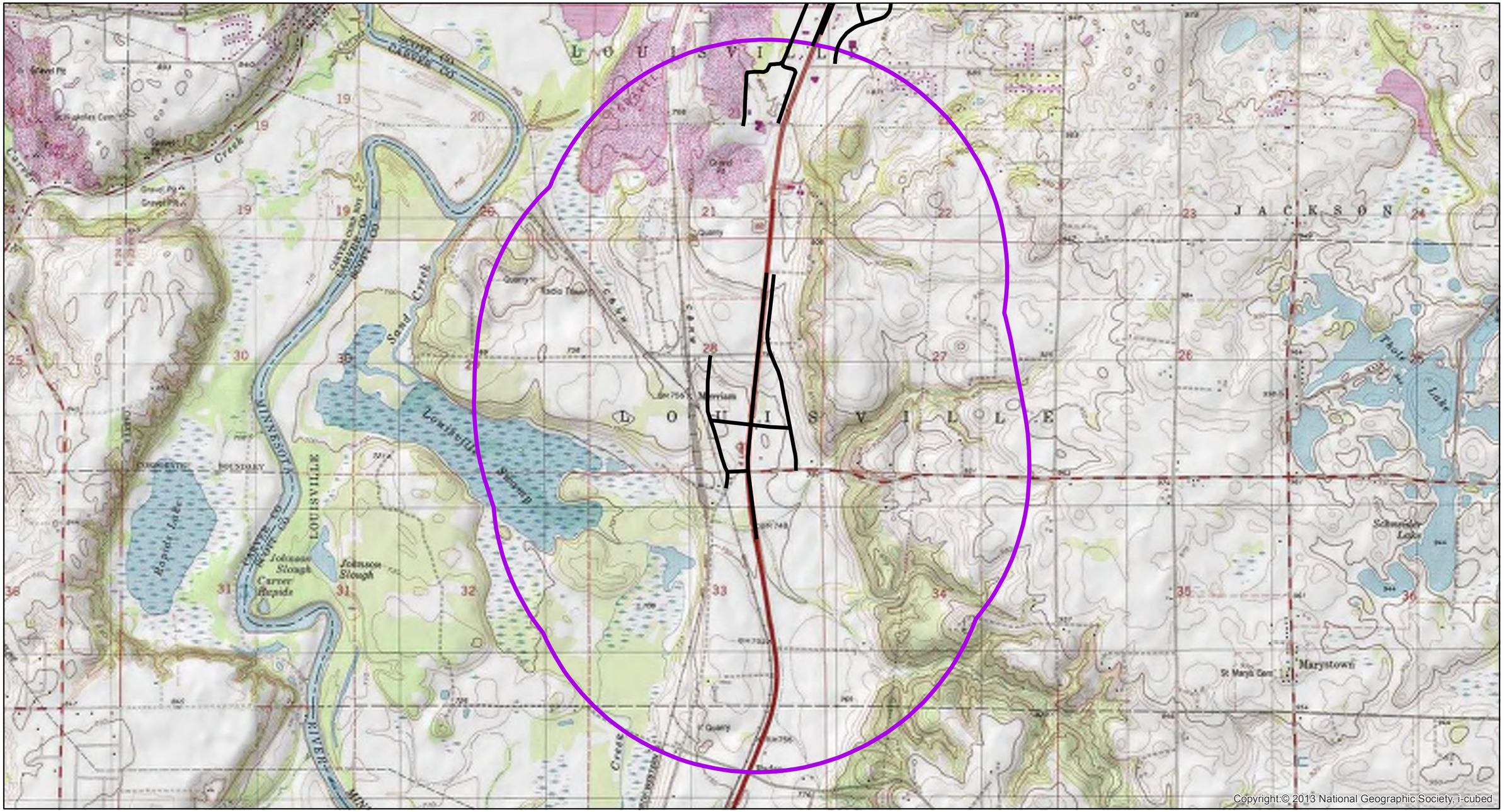

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8-11-16

FIGURE 2 TOPOGRAPHY

Source: USGS

Hwy 169, CSAH 14 Alignment

1 Mile Project Area

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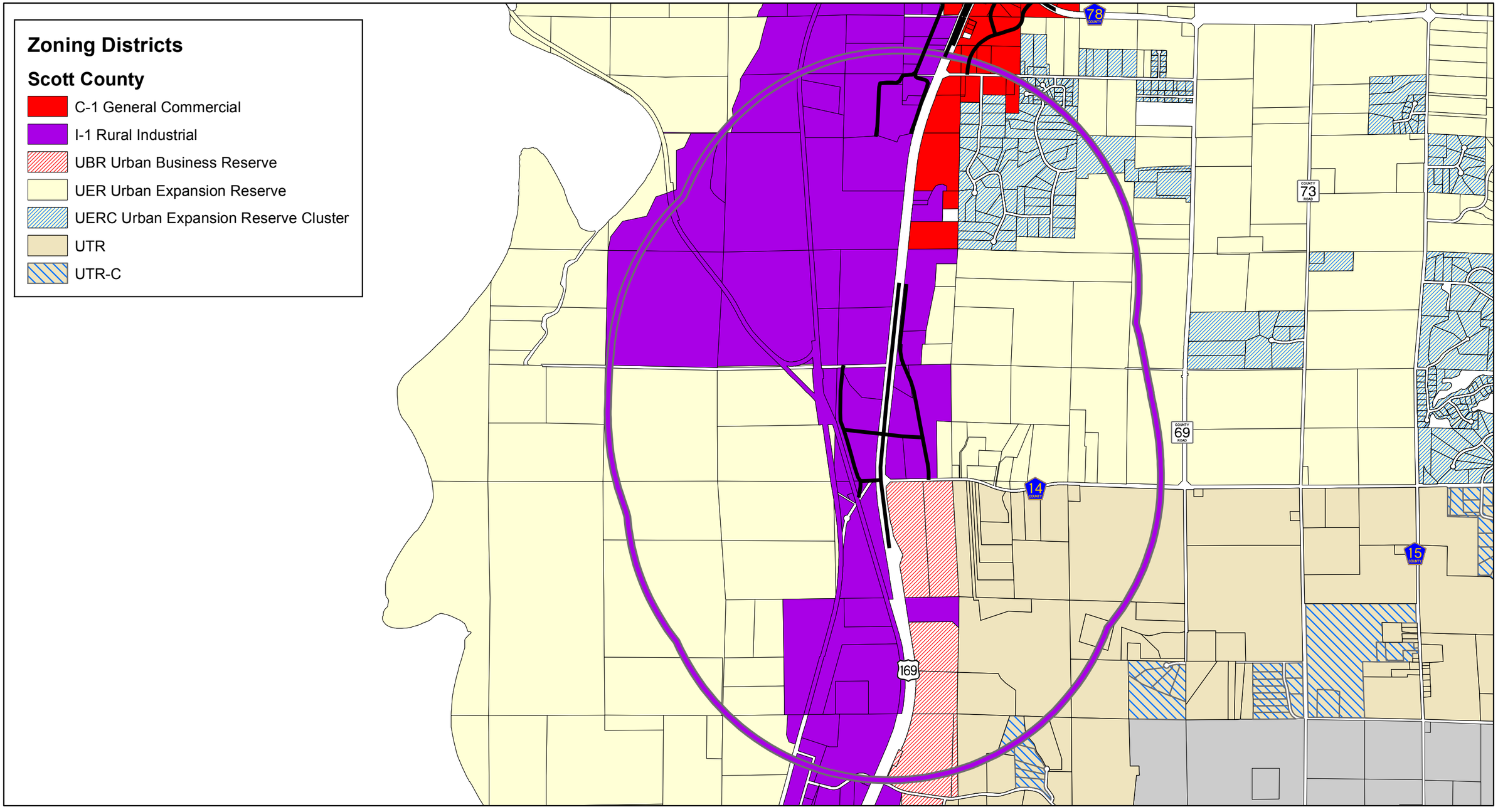

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8-11-16

FIGURE 3 ZONING - ADJACENT PROPERTIES

Source: Scott County Zoning Administration

1 Mile Project Area

Hwy 169, CSAH 14 Alignment

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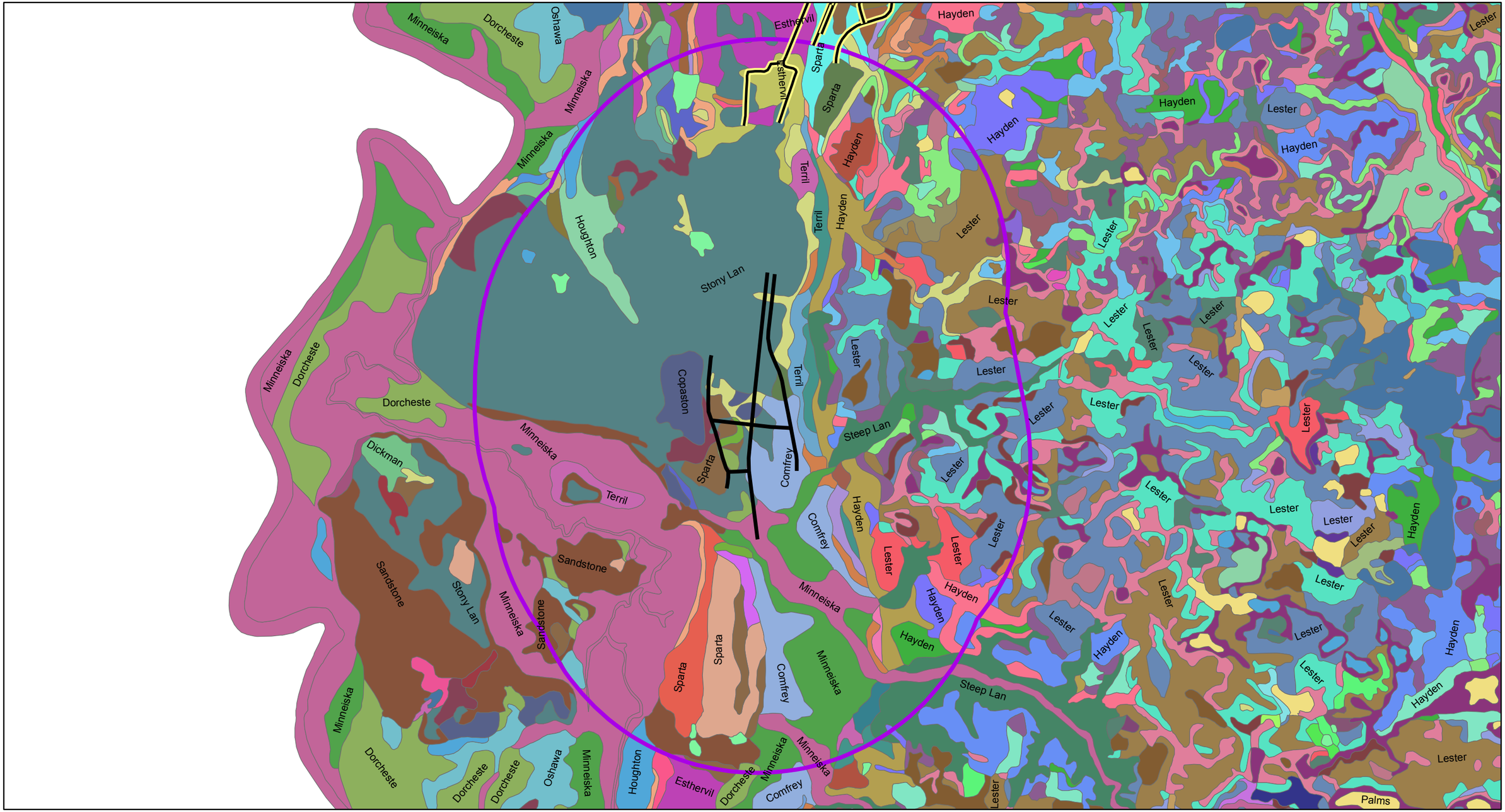

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Shakopee, MN 55379

US 169/CSAH 14 Interchange

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8-11-16

FIGURE 4: SOILS

Source: Soil Survey of Scott County

Hwy 169, CSAH 14 Alignment

1 Mile Project Area

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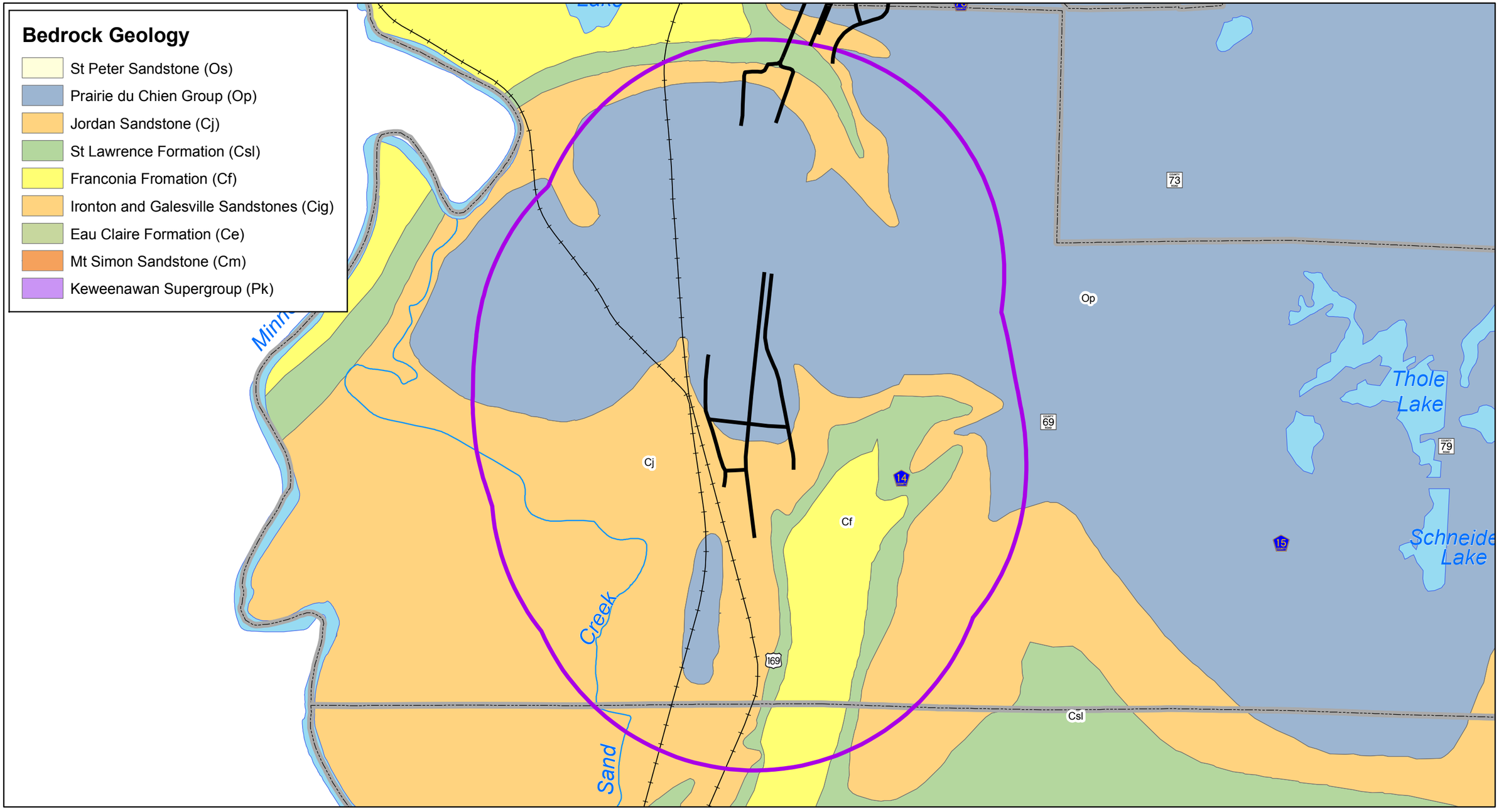

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Shakopee, MN 55379

US 169/CSAH 14 Interchange

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8-11-16

FIGURE 5: GEOLOGY

Source: MN Geological Survey

Hwy 169, CSAH 14 Alignment

1 Mile Project Area

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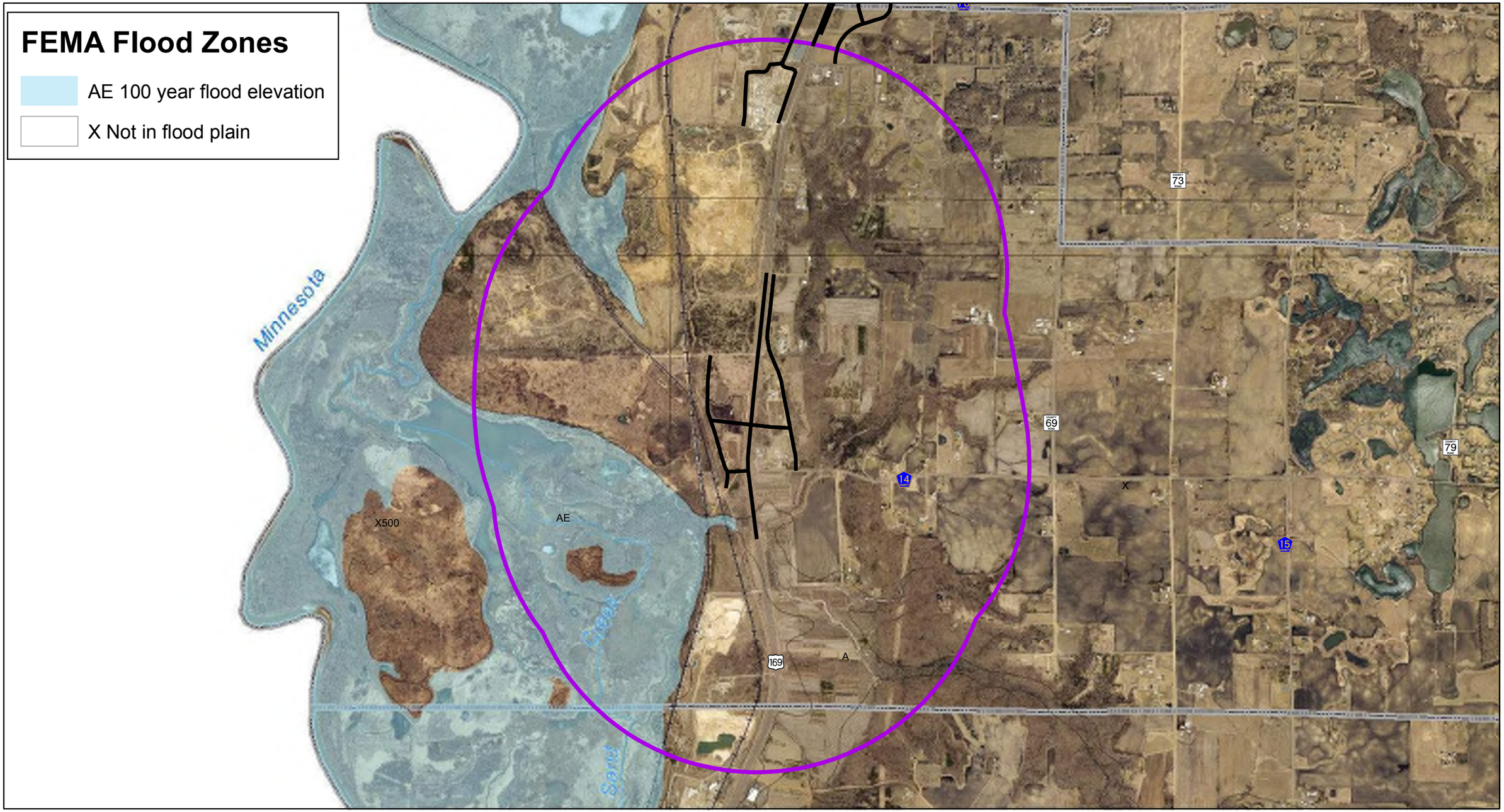

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Environmental Services
200 Fourth Avenue West
Shakopee, MN 55379

US 169/CSAH 14 Interchange

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8-11-16

FIGURE 6: FEMA

Source: FEMA

Hwy 169, CSAH 14 Alignment

1 Mile Project Area

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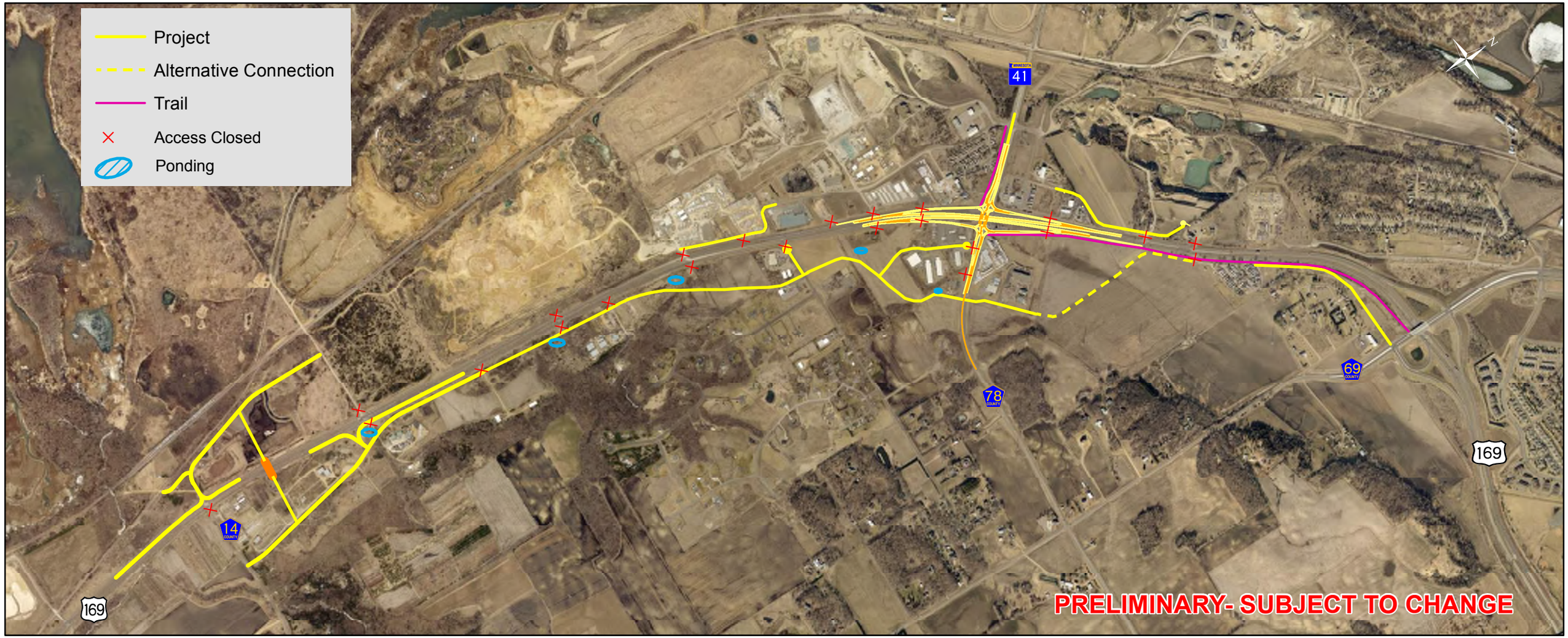
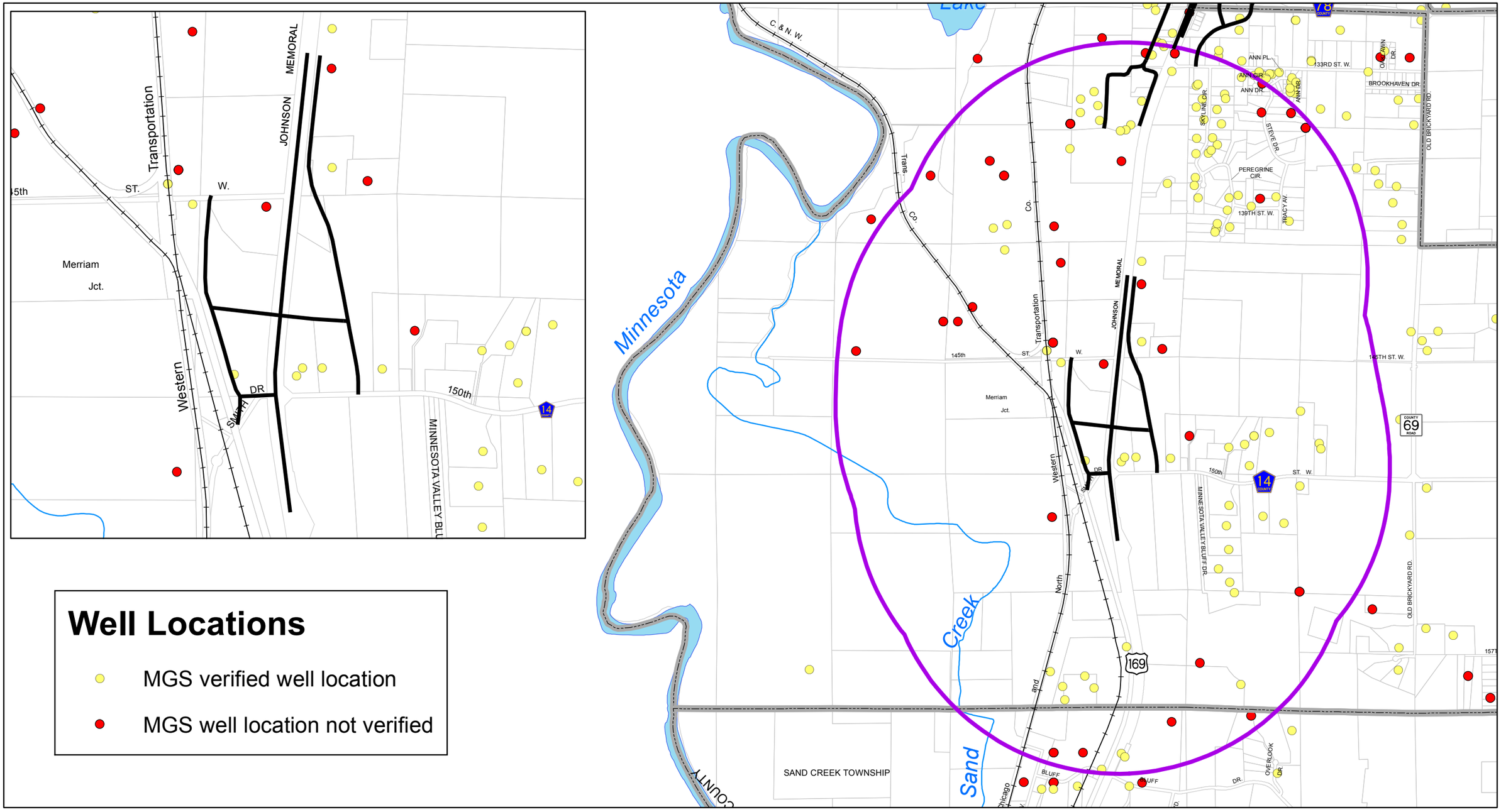


Scott County
Physical Development Department
600 Country Trail East
Jordan, MN 55352

Preliminary Concept

US 169/TH 41/CSAH 78 Interchange



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US 169/CSAH 14 Interchange

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8-11-16

FIGURE 8: WELLS

Source: MN Geological Survey

1 Mile Project Area

Hwy 169, CSAH 14 Alignment

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US 169/CSAH 14 Interchange

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8-11-16

FIGURE 9: SEPTIC LOCATIONS

Source: Scott County Environmental Health

Hwy 169, CSAH 14 Alignment

1 Mile Project Area

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169 / 14 Intersection
US169 / MN14
Shakopee, MN 55379

Inquiry Number: 4693872.2s
August 05, 2016

The EDR Radius Map™ Report with GeoCheck®

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Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

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Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

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EXECUTIVE SUMMARY

A search of available environmental records was conducted by Environmental Data Resources, Inc (EDR). The report was designed to assist parties seeking to meet the search requirements of EPA's Standards and Practices for All Appropriate Inquiries (40 CFR Part 312), the ASTM Standard Practice for Environmental Site Assessments (E 1527-13) or custom requirements developed for the evaluation of environmental risk associated with a parcel of real estate.

TARGET PROPERTY INFORMATION

ADDRESS

US169 / MN14
SHAKOPEE, MN 55379

COORDINATES

Latitude (North):	44.7329710 - 44˚ 43' 58.69''
Longitude (West):	93.5887050 - 93˚ 35' 19.33''
Universal Tranverse Mercator:	Zone 15
UTM X (Meters):	453384.7
UTM Y (Meters):	4953239.0
Elevation:	744 ft. above sea level

USGS TOPOGRAPHIC MAP ASSOCIATED WITH TARGET PROPERTY

Target Property Map:	5964225 JORDAN EAST, MN
Version Date:	2013
North Map:	5964261 SHAKOPEE, MN
Version Date:	2013

AERIAL PHOTOGRAPHY IN THIS REPORT

Portions of Photo from:	20150927
Source:	USDA

MAPPED SITES SUMMARY

Target Property Address:
US169 / MN14
SHAKOPEE, MN 55379

Click on Map ID to see full detail.

MAP ID	SITE NAME	ADDRESS	DATABASE ACRONYMS	RELATIVE ELEVATION	DIST (ft. & mi.) DIRECTION
A1		14355 JOHNSON MEMOR	EDR Hist Auto	Higher	1 ft.
A2	DYNOTEC INDUSTRIES I	14355 JOHNSON MEMORI	FINDS, ECHO	Higher	1 ft.
A3	DYNOTEC INDUSTRIES I	14355 JOHNSON MEMORI	RCRA-CESQG, WIMN	Higher	1 ft.
B4	MN VALLEY LANDSCAPE	14505 JOHNSON MEMORI	RGA LUST	Higher	1 ft.
B5	JIMMY'S CRC - JOHNSO	14501 JOHNSON MEMORI	RCRA NonGen / NLR, FINDS, WIMN, ECHO	Higher	1 ft.
A6		14345 JOHNSON MEMOR	EDR Hist Auto	Higher	1 ft.
A7		14331 JOHNSON MEMOR	EDR Hist Auto	Higher	1 ft.
A8	COMMERCIAL TRUCK COL	14345 JOHNSON MEMORI	FINDS, ECHO	Higher	1 ft.
A9	COMMERCIAL TRUCK COL	14345 JOHNSON MEMORI	WIMN	Higher	1 ft.
A10	COMMERCIAL TRUCK COL	14345 JOHNSON MEMORI	RCRA-CESQG	Higher	1 ft.
C11	SHAKOPEE COMPOST FAC	14800 JOHNSON MEMORI	FINDS, ECHO	Higher	1 ft.
C12	NRG - SHAKOPEE COMPO	14800 JOHNSON MEMORI	SPILLS, Financial Assurance	Higher	1 ft.
C13	SPECIALIZED ENVIRONM	14800 JOHNSON MEMORI	AST	Higher	1 ft.
14	FRACMASTER SANDS LLC		US MINES	Higher	1 ft.
C15	SOI	14800 JOHNSON MEMORI	SWF/LF, SPILLS, Financial Assurance, WIMN	Higher	1 ft.
D16	MINNESOTA VALLEY WHO	14505 JOHNSON MEMORI	AGSPILLS, WIMN	Higher	1 ft.
D17	MN VALLEY WHOLESALE	14505 JOHNSON MEMORI	LUST, UST, AST, SPILLS, Financial Assurance	Higher	1 ft.
D18	MINNESOTA VALLEY WHO	14505 JOHNSON MEMORI	RCRA-CESQG, FINDS, ECHO	Higher	1 ft.
C19	SHAKOPEE COMPOST FAC	14800 JOHNSON MEMORI	RGA LF	Higher	1 ft.
20		3232 W 150TH ST	AGSPILLS	Higher	1 ft.
21	PICHA CREEK STREAM R	ADDRESS UNKNOWN	WIMN	Higher	280, 0.053, SSE
E22	SHAKOPEE SAND, LLC	15566 JOHNSON MEMORI	AIRS, Financial Assurance, TIER 2, WIMN	Higher	445, 0.084, South
E23	SHAKOPEE SAND LLC	15566 JOHNSON MEMORI	AST	Higher	445, 0.084, South
E24	CONCRETE MOBILTY	15566 JOHNSON MEMORI	RCRA-CESQG	Higher	445, 0.084, South
25	SHAKOPEE SAND, LLC		US MINES	Higher	1318, 0.250, South
26	FLOOD BROTHERS, INC.	15870 JOHNSON MEMORI	SRS	Higher	1719, 0.326, South
F27	FLOOD BROTHERS AUTO	15870 JOHNSON MEMORI	LAST, VIC, SRS, SPILLS, Financial Assurance, WIMN,...	Higher	1827, 0.346, South
F28	FLOOD BROTHERS BURN	15870 JOHNSON MEMORI	MN LS, WIMN	Higher	1827, 0.346, South

EXECUTIVE SUMMARY

TARGET PROPERTY SEARCH RESULTS

The target property was not listed in any of the databases searched by EDR.

DATABASES WITH NO MAPPED SITES

No mapped sites were found in EDR's search of available ("reasonably ascertainable ") government records either on the target property or within the search radius around the target property for the following databases:

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

NPL ..... National Priority List
Proposed NPL ..... Proposed National Priority List Sites
NPL LIENS ..... Federal Superfund Liens

Federal Delisted NPL site list

Delisted NPL ..... National Priority List Deletions

Federal CERCLIS list

FEDERAL FACILITY ..... Federal Facility Site Information listing
SEMS ..... Superfund Enterprise Management System

Federal CERCLIS NFRAP site list

SEMS-ARCHIVE ..... Superfund Enterprise Management System Archive

Federal RCRA CORRACTS facilities list

CORRACTS ..... Corrective Action Report

Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF ..... RCRA - Treatment, Storage and Disposal

Federal RCRA generators list

RCRA-LQG ..... RCRA - Large Quantity Generators
RCRA-SQG ..... RCRA - Small Quantity Generators

Federal institutional controls / engineering controls registries

LUCIS ..... Land Use Control Information System
US ENG CONTROLS ..... Engineering Controls Sites List
US INST CONTROL ..... Sites with Institutional Controls

EXECUTIVE SUMMARY

Federal ERNS list

ERNS..... Emergency Response Notification System

State- and tribal - equivalent NPL

MN PLP..... Permanent List of Priorities

State- and tribal - equivalent CERCLIS

SHWS..... Superfund Site Information Listing

State and tribal landfill and/or solid waste disposal site lists

UNPERM LF..... Unpermitted Facilities
LCP..... Closed Landfills Priority List

State and tribal leaking storage tank lists

INDIAN LUST..... Leaking Underground Storage Tanks on Indian Land

State and tribal registered storage tank lists

FEMA UST..... Underground Storage Tank Listing
INDIAN UST..... Underground Storage Tanks on Indian Land

State and tribal institutional control / engineering control registries

INST CONTROL..... Site Remediation Section Database

State and tribal voluntary cleanup sites

INDIAN VCP..... Voluntary Cleanup Priority Listing

State and tribal Brownfields sites

BROWNFIELDS..... Petroleum Brownfields Program Sites

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS..... A Listing of Brownfields Sites

Local Lists of Landfill / Solid Waste Disposal Sites

SWRCY..... Recycling Facilities
INDIAN ODI..... Report on the Status of Open Dumps on Indian Lands
ODI..... Open Dump Inventory
DEBRIS REGION 9..... Torres Martinez Reservation Illegal Dump Site Locations

Local Lists of Hazardous waste / Contaminated Sites

US HIST CDL..... Delisted National Clandestine Laboratory Register

CDL	Clandestine Drug Labs
MN DEL PLP	Delisted Permanent List of Priorities
US CDL	National Clandestine Laboratory Register

Local Land Records

LIENS	Environmental Liens
LIENS 2	CERCLA Lien Information

Records of Emergency Release Reports

HMIRS	Hazardous Materials Information Reporting System
SPILLS 90	SPILLS 90 data from FirstSearch
SPILLS 80	SPILLS 80 data from FirstSearch

Other Ascertainable Records

FUDS	Formerly Used Defense Sites
DOD	Department of Defense Sites
SCRD DRYCLEANERS	State Coalition for Remediation of Drycleaners Listing
US FIN ASSUR	Financial Assurance Information
EPA WATCH LIST	EPA WATCH LIST
2020 COR ACTION	2020 Corrective Action Program List
TSCA	Toxic Substances Control Act
TRIS	Toxic Chemical Release Inventory System
SSTS	Section 7 Tracking Systems
ROD	Records Of Decision
RMP	Risk Management Plans
RAATS	RCRA Administrative Action Tracking System
PRP	Potentially Responsible Parties
PADS	PCB Activity Database System
ICIS	Integrated Compliance Information System
FTTS	FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
MLTS	Material Licensing Tracking System
COAL ASH DOE	Steam-Electric Plant Operation Data
COAL ASH EPA	Coal Combustion Residues Surface Impoundments List
PCB TRANSFORMER	PCB Transformer Registration Database
RADINFO	Radiation Information Database
HIST FTTS	FIFRA/TSCA Tracking System Administrative Case Listing
DOT OPS	Incident and Accident Data
CONSENT	Superfund (CERCLA) Consent Decrees
INDIAN RESERV	Indian Reservations
FUSRAP	Formerly Utilized Sites Remedial Action Program
UMTRA	Uranium Mill Tailings Sites
LEAD SMELTERS	Lead Smelter Sites
US AIRS	Aerometric Information Retrieval System Facility Subsystem
UXO	Unexploded Ordnance Sites
DOCKET HWC	Hazardous Waste Compliance Docket Listing
AGVIC	Agricultural Voluntary Investigation & Cleanup Listing
AIRS	Permit Contact List
BULK	Bulk Facilities Database
COAL ASH	Coal Ash Disposal Site Listing
DRYCLEANERS	Registered Drycleaning Facilities
ENF	Generators Associated with Enforcement Logs

EXECUTIVE SUMMARY

MN HWS Permit ..... Active TSD Facilities
MANIFEST ..... Hazardous Waste Manifest Data
MDA LIS ..... Licensing Information System Database Listing
TIER 2 ..... Tier 2 Facility Listing
NPDES ..... Wastewater Permits Listing
FUELS PROGRAM ..... EPA Fuels Program Registered Listing

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR MGP ..... EDR Proprietary Manufactured Gas Plants
EDR Hist Cleaner ..... EDR Exclusive Historic Dry Cleaners

EDR RECOVERED GOVERNMENT ARCHIVES

Exclusive Recovered Govt. Archives

RGA HWS ..... Recovered Government Archive State Hazardous Waste Facilities List

SURROUNDING SITES: SEARCH RESULTS

Surrounding sites were identified in the following databases.

Elevations have been determined from the USGS Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified. Sites with an elevation equal to or higher than the target property have been differentiated below from sites with an elevation lower than the target property.
Page numbers and map identification numbers refer to the EDR Radius Map report where detailed data on individual sites can be reviewed.

Sites listed in ***bold italics*** are in multiple databases.

Unmappable (orphan) sites are not considered in the foregoing analysis.

STANDARD ENVIRONMENTAL RECORDS

Federal RCRA generators list

RCRA-CESQG: RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Conditionally exempt small quantity generators (CESQGs) generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month.

A review of the RCRA-CESQG list, as provided by EDR, and dated 12/09/2015 has revealed that there are 4 RCRA-CESQG sites within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
DYNOTEC INDUSTRIES I	***14355 JOHNSON MEMORI***	***0 - 1/8 (0.000 mi.)***	***A3***	***8***
COMMERCIAL TRUCK COL	14345 JOHNSON MEMORI	0 - 1/8 (0.000 mi.)	A10	14
MINNESOTA VALLEY WHO	***14505 JOHNSON MEMORI***	***0 - 1/8 (0.000 mi.)***	***D18***	***46***
CONCRETE MOBILTY	15566 JOHNSON MEMORI	S 0 - 1/8 (0.084 mi.)	E24	69

EXECUTIVE SUMMARY

State and tribal landfill and/or solid waste disposal site lists

SWF/LF: The Solid Waste Facilities/Landfill Sites records typically contain an inventory of solid waste disposal facilities or landfills in a particular state. The data come from the Minnesota Pollution Control's Permitted Solid Waste Disposal Facilities list.

A review of the SWF/LF list, as provided by EDR, and dated 05/01/2016 has revealed that there is 1 SWF/LF site within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
SOI	***14800 JOHNSON MEMORI***	***0 - 1/8 (0.000 mi.)***	***C15***	***22***
Facility Id: 56321541				

State and tribal leaking storage tank lists

LUST: The Leaking Underground Storage Tank Incident Reports contain an inventory of reported leaking underground storage tank incidents. The data come from the Minnesota Pollution Control Agency's Leak Sites list.

A review of the LUST list, as provided by EDR, and dated 05/01/2016 has revealed that there is 1 LUST site within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
MN VALLEY WHOLESALE	***14505 JOHNSON MEMORI***	***0 - 1/8 (0.000 mi.)***	***D17***	***32***
Complete Site Closed Date: 05/06/1999 00:00:00				
Site Id: 35817				
MNPCA ID: 223660				

LAST: A listing of leaking aboveground storage tanks.

A review of the LAST list, as provided by EDR, and dated 05/01/2016 has revealed that there is 1 LAST site within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
FLOOD BROTHERS AUTO	***15870 JOHNSON MEMORI***	***S 1/4 - 1/2 (0.346 mi.)***	***F27***	***77***
Complete Site Closed Date: 05/05/2011 00:00:00				
Site Id: 193932				
MN PCA ID: 54717097				

State and tribal registered storage tank lists

UST: The Underground Storage Tank database contains registered USTs. USTs are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA). The data come from the Minnesota Pollution Control's Underground Storage Tank File.

A review of the UST list, as provided by EDR, and dated 05/01/2016 has revealed that there is 1 UST

site within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
MN VALLEY WHOLESALE Tank Status: Removed Program Interest Id: 193837	***14505 JOHNSON MEMORI***	***0 - 1/8 (0.000 mi.)***	***D17***	***32***

AST: The Aboveground Storage Tank database contains registered ASTs. The data come from the Minnesota Pollution Control's Aboveground Storage Tank File.

A review of the AST list, as provided by EDR, and dated 05/01/2016 has revealed that there are 3 AST sites within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
SPECIALIZED ENVIRONM Tank Status: 3 Program Interest Id: 270337	14800 JOHNSON MEMORI	0 - 1/8 (0.000 mi.)	C13	17
MN VALLEY WHOLESALE Tank Status: 3 Program Interest Id: 193837	***14505 JOHNSON MEMORI***	***0 - 1/8 (0.000 mi.)***	***D17***	***32***
SHAKOPEE SAND LLC Tank Status: 5 Tank Status: 3 Program Interest Id: 66663839	15566 JOHNSON MEMORI	S 0 - 1/8 (0.084 mi.)	E23	62

State and tribal voluntary cleanup sites

VIC: This is the Minnesota Pollution Control Agency's Voluntary Investigation and Cleanup Program list.

A review of the VIC list, as provided by EDR, and dated 02/16/2016 has revealed that there is 1 VIC site within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
FLOOD BROTHERS AUTO Facility Id: VP21340	***15870 JOHNSON MEMORI***	***S 1/4 - 1/2 (0.346 mi.)***	***F27***	***77***

ADDITIONAL ENVIRONMENTAL RECORDS

Local Lists of Hazardous waste / Contaminated Sites

SRS: The database contains site information for sites monitored by the Site Remediation Section.

A review of the SRS list, as provided by EDR, and dated 02/16/2016 has revealed that there are 2 SRS

sites within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
FLOOD BROTHERS, INC. Facility Id: RCRA1139	15870 JOHNSON MEMORI	S 1/4 - 1/2 (0.326 mi.)	26	73
FLOOD BROTHERS AUTO Facility Id: VP21340	***15870 JOHNSON MEMORI***	***S 1/4 - 1/2 (0.346 mi.)***	***F27***	***77***

Records of Emergency Release Reports

SPILLS: This is the Minnesota Pollution Coontrol Agency's Spills Log.

A review of the SPILLS list, as provided by EDR, and dated 05/01/2016 has revealed that there are 3 SPILLS sites within approximately 0.001 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
NRG - SHAKOPEE COMPO Spill Closure: Response Completed	***14800 JOHNSON MEMORI***	***0 - 1/8 (0.000 mi.)***	***C12***	***16***
SOI Spill Closure: Nonsignificant, No Followup	***14800 JOHNSON MEMORI***	***0 - 1/8 (0.000 mi.)***	***C15***	***22***
MN VALLEY WHOLESALE	***14505 JOHNSON MEMORI***	***0 - 1/8 (0.000 mi.)***	***D17***	***32***

AGSPILLS: Incidents involving agricultural chemicals. The data come from the Minnesota Department of Agriculture.

A review of the AGSPILLS list, as provided by EDR, and dated 04/18/2016 has revealed that there are 2 AGSPILLS sites within approximately 0.001 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
MINNESOTA VALLEY WHO Facility Id: 92-0031 Date Closed: 1993-01-14	***14505 JOHNSON MEMORI***	***0 - 1/8 (0.000 mi.)***	***D16***	***31***
Not reported Facility Id: FY77I033 Date Closed: 1978-01-06	3232 W 150TH ST	0 - 1/8 (0.000 mi.)	20	48

Other Ascertainable Records

RCRA NonGen / NLR: RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Non-Generators do not presently generate hazardous waste.

A review of the RCRA NonGen / NLR list, as provided by EDR, and dated 12/09/2015 has revealed that there is 1 RCRA NonGen / NLR site within approximately 0.25 miles of the target property.

EXECUTIVE SUMMARY

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
JIMMY'S CRC - JOHNSO	***14501 JOHNSON MEMORI***	***0 - 1/8 (0.000 mi.)***	***B5***	***10***

US MINES: Mines Master Index File. The source of this database is the Dept. of Labor, Mine Safety and Health Administration.

A review of the US MINES list, as provided by EDR, has revealed that there are 2 US MINES sites within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
FRACMASTER SANDS LLC Database: US MINES, Date of Government Version: 02/09/2016		0 - 1/8 (0.000 mi.)	14	21
SHAKOPEE SAND, LLC Database: US MINES, Date of Government Version: 02/09/2016		S 1/8 - 1/4 (0.250 mi.)	25	70

FINDS: The Facility Index System contains both facility information and "pointers" to other sources of information that contain more detail. These include: RCRIS; Permit Compliance System (PCS); Aerometric Information Retrieval System (AIRS); FATES (FIFRA [Federal Insecticide Fungicide Rodenticide Act] and TSCA Enforcement System, FTTS [FIFRA/TSCA Tracking System]; CERCLIS; DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes); Federal Underground Injection Control (FURS); Federal Reporting Data System (FRDS); Surface Impoundments (SIA); TSCA Chemicals in Commerce Information System (CICS); PADS; RCRA-J (medical waste transporters/disposers); TRIS; and TSCA. The source of this database is the U.S. EPA/NTIS.

A review of the FINDS list, as provided by EDR, and dated 07/20/2015 has revealed that there are 5 FINDS sites within approximately 0.001 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
DYNOTEC INDUSTRIES I	***14355 JOHNSON MEMORI***	***0 - 1/8 (0.000 mi.)***	***A2***	***8***
JIMMY'S CRC - JOHNSO	***14501 JOHNSON MEMORI***	***0 - 1/8 (0.000 mi.)***	***B5***	***10***
COMMERCIAL TRUCK COL	***14345 JOHNSON MEMORI***	***0 - 1/8 (0.000 mi.)***	***A8***	***14***
SHAKOPEE COMPOST FAC	***14800 JOHNSON MEMORI***	***0 - 1/8 (0.000 mi.)***	***C11***	***16***
MINNESOTA VALLEY WHO	***14505 JOHNSON MEMORI***	***0 - 1/8 (0.000 mi.)***	***D18***	***46***

Financial Assurance: Financial assurance is intended to ensure that resources are available to pay for the cost of closure, post-closure care, and corrective measures if the owner or operator of a regulated facility is unable or unwilling to pay.

A review of the Financial Assurance list, as provided by EDR, has revealed that there are 3 Financial Assurance sites within approximately 0.001 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
NRG - SHAKOPEE COMPO Database: Financial Assurance 1, Date of Government Version: 05/01/2016 PROGRAM ID: 292835	***14800 JOHNSON MEMORI***	***0 - 1/8 (0.000 mi.)***	***C12***	***16***
SOI Database: Financial Assurance 1, Date of Government Version: 05/01/2016 Database: Financial Assurance 2, Date of Government Version: 05/01/2016	***14800 JOHNSON MEMORI***	***0 - 1/8 (0.000 mi.)***	***C15***	***22***

PROGRAM ID: 270337
PROGRAM ID: 181247
PROGRAM ID: 185143
Facility Id: 56321541
Program Interest ID: 56321541

MN VALLEY WHOLESALE ***14505 JOHNSON MEMORI*** ***0 - 1/8 (0.000 mi.)*** ***D17*** ***32***
Database: Financial Assurance 1, Date of Government Version: 05/01/2016
PROGRAM ID: 193837
PROGRAM ID: 223660
PROGRAM ID: 175100

MN LS: The List of Sites includes: Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS), No Further Remedial Action Planned (NFRAP), National Priorities List (NPL), Permanent List of Priorities (PLP), Sites delisted from the Permanent List of Priorities (DPLP), Hazardous Waste Permit Unit Project Facilities (HW PERM), List of Permitted Solid Waste Facilities (SW PERM), 1980 Metropolitan Area Waste Disposal Site Inventory,1980 Statewide Outstate Dump Inventory (ODI), Voluntary and Investigation Program (VIC), and Closed Landfill Sites Undergoing Cleanup (LCP). The List of Sites comes from Minnesota Pollution Control

A review of the MN LS list, as provided by EDR, and dated 04/22/2009 has revealed that there is 1 MN LS site within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
FLOOD BROTHERS BURN MPCA Id: VP21340 Link ID: 6433	***15870 JOHNSON MEMORI***	***S 1/4 - 1/2 (0.346 mi.)***	***F28***	***102***

WIMN: Since 2003, the PCA's "What's in My Neighborhood?" database provides information about air quality, hazardous waste, remediation, solid waste, tanks and leaks, and water quality around Minnesota.

A review of the WIMN list, as provided by EDR, and dated 06/08/2015 has revealed that there are 9 WIMN sites within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
DYNOTEC INDUSTRIES I MPCA Id: MNS000145037 Status: Active	***14355 JOHNSON MEMORI***	***0 - 1/8 (0.000 mi.)***	***A3***	***8***
JIMMY'S CRC - JOHNSO MPCA Id: MNR000007724 Status: Inactive	***14501 JOHNSON MEMORI***	***0 - 1/8 (0.000 mi.)***	***B5***	***10***
COMMERCIAL TRUCK COL MPCA Id: MNS000138784 Status: Active	14345 JOHNSON MEMORI	0 - 1/8 (0.000 mi.)	A9	14
SOI MPCA Id: Multiple Activities Status: Active	***14800 JOHNSON MEMORI***	***0 - 1/8 (0.000 mi.)***	***C15***	***22***
MINNESOTA VALLEY WHO MPCA Id: Multiple Activities Status: Active	***14505 JOHNSON MEMORI***	***0 - 1/8 (0.000 mi.)***	***D16***	***31***
PICHA CREEK STREAM R	ADDRESS UNKNOWN	SSE 0 - 1/8 (0.053 mi.)	21	48

MPCA Id: C00031338 Status: Inactive				
SHAKOPEE SAND, LLC MPCA Id: C00033387 MPCA Id: Multiple Activities Status: Inactive Status: Active	***15566 JOHNSON MEMORI***	***S 0 - 1/8 (0.084 mi.)***	***E22***	***49***
FLOOD BROTHERS AUTO MPCA Id: Multiple Activities Status: Active	***15870 JOHNSON MEMORI***	***S 1/4 - 1/2 (0.346 mi.)***	***F27***	***77***
FLOOD BROTHERS BURN MPCA Id: Multiple Activities Status: Active	***15870 JOHNSON MEMORI***	***S 1/4 - 1/2 (0.346 mi.)***	***F28***	***102***

ECHO: ECHO provides integrated compliance and enforcement information for about 800,000 regulated facilities nationwide.

A review of the ECHO list, as provided by EDR, and dated 09/20/2015 has revealed that there are 5 ECHO sites within approximately 0.001 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
DYNOTEC INDUSTRIES I	***14355 JOHNSON MEMORI***	***0 - 1/8 (0.000 mi.)***	***A2***	***8***
JIMMY'S CRC - JOHNSO	***14501 JOHNSON MEMORI***	***0 - 1/8 (0.000 mi.)***	***B5***	***10***
COMMERCIAL TRUCK COL	***14345 JOHNSON MEMORI***	***0 - 1/8 (0.000 mi.)***	***A8***	***14***
SHAKOPEE COMPOST FAC	***14800 JOHNSON MEMORI***	***0 - 1/8 (0.000 mi.)***	***C11***	***16***
MINNESOTA VALLEY WHO	***14505 JOHNSON MEMORI***	***0 - 1/8 (0.000 mi.)***	***D18***	***46***

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR Hist Auto: EDR has searched selected national collections of business directories and has collected listings of potential gas station/filling station/service station sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include gas station/filling station/service station establishments. The categories reviewed included, but were not limited to gas, gas station, gasoline station, filling station, auto, automobile repair, auto service station, service station, etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

A review of the EDR Hist Auto list, as provided by EDR, has revealed that there are 3 EDR Hist Auto sites within approximately 0.125 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
Not reported	14355 JOHNSON MEMOR	0 - 1/8 (0.000 mi.)	A1	8
Not reported	14345 JOHNSON MEMOR	0 - 1/8 (0.000 mi.)	A6	12
Not reported	14331 JOHNSON MEMOR	0 - 1/8 (0.000 mi.)	A7	13

EXECUTIVE SUMMARY

EDR RECOVERED GOVERNMENT ARCHIVES

Exclusive Recovered Govt. Archives

RGA LF: The EDR Recovered Government Archive Landfill database provides a list of landfills derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the Minnesota Pollution Control Agency in Minnesota.

A review of the RGA LF list, as provided by EDR, has revealed that there is 1 RGA LF site within approximately 0.001 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
SHAKOPEE COMPOST FAC Facility ID: 56321541	14800 JOHNSON MEMORI	0 - 1/8 (0.000 mi.)	C19	48

RGA LUST: The EDR Recovered Government Archive Leaking Underground Storage Tank database provides a list of LUST incidents derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the Minnesota Pollution Control Agency in Minnesota.

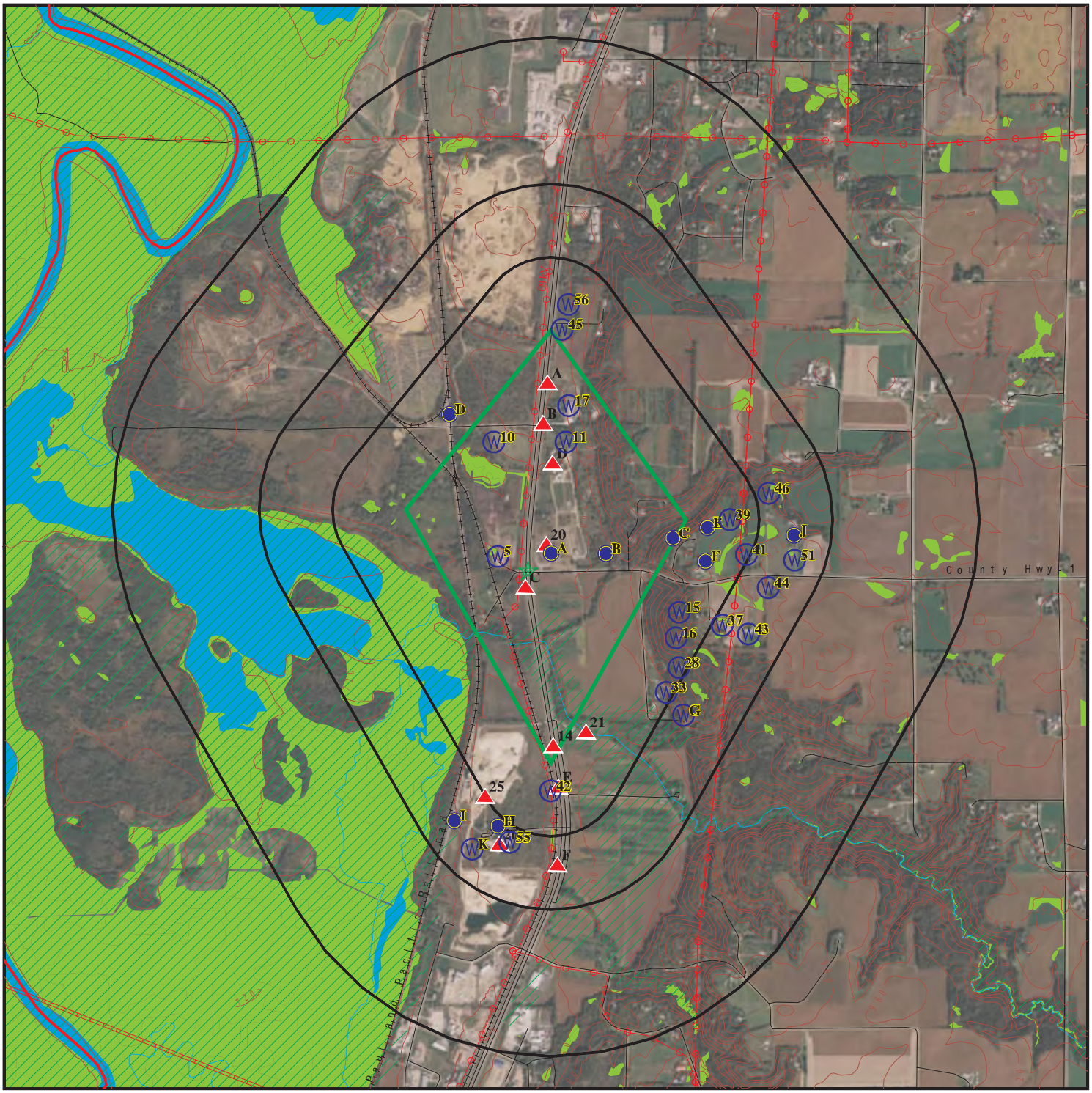
A review of the RGA LUST list, as provided by EDR, has revealed that there is 1 RGA LUST site within approximately 0.001 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
MN VALLEY LANDSCAPE	14505 JOHNSON MEMORI	0 - 1/8 (0.000 mi.)	B4	10

EXECUTIVE SUMMARY

There were no unmapped sites in this report.

OVERVIEW MAP - 4693872.2S



Target Property

Sites at elevations higher than or equal to the target property

Sites at elevations lower than the target property

Manufactured Gas Plants

National Priority List Sites

Dept. Defense Sites

0 1/4 1/2 1 Miles

Indian Reservations BIA

County Boundary

Power transmission lines

Pipelines

100-year flood zone

500-year flood zone

National Wetland Inventory

State Wetlands

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME:	169 / 14 Intersection	CLIENT:	Scott County Environmental Health
ADDRESS:	US169 / MN14 Shakopee MN 55379	CONTACT:	Richard Jones
		INQUIRY #:	4693872.2s
LAT/LONG:	44.732971 / 93.588705	DATE:	August 05, 2016 5:15 pm

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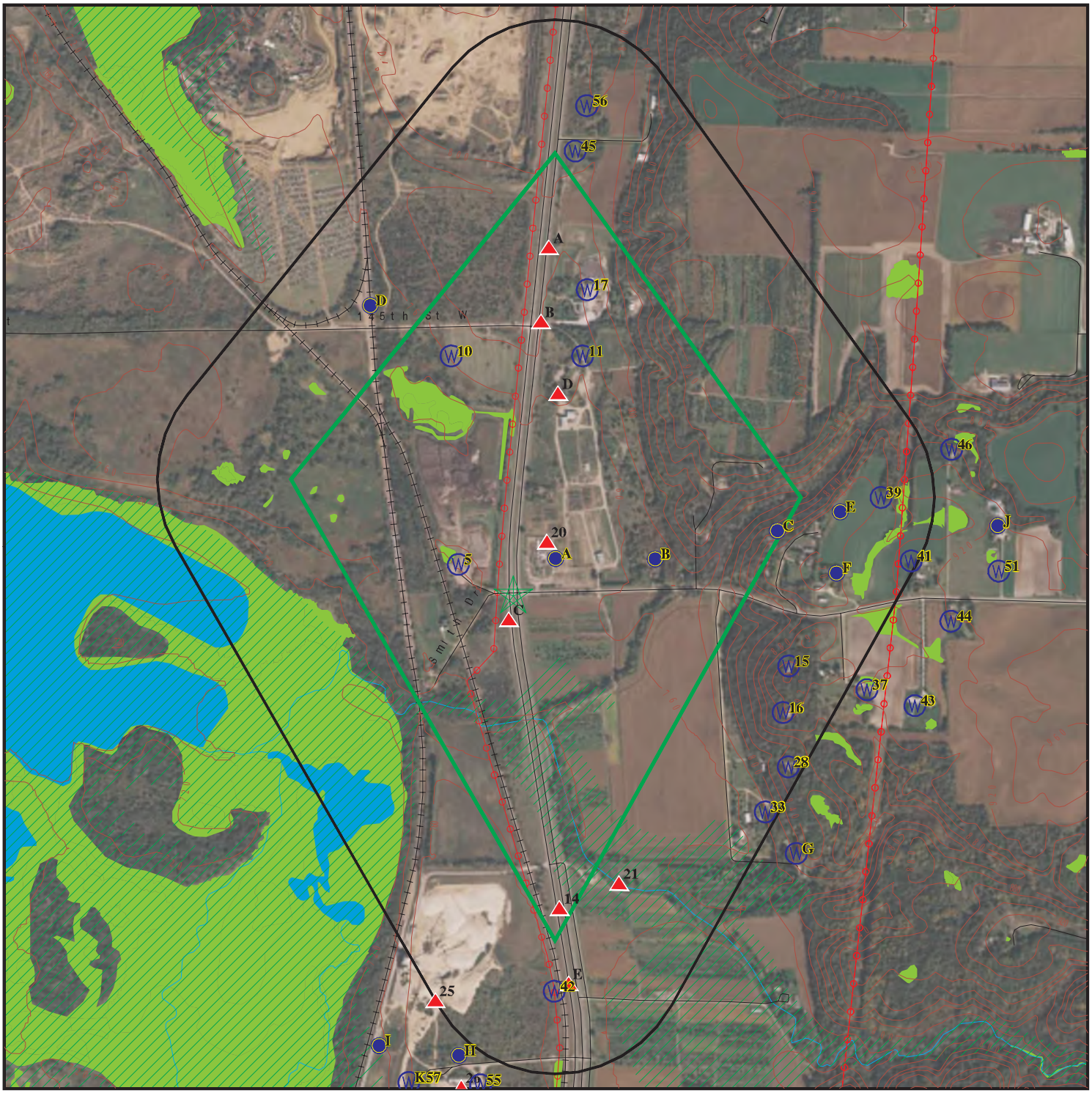
DETAIL MAP - 4693872.2S



Target Property

Sites at elevations higher than or equal to the target property

Sites at elevations lower than the target property

Manufactured Gas Plants

Sensitive Receptors

National Priority List Sites

Dept. Defense Sites

Indian Reservations BIA

Power transmission lines

100-year flood zone

500-year flood zone

National Wetland Inventory

State Wetlands

0 1/4 1/2 1 Miles

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME:	169 / 14 Intersection	CLIENT:	Scott County Environmental Health
ADDRESS:	US169 / MN14 Shakopee MN 55379	CONTACT:	Richard Jones
		INQUIRY #:	4693872.2s
LAT/LONG:	44.732971 / 93.588705	DATE:	August 05, 2016 5:16 pm

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MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
STANDARD ENVIRONMENTAL RECORDS								
Federal NPL site list								
NPL	1.000		0	0	0	0	NR	0
Proposed NPL	1.000		0	0	0	0	NR	0
NPL LIENS	0.001		0	NR	NR	NR	NR	0
Federal Delisted NPL site list								
Delisted NPL	1.000		0	0	0	0	NR	0
Federal CERCLIS list								
FEDERAL FACILITY	0.500		0	0	0	NR	NR	0
SEMS	0.500		0	0	0	NR	NR	0
Federal CERCLIS NFRAP site list								
SEMS-ARCHIVE	0.500		0	0	0	NR	NR	0
Federal RCRA CORRACTS facilities list								
CORRACTS	1.000		0	0	0	0	NR	0
Federal RCRA non-CORRACTS TSD facilities list								
RCRA-TSDF	0.500		0	0	0	NR	NR	0
Federal RCRA generators list								
RCRA-LQG	0.250		0	0	NR	NR	NR	0
RCRA-SQG	0.250		0	0	NR	NR	NR	0
RCRA-CESQG	0.250		4	0	NR	NR	NR	4
Federal institutional controls / engineering controls registries								
LUCIS	0.500		0	0	0	NR	NR	0
US ENG CONTROLS	0.500		0	0	0	NR	NR	0
US INST CONTROL	0.500		0	0	0	NR	NR	0
Federal ERNS list								
ERNS	0.001		0	NR	NR	NR	NR	0
State- and tribal - equivalent NPL								
MN PLP	1.000		0	0	0	0	NR	0
State- and tribal - equivalent CERCLIS								
SHWS	1.000		0	0	0	0	NR	0
State and tribal landfill and/or solid waste disposal site lists								
SWF/LF	0.500		1	0	0	NR	NR	1
UNPERM LF	0.500		0	0	0	NR	NR	0
LCP	0.500		0	0	0	NR	NR	0
State and tribal leaking storage tank lists								
LUST	0.500		1	0	0	NR	NR	1

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
LAST	0.500		0	0	1	NR	NR	1
INDIAN LUST	0.500		0	0	0	NR	NR	0
State and tribal registered storage tank lists								
FEMA UST	0.250		0	0	NR	NR	NR	0
UST	0.250		1	0	NR	NR	NR	1
AST	0.250		3	0	NR	NR	NR	3
INDIAN UST	0.250		0	0	NR	NR	NR	0
State and tribal institutional control / engineering control registries								
INST CONTROL	0.500		0	0	0	NR	NR	0
State and tribal voluntary cleanup sites								
VIC	0.500		0	0	1	NR	NR	1
INDIAN VCP	0.500		0	0	0	NR	NR	0
State and tribal Brownfields sites								
BROWNFIELDS	0.500		0	0	0	NR	NR	0
ADDITIONAL ENVIRONMENTAL RECORDS								
Local Brownfield lists								
US BROWNFIELDS	0.500		0	0	0	NR	NR	0
Local Lists of Landfill / Solid Waste Disposal Sites								
SWRCY	0.500		0	0	0	NR	NR	0
INDIAN ODI	0.500		0	0	0	NR	NR	0
ODI	0.500		0	0	0	NR	NR	0
DEBRIS REGION 9	0.500		0	0	0	NR	NR	0
Local Lists of Hazardous waste / Contaminated Sites								
US HIST CDL	0.001		0	NR	NR	NR	NR	0
SRS	0.500		0	0	2	NR	NR	2
CDL	0.001		0	NR	NR	NR	NR	0
MN DEL PLP	1.000		0	0	0	0	NR	0
US CDL	0.001		0	NR	NR	NR	NR	0
Local Land Records								
LIENS	0.001		0	NR	NR	NR	NR	0
LIENS 2	0.001		0	NR	NR	NR	NR	0
Records of Emergency Release Reports								
HMIRS	0.001		0	NR	NR	NR	NR	0
SPILLS	0.001		3	NR	NR	NR	NR	3
AGSPILLS	0.001		2	NR	NR	NR	NR	2
SPILLS 90	0.001		0	NR	NR	NR	NR	0
SPILLS 80	0.001		0	NR	NR	NR	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
Other Ascertainable Records								
RCRA NonGen / NLR	0.250		1	0	NR	NR	NR	1
FUDS	1.000		0	0	0	0	NR	0
DOD	1.000		0	0	0	0	NR	0
SCRD DRYCLEANERS	0.500		0	0	0	NR	NR	0
US FIN ASSUR	0.001		0	NR	NR	NR	NR	0
EPA WATCH LIST	0.001		0	NR	NR	NR	NR	0
2020 COR ACTION	0.250		0	0	NR	NR	NR	0
TSCA	0.001		0	NR	NR	NR	NR	0
TRIS	0.001		0	NR	NR	NR	NR	0
SSTS	0.001		0	NR	NR	NR	NR	0
ROD	1.000		0	0	0	0	NR	0
RMP	0.001		0	NR	NR	NR	NR	0
RAATS	0.001		0	NR	NR	NR	NR	0
PRP	0.001		0	NR	NR	NR	NR	0
PADS	0.001		0	NR	NR	NR	NR	0
ICIS	0.001		0	NR	NR	NR	NR	0
FTTS	0.001		0	NR	NR	NR	NR	0
MLTS	0.001		0	NR	NR	NR	NR	0
COAL ASH DOE	0.001		0	NR	NR	NR	NR	0
COAL ASH EPA	0.500		0	0	0	NR	NR	0
PCB TRANSFORMER	0.001		0	NR	NR	NR	NR	0
RADINFO	0.001		0	NR	NR	NR	NR	0
HIST FTTS	0.001		0	NR	NR	NR	NR	0
DOT OPS	0.001		0	NR	NR	NR	NR	0
CONSENT	1.000		0	0	0	0	NR	0
INDIAN RESERV	0.001		0	NR	NR	NR	NR	0
FUSRAP	1.000		0	0	0	0	NR	0
UMTRA	0.500		0	0	0	NR	NR	0
LEAD SMELTERS	0.001		0	NR	NR	NR	NR	0
US AIRS	0.001		0	NR	NR	NR	NR	0
US MINES	0.250		1	1	NR	NR	NR	2
FINDS	0.001		5	NR	NR	NR	NR	5
UXO	1.000		0	0	0	0	NR	0
DOCKET HWC	0.001		0	NR	NR	NR	NR	0
AGVIC	0.500		0	0	0	NR	NR	0
AIRS	0.001		0	NR	NR	NR	NR	0
BULK	0.250		0	0	NR	NR	NR	0
COAL ASH	0.500		0	0	0	NR	NR	0
DRYCLEANERS	0.250		0	0	NR	NR	NR	0
ENF	0.001		0	NR	NR	NR	NR	0
Financial Assurance	0.001		3	NR	NR	NR	NR	3
MN HWS Permit	1.000		0	0	0	0	NR	0
MANIFEST	0.250		0	0	NR	NR	NR	0
MDA LIS	0.250		0	0	NR	NR	NR	0
MN LS	0.500		0	0	1	NR	NR	1
TIER 2	0.001		0	NR	NR	NR	NR	0
WIMN	0.500		7	0	2	NR	NR	9
NPDES	TP		NR	NR	NR	NR	NR	0
FUELS PROGRAM	0.250		0	0	NR	NR	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
ECHO	0.001		5	NR	NR	NR	NR	5
EDR HIGH RISK HISTORICAL RECORDS								
EDR Exclusive Records								
EDR MGP	1.000		0	0	0	0	NR	0
EDR Hist Auto	0.125		3	NR	NR	NR	NR	3
EDR Hist Cleaner	0.125		0	NR	NR	NR	NR	0
EDR RECOVERED GOVERNMENT ARCHIVES								
Exclusive Recovered Govt. Archives								
RGA HWS	0.001		0	NR	NR	NR	NR	0
RGA LF	0.001		1	NR	NR	NR	NR	1
RGA LUST	0.001		1	NR	NR	NR	NR	1
- Totals --		0	42	1	7	0	0	50

NOTES:

TP = Target Property

NR = Not Requested at this Search Distance

Sites may be listed in more than one database

SCOTT COUNTY
COMMUNITY SERVICES DIVISION
ENVIRONMENTAL SERVICES
200 FOURTH AVENUE WEST
SHAKOPEE, MN 55379-1220
(952) 496-8475 Fax: (952) 496-8496
Website: www.co.scott.mn.us

August 15, 2016

Craig Jenson
Program Delivery
Scott County Public Works
600 Country Trl E
Jordan MN 55352

Dear Mr. Jenson:

This letter regards your request for information on environmental concerns within ½ mile of the County Road 14 and U. S. Highway 169 project in Louisville Township as outlined in the map provided to us by Greg Wagner of our Planning Dept. The concerns we know about are as follows:

1. There is only one hazardous waste generator licensed by Scott County in this area (see enclosed). There may be additional generators of hazardous waste in this area, but they are not licensed by the County at this time.

2. For information on above-ground and underground storage tanks, call the Minnesota Pollution Control Agency (MPCA) at 651-296-6300.

3. Hazardous material or petroleum spills:

   A. We were involved in the investigation and cleanup of a large fire in 2005 (Flood Brothers) located at 15870 Johnson Memorial Dr. in Louisville Township. Items found in the remains of the fire included automobile tires and parts, used oil containers, gasoline and fuel tanks, plus other solid waste and containers whose contents were unknown. The MPCA site ID# is 17318, and the Voluntary Investigation & Cleanup (VIC) ID# is VP21340.

   B. We received "no action" letters from the MPCA regarding petroleum tank releases for the following businesses:

      1. Anchor Block and Johnson Block/RW Concrete at 13450 Johnson Memorial Dr. in Louisville Twp.:
         - Johnson Block/RW Concrete closure letter dated July 29, 1992. The MPCA Leak site ID# is 4755.
         - Anchor Block closure letter dated June 20, 1996. The MPCA Leak site ID# is 8096.

      2. Minnesota Valley Landscape at 14505 Johnson Memorial Dr. in Louisville Twp. (closure letter dated May 6, 1999). MPCA Leak site ID# is 11241.

   Please contact the MPCA at 651-296-6300 for more information on tanks/releases in this area.

4. Hazardous material storage: Call the Shakopee Fire Chief at 952-233-9300, or the Minnesota Emergency Response Commission at 651-297-7372.

5. Hazardous waste disposal sites: No licensed hazardous waste disposal facility has ever operated in this area.

6. Solid waste landfills and dumps:

   A. Anchor Block and Concrete at 13450 Johnson Memorial Dr. in Louisville Twp. had a dump consisting of solid waste and a minor amount of hazardous waste in the early 1990s. The County required that some of the waste be removed, but we allowed most of the remaining waste (primarily concrete) to be covered with soil.

   B. Hollander Auto Salvage operated at 13901 Johnson Memorial Dr. in Louisville Twp. until the mid-1980s. We were involved in the cleanup of the surface material/waste at the site between 1999 and 2002, but it is likely some waste still remains buried there.

   C. We investigated several solid waste dumps at Minnesota Valley Landscaping, 14505 Johnson Memorial Dr. in Louisville Twp. This includes a dump that we investigated around 1990 that contained vehicles, garbage, etc. We required some waste to be removed from the site, and the remaining waste to be covered with soil. In 1993, we also observed solid waste being burned on the site.

   D. This Department licenses a tree and brush compost site at 14800 Johnson Memorial Dr.

   We are not aware of any groundwater contamination that resulted from the dumps noted above.

7. Soil or groundwater contamination: I have enclosed a map from the Minnesota Geological Survey delineating the areas in Scott County most susceptible to bedrock aquifer contamination. As you can see, this property lies in one of the zones that is most susceptible to contamination.

The information provided herein is based on Department records and staff recall since 1978. There is very little information on file regarding problems of this nature prior to 1978. The Louisville Township clerk, Cheryl Doucette (952-445-8715 or town_clerk@hotmail.com), may be able to provide you with more information.

Please contact me at 952-496-8352 or pschmitt@co.scott.mn.us if you have any questions.

Sincerely,

Peter M. Schmitt
Scott County Environmental Services

Enclosures

SCOTT COUNTY LICENSED HAZARDOUS WASTE GENERATORS AND WASTES FOR ENVIRONMENTAL SITE ASSESSMENT

The list of generators below are in order by generator name. Township, Range and Sectional information is located immediately above each generator name - the site address is below the name. Waste amounts are either actual amounts reportedly generated for calendar year 2015, or estimated annual amounts if the generator was first licensed in 2016. The list no longer contains generators that are "Minimal Generators" because they are not required to submit an annual report (except Minimal Generators will list in their first registration year).

115N 23W 21 **Parcel #** 79210050

ANCHOR BLOCK COMPANY

13450 JOHNSON MEMORIAL DR

H2	0	Pounds	LEAD ACID BATTERIES
H3	0	Units	FLUORESCENT LAMPS
H4	0	Gallons	USED ANTIFREEZE
H5	0	Pounds	MISC Waste
H6	110	Gallons	BURNISHED BLOCK SEALER/LIQUID
N1	0	Gallons	PARTS WASHER
N2	100	Pounds	SPRAY BOOTH FILTERS
O1	0	Gallons	USED OIL
O2	0	Gallons	USED OIL FILTERS

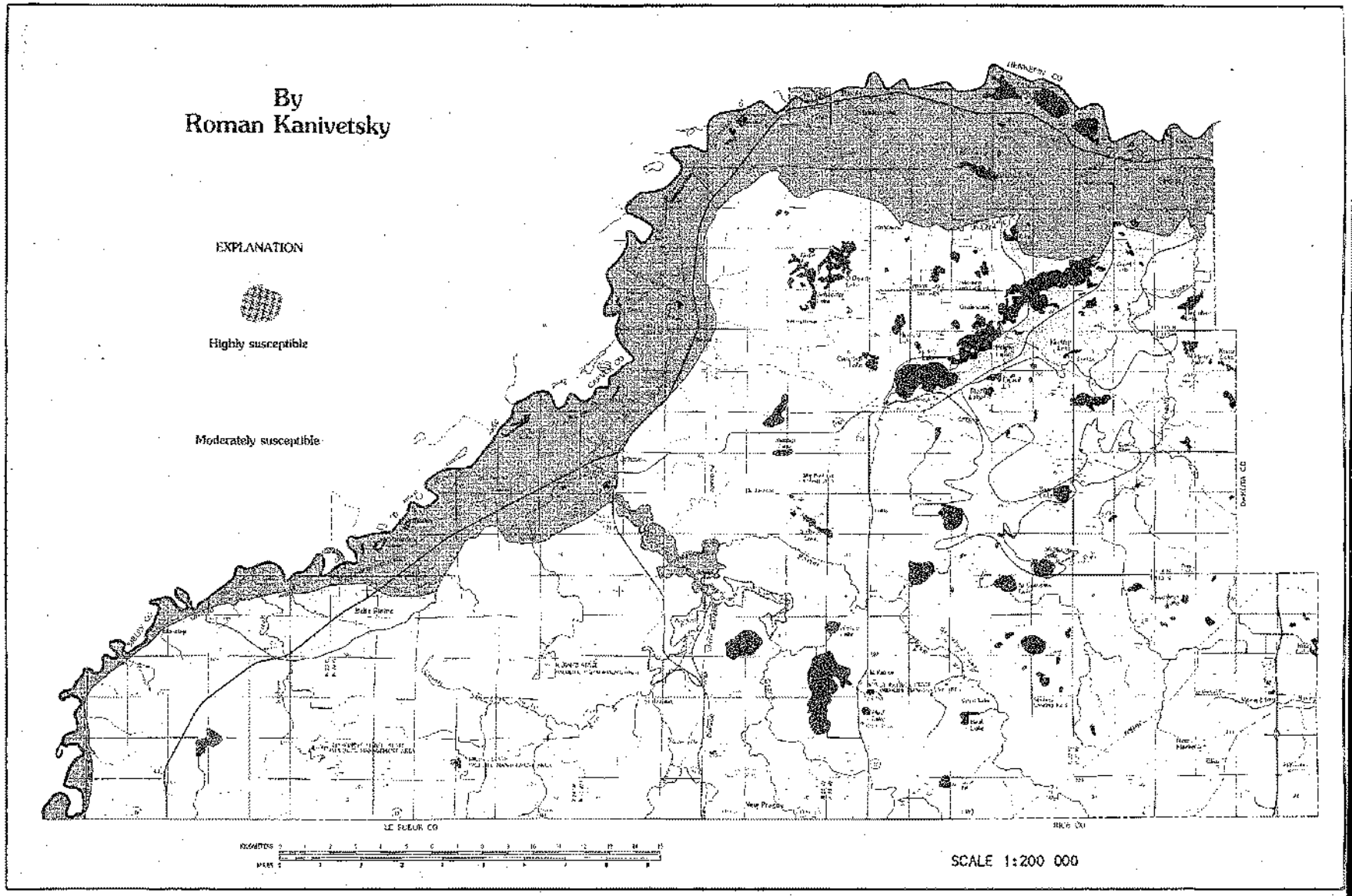


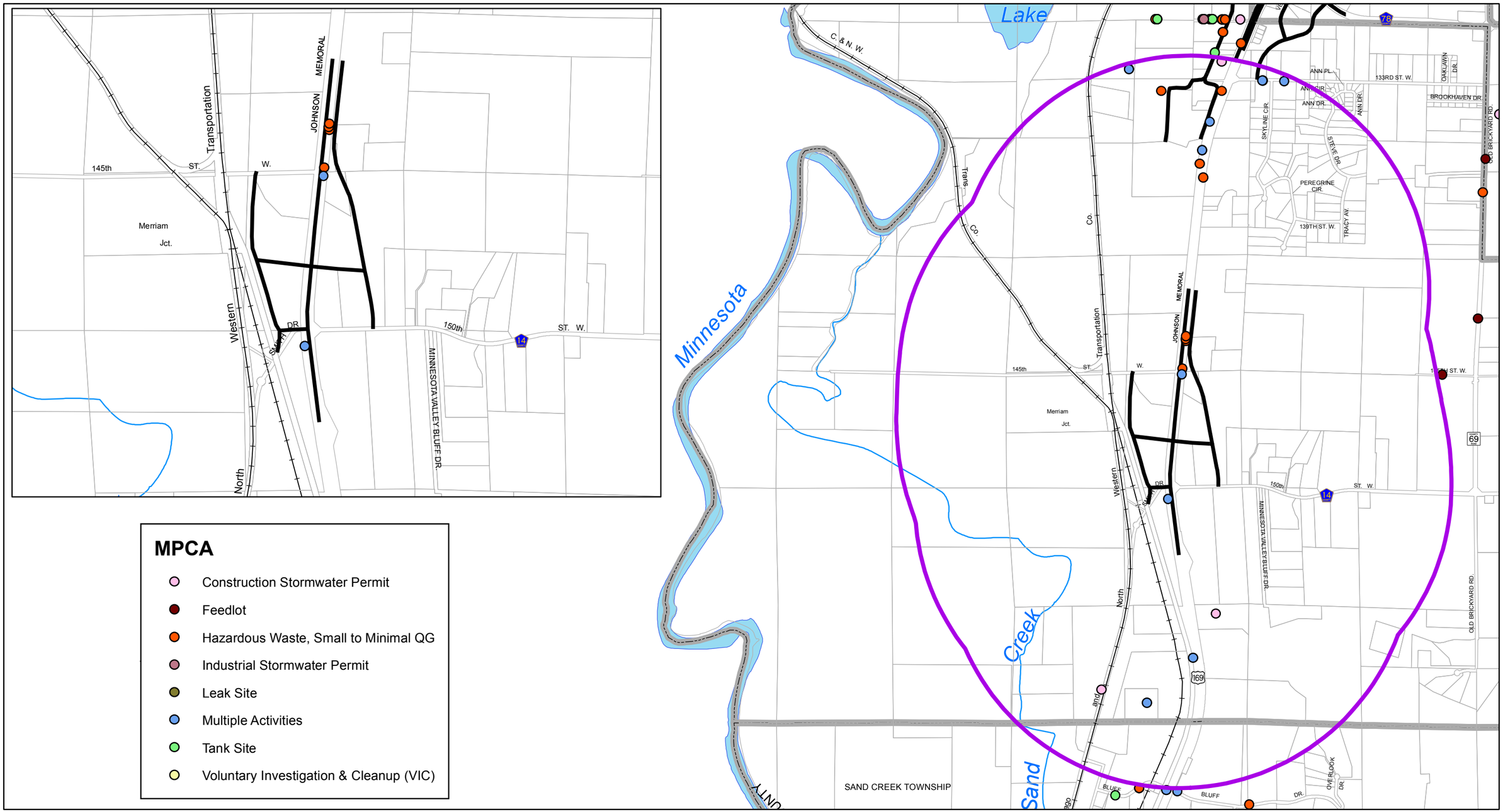
FIGURE 3—SUSCEPTIBILITY OF BEDROCK AQUIFERS TO CONTAMINATION

In Scott County the ability of surface contaminants to enter the bedrock formations that can serve as sources of water supply depends mainly on the permeability and thickness of the overlying unconsolidated materials and the depth to the water table. Outwash and ice-contact deposits of sand and gravel are highly permeable because water moves readily through spaces between grains and pebbles. Silt and clay particles fill the spaces between coarser grains in glacial till, and till is therefore relatively compact and impermeable.

The areas most susceptible to contamination are along the Minnesota River and the lower part of Sand Creek, where the water table is near the land surface and the unconsolidated materials are both thin and highly permeable.

The area in Helena, Prior Lake, and Spring Lake Townships is moderately susceptible because the overlying unconsolidated materials are fairly permeable, although the water table there is generally about 70 to 100 feet below the surface.

The bedrock of the rest of the county has a thick cover of glacial till which has a low permeability. For most practical purposes, these bedrock aquifers are not considered susceptible to short-term contamination.



Scott County Community Services
Environmental Services
200 Fourth Avenue West
Shakopee, MN 55379

US 169/CSAH 14 Interchange

N

8-11-16

FIGURE 12: MPCA SITES

Source: MN Pollution Control Agency

1 Mile Project Area

Hwy 169, CSAH 14 Alignment

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Figure 13 Anchor Block Concrete Dump Site – Approximate Location

13450 Johnson Memorial Highway

Figure 14 Hollander Auto Salvage Dump Site – Approximate Location

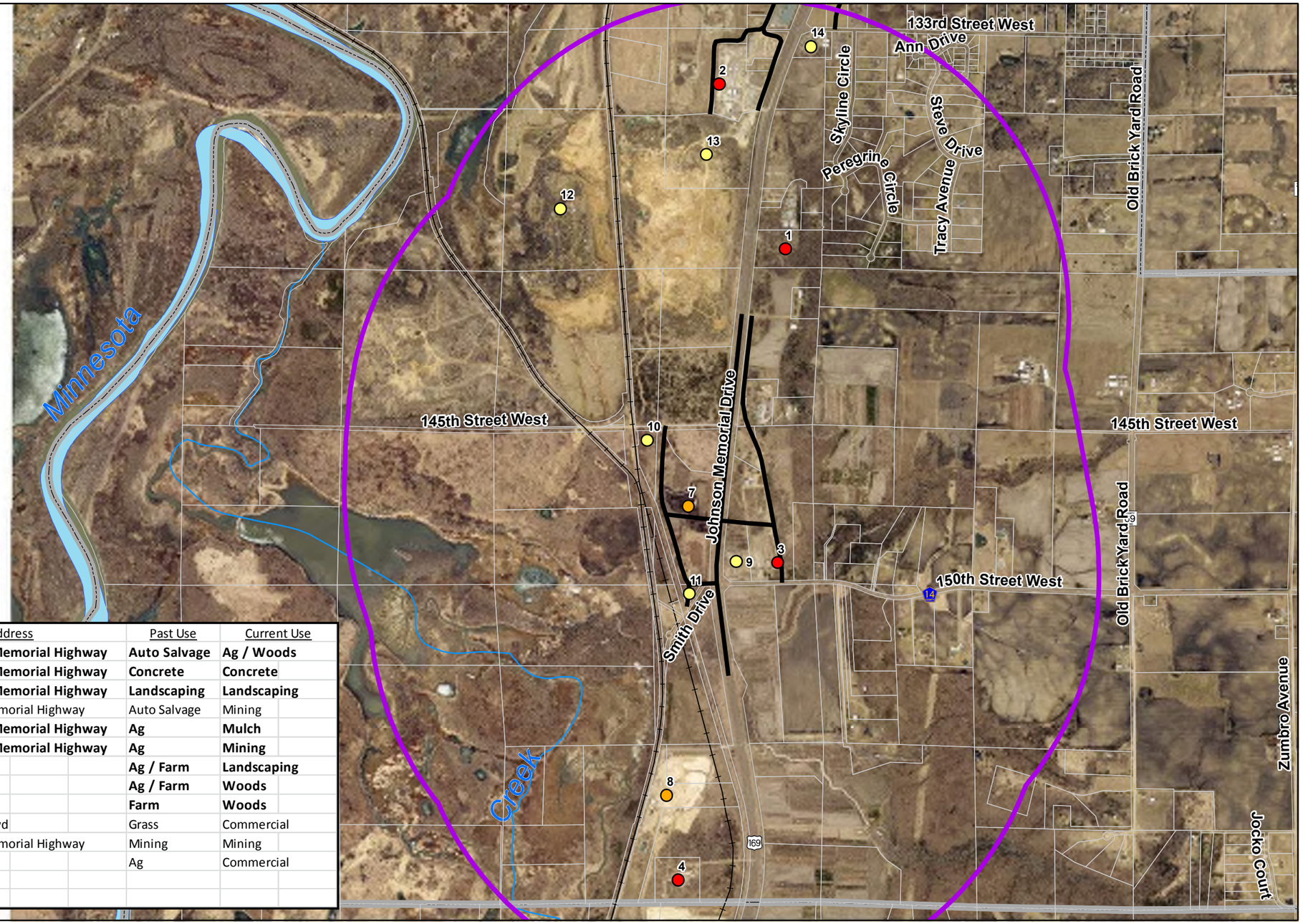
13901 Johnson Memorial Highway

1980's Aerial Photo

Figure 15 Minnesota Valley Wholesale Dump Site – Approximate Location

14505 Johnson Memorial Highway

1990's Aerial Photo



REC Sites

Ranking

- High
- Medium
- Low

Number	Ranking	Site	Address	Past Use	Current Use
1	**High**	**Hollander Auto Salvage**	**13901 Johnson Memorial Highway**	**Auto Salvage**	**Ag / Woods**
2	**High**	**Anchor Block and Conrete**	**13450 Johnson Memorial Highway**	**Concrete**	**Concrete**
3	**High**	**MN Valley Landscaping**	**14505 Johnson Memorial Highway**	**Landscaping**	**Landscaping**
4	High	Flood Brothers Auto	15870 Johnson Memorial Highway	Auto Salvage	Mining
7	**Medium**	**S.E.T. (aka The Mulch Store)**	**14800 Johnson Memorial Highway**	**Ag**	**Mulch**
8	**Medium**	**Shakopee Sand LLC**	**15566 Johnson Memorial Highway**	**Ag**	**Mining**
9	**Low**	**Ag Spill**	**3232 150th St W**	**Ag / Farm**	**Landscaping**
10	**Low**	**Abandoned Solid Waste**	**3525 145st W**	**Ag / Farm**	**Woods**
11	**Low**	**Abandoned Solid Waste**	**15030 Smith Dr**	**Farm**	**Woods**
12	Low	Mid America Festivals	12364 Chestnut Blvd	Grass	Commercial
13	Low	Bryan Rock Products	13580 Johnson Memorial Highway	Mining	Mining
14	Low	Lano Equipment	3021 133rd St W	Ag	Commercial

The bold locations are 100' or closer to the project area.

Scott County Community Services
Environmental Services
200 Fourth Avenue West
Shakopee, MN 55379

US 169/CSAH 14 Interchange

N

8-11-16

FIGURE 16: Potential Recognized Environmental Concern (REC) Locations

Source: MPCA, EDR, Scott County

1 Mile Project Area

Hwy 169, CSAH 14 Alignment

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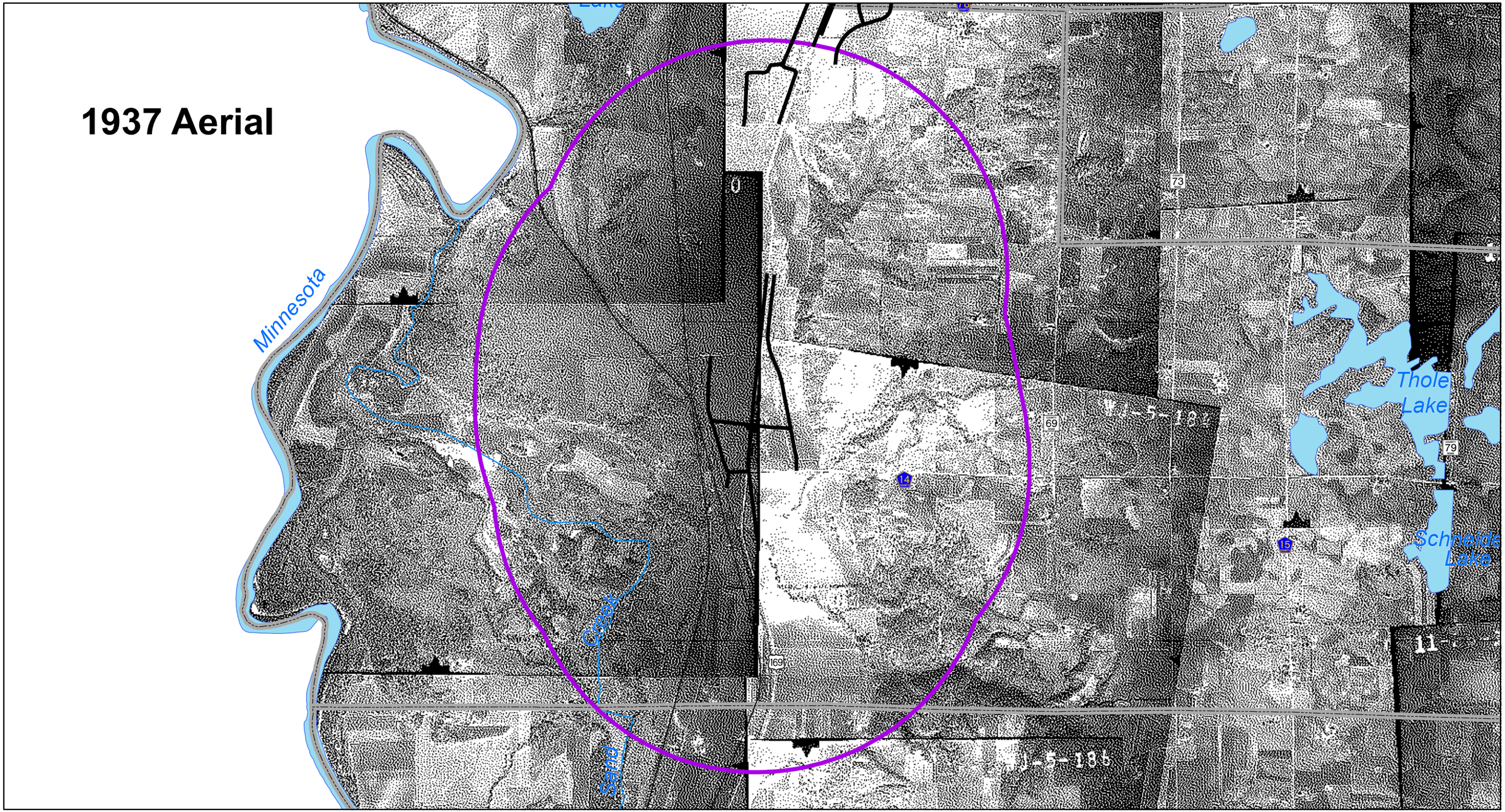
1937 Aerial



Scott County Community Services
Environmental Services
200 Fourth Avenue West
Shakopee, MN 55379

US 169/CSAH 14 Interchange

N

8-11-16

AERIAL PHOTO

Hwy 169, CSAH 14 Alignment

1 Mile Project Area

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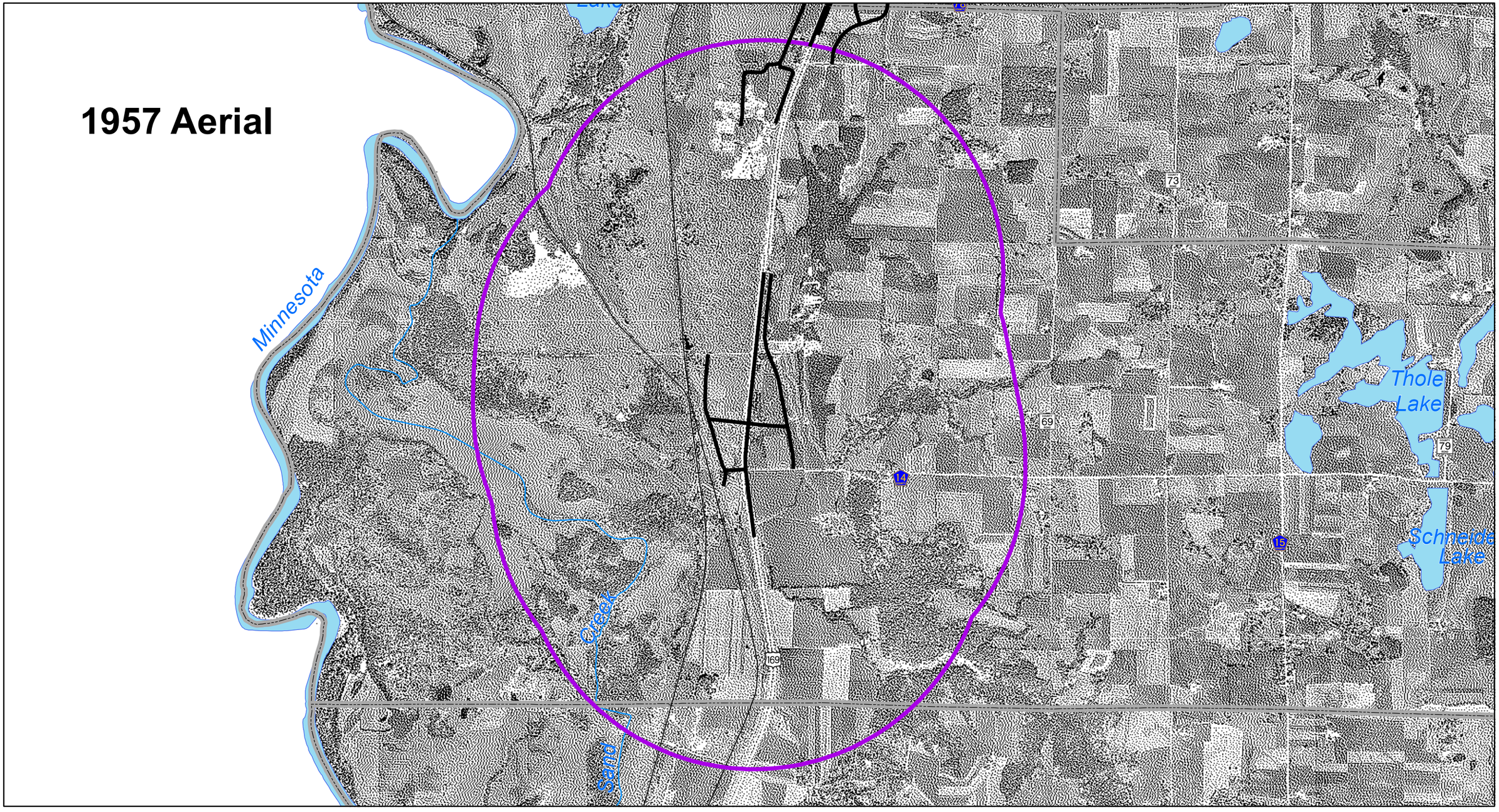

Scott County Community Services
Environmental Services
200 Fourth Avenue West
Shakopee, MN 55379

US 169/CSAH 14 Interchange

N

8-11-16

AERIAL PHOTO

Hwy 169, CSAH 14 Alignment

1 Mile Project Area

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Scott County Community Services
Environmental Services
200 Fourth Avenue West
Shakopee, MN 55379

US 169/CSAH 14 Interchange

N

8-11-16

AERIAL PHOTO

Hwy 169, CSAH 14 Alignment
1 Mile Project Area

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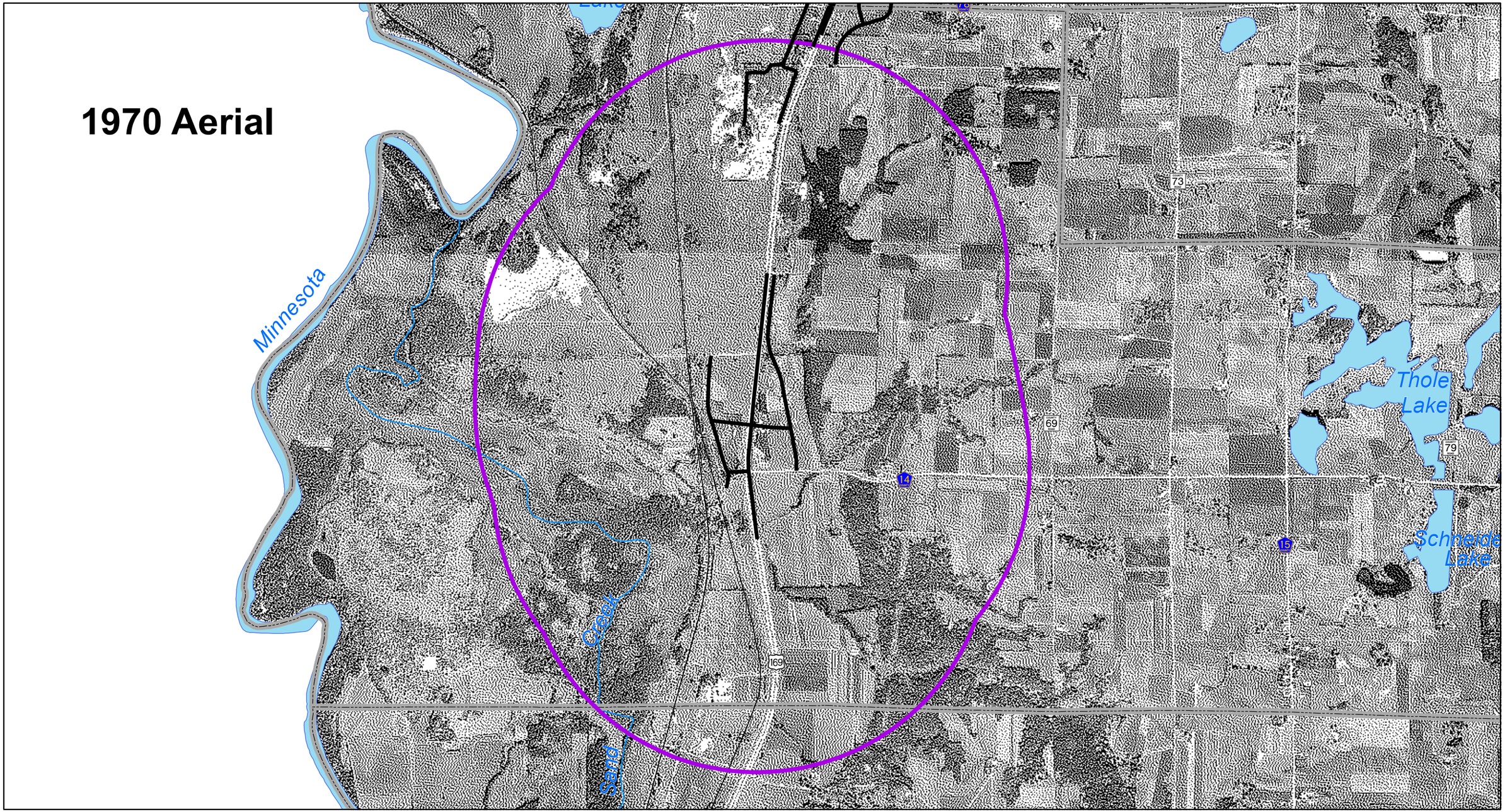

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Shakopee, MN 55379

US 169/CSAH 14 Interchange

N

8-11-16

AERIAL PHOTO

Hwy 169, CSAH 14 Alignment

1 Mile Project Area

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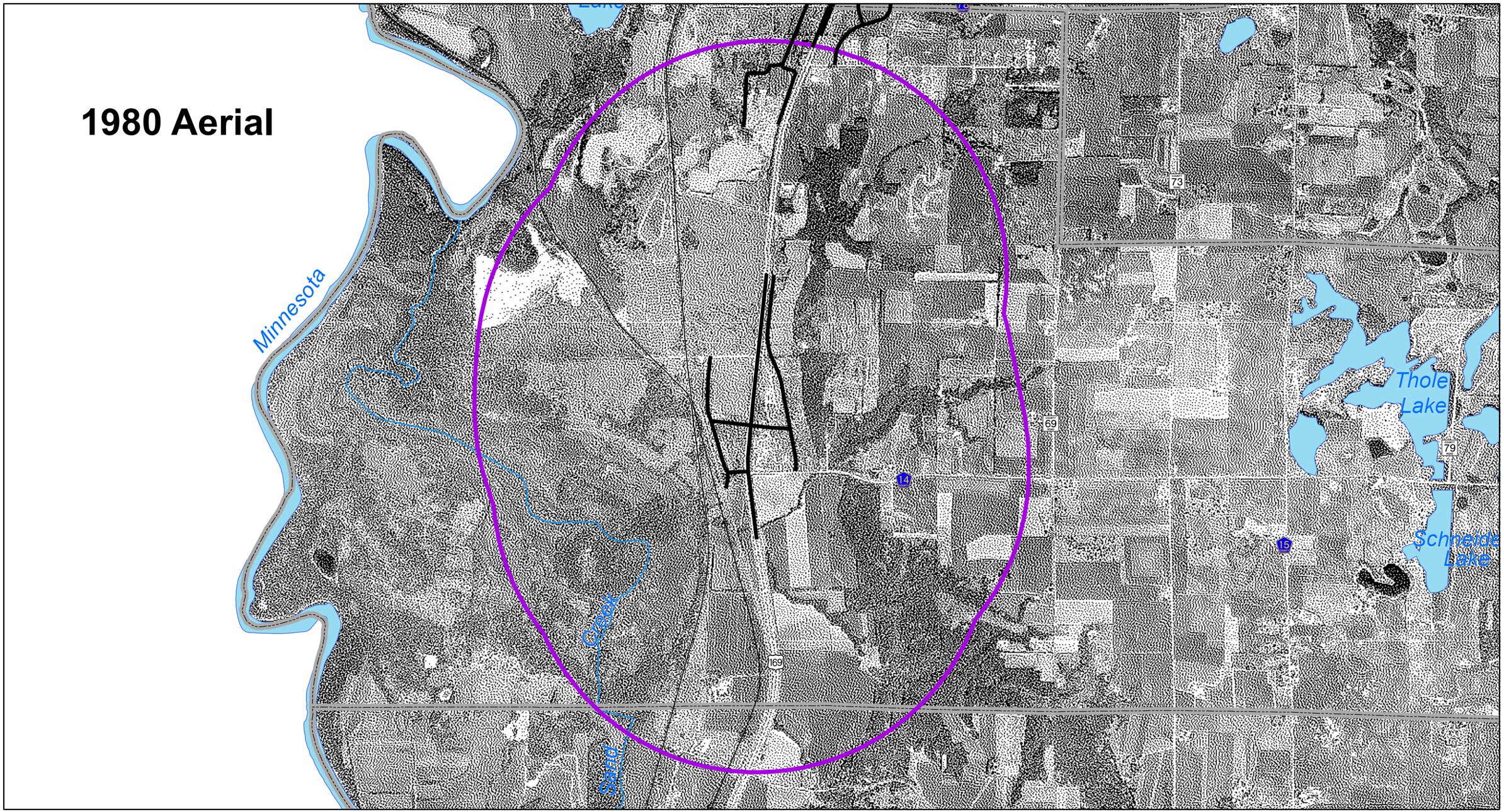

Scott County Community Services
Environmental Services
200 Fourth Avenue West
Shakopee, MN 55379

US 169/CSAH 14 Interchange

N

8-11-16

AERIAL PHOTO

Hwy 169, CSAH 14 Alignment

1 Mile Project Area

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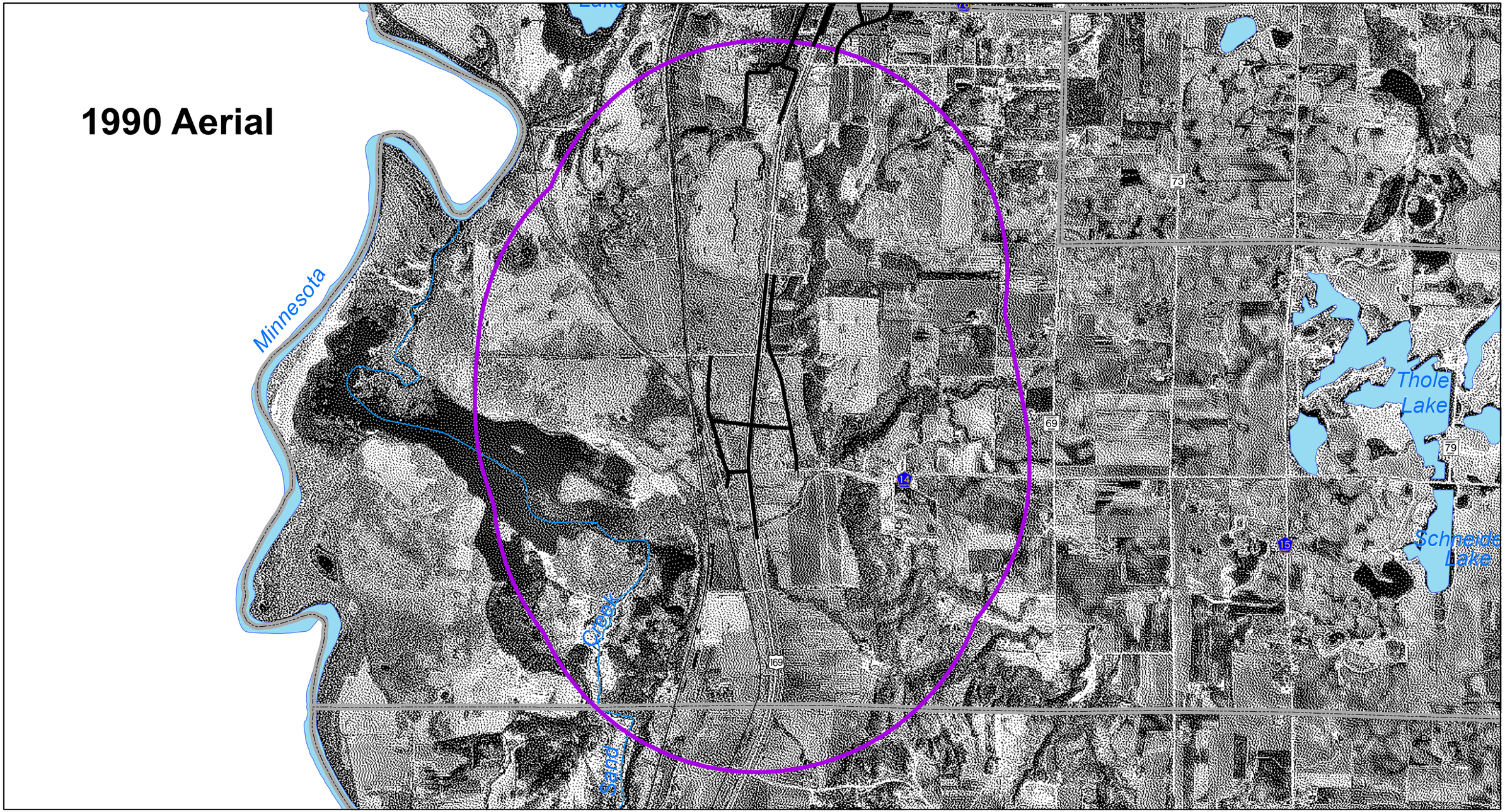

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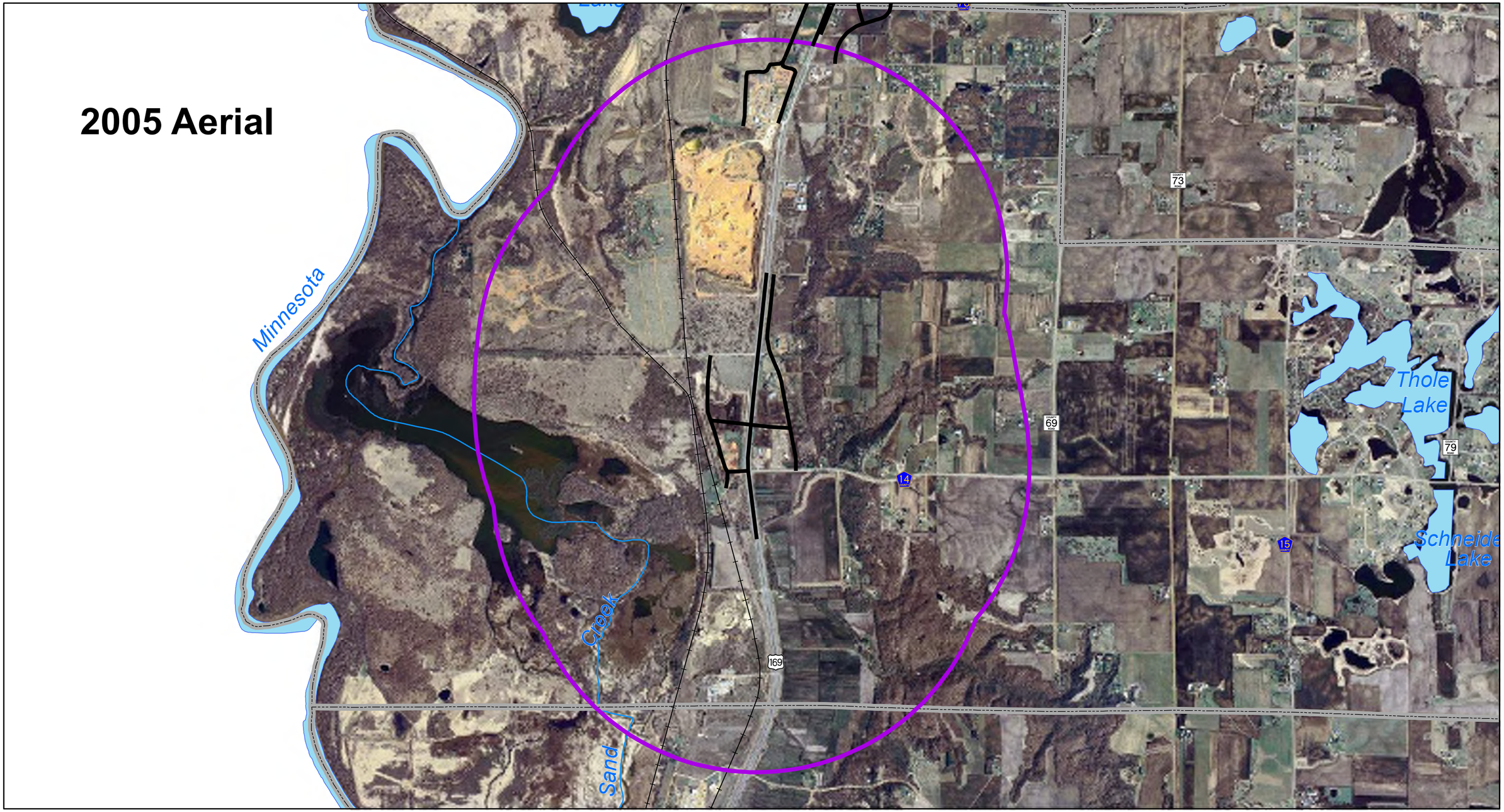

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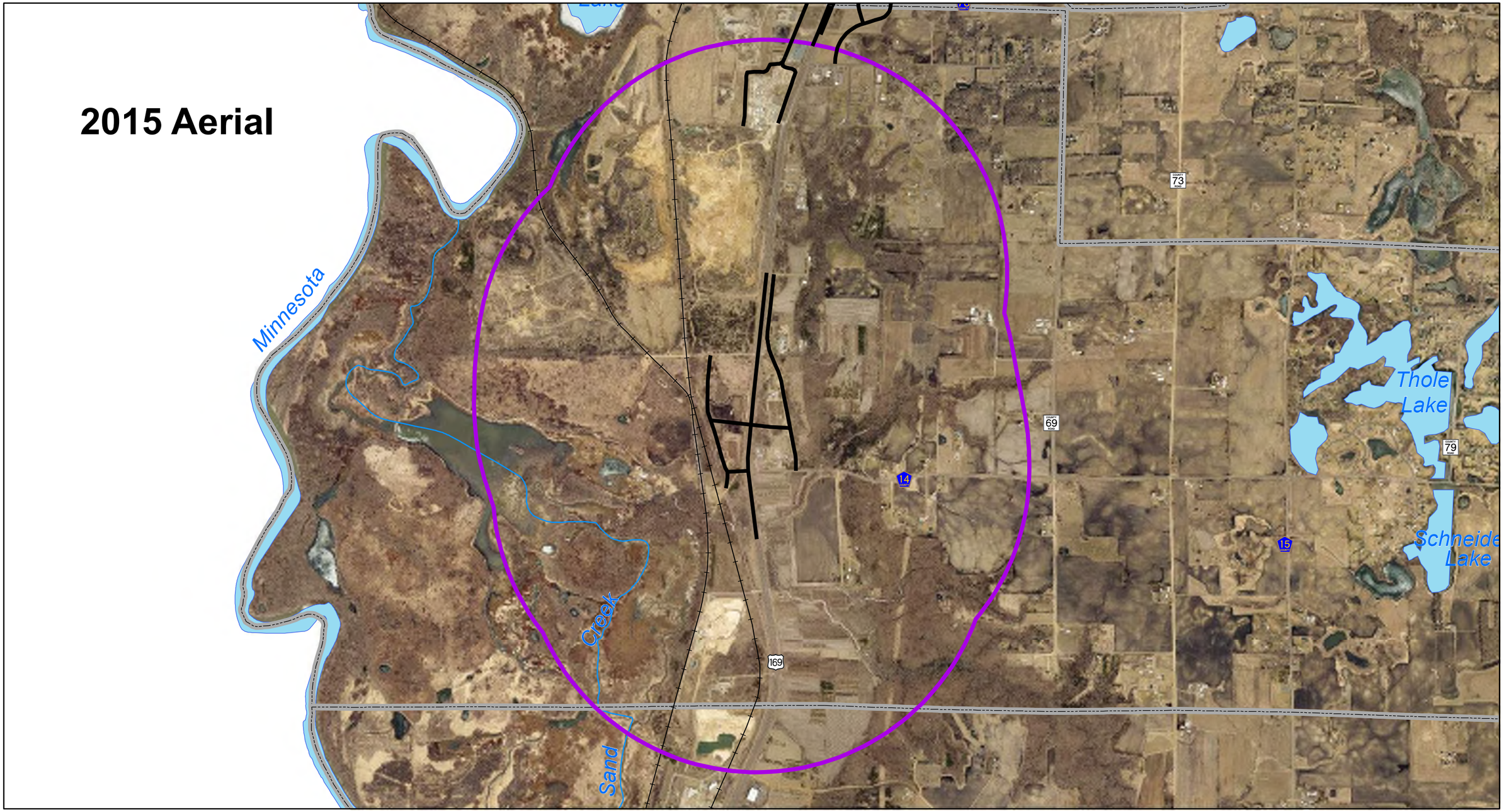

Scott County Community Services
Environmental Services
200 Fourth Avenue West
Shakopee, MN 55379

US 169/CSAH 14 Interchange

N

8-11-16

AERIAL PHOTO

Hwy 169, CSAH 14 Alignment

1 Mile Project Area

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14801 Johnson Memorial Drive	**8/5/16**
Property identification:**79280050**	
1. Methodology for walk over: **Observation from roadway via vehicle**	
2. Limitations: **Limited to public roads**	
3. General setting/neighboring properties: **MN River Valley-Louisville Township**	
North: **Property Line and for sale property**	
East: **Out buildings / storage sheds**	
South: **Green house, landscape business and tree growing range**	
West: **Immediately adjacent to U.S. Hwy 169**	
4. Current uses subject property: **Residential Home**	
5. Current uses neighboring property: **Agricultural/ Forestry**	
6. Current uses surrounding area: **Tree farm**	
7. Past uses subject property: **Unknown, Built 1956**	
8. Past uses neighboring property: **Unknown**	
9. Past uses surrounding area: **Unknown**	
10. Geologic, hydrogeologic, hydrologic and topographic conditions: **Soils TcA, Bedrock Ce**	
No hydric soils, No wetlands, High groundwater susceptibility	
11. Structures and improvements on subject property: **House and out buildings**	
12. Roads: **Gravel driveway on property**	
13 Water supply: **Well on property per city view to south 600 feet**	
14 Sewage disposal system: **1950? No records in City View**	
15 Storage tanks: **unknown**	
16 Chemical storage: **non found**	
17 Drums/containers: **non found**	
18 Solid waste disposal: **Old home site**	
19 Pools of liquid: **none found**	
20 Ponds, pits, lagoons: **none found**	
21 Odors: **no**	
22 PCB electrical/hydraulic: **none found**	
23 Heating/ cooling: **unknown**	
24 Drains/sumps: **non found**	
25 Leaks, stains, corrosion: **no**	
26 Stressed vegetation: **no**	
27 Waste water/cooling water: **non found**	
28 Wells: **well on property per city view to south 710 feet and 627 feet to SE**	

3525 145th St W	8/5/16
Property identification:**79280110**	
1. Methodology for walk over: **Observation from roadway via vehicle**	
2. Limitations: **Limited to public roads**	
3. General setting/neighboring properties: **MN River Valley-Louisville Township**	
North: **Rock Quarry and Natural Environment to North**	
East: **Monitoring well to East**	
South: **Railroad and Mulch site to South**	
West: **Railroad and USFWS Refuge to West**	
4. Current uses subject property: **Abandoned property**	
5. Current uses neighboring property: **Agricultural and Industrial**	
6. Current uses surrounding area: **Railroad, Mulch store**	
7. Past uses subject property: **residential**	
8. Past uses neighboring property: **field**	
9. Past uses surrounding area: **Quarry**	
10. Geologic, hydrogeologic, hydrologic and topographic conditions: **Soils TcA and SC Bedrock Ce**	
No hydric soils, No wetlands, High groundwater susceptibility	
11. Structures and improvements on subject property: **Old Building**	
12. Roads: **Gravel Road on property and adjacent township gravel roads with RR access road to**	
13 Water supply: **Well on property per city view**	
14 Sewage disposal system: **SSTS gravity trench 1994 per city view**	
15 Storage tanks: **unknown**	
16 Chemical storage: **non found**	
17 Drums/containers: **non found**	
18 Solid waste disposal: **Old wood, building, demo**	
19 Pools of liquid: **none found**	
20 Ponds, pits, lagoons: **none found**	
21 Odors: **no**	
22 PCB electrical/hydraulic: **none found**	
23 Heating/ cooling: **unknown**	
24 Drains/sumps: **non found**	
25 Leaks, stains, corrosion: **no**	
26 Stressed vegetation: **no**	
27 Waste water/cooling water: **non found**	
28 Wells: **well on property per city view**	

15030 Smith Drive	**8/5/16**
Property identification:**79330051**	
1. Methodology for walk over: **Observation from roadway via vehicle**	
2. Limitations: **Limited to public roads**	
3. General setting/neighboring properties: **MN River Valley-Louisville Township**	
North: **Mulch Store site to North**	
East: **U.S. Hwy 169 and undeveloped overgrown trees to East**	
South: **undeveloped overgrown trees to South**	
West: **Railroad tracks and adjacent property with house to West**	
4. Current uses subject property: **Dump/waste storage**	
5. Current uses neighboring property: **Home / Railroad/**	
6. Current uses surrounding area: **Agricultural**	
7. Past uses subject property: **Unknown**	
8. Past uses neighboring property: **Unknown**	
9. Past uses surrounding area: **Unknown**	
10. Geologic, hydrogeologic, hydrologic and topographic conditions: **Soils HdB and Sc, Bedrock Cj**	
No hydric soils, No wetlands on NWI, High groundwater susceptibility	
11. Structures and improvements on subject property: **Old Buildings**	
12. Roads: **Gravel driveway on property**	
13 Water supply: **No known wells on property**	
14 Sewage disposal system: **none on record**	
15 Storage tanks: **unknown**	
16 Chemical storage: **non found**	
17 Drums/containers: **Yes, burn barrel**	
18 Solid waste disposal: **Yes, Misc. solid waste and demo**	
19 Pools of liquid: **none found**	
20 Ponds, pits, lagoons: **none found**	
21 Odors: **no**	
22 PCB electrical/hydraulic: **none found**	
23 Heating/ cooling: **unknown**	
24 Drains/sumps: **non found**	
25 Leaks, stains, corrosion: **no**	
26 Stressed vegetation: **no**	
27 Waste water/cooling water: **non found**	
28 Wells: **No known wells on property, wells to North and West**	

Appendix D - Reconnaissance Photographs

A). Abandoned Waste, Household trash. NW corner of intersection at 145th ST W and US 169

B). Merriam Junction monitoring well, Looking South from 145th St

C) Access Road on Property across from 3525 145th ST W looking N

C) Property located at 3525 145th ST W looking SE

C) Abandoned Waste, Demolition Debris in ditch at 3525 145th St W looking S

C) Abandoned Building with Septic Located at 3525 145th St W looking S

D) Abandoned Waste, 55 Gallon drum W/O top, suspected Burn Barrel at 15030 Smith Dr.

D) Abandoned Waste, Misc. Furniture items, Couches, etc. located at 15030 Smith Dr.

D) Abandoned Waste, Blue Tarp located at 15030 Smith Dr.

D) Abandoned Waste, Additional Misc. Furniture, etc. located at 15030 Smith Dr.

D) Abandoned Waste, Industrial Workbench located at 15030 Smith Dr.

D) Abandoned Waste, Old Building, boards, blocks, and pallets located at 15030 Smith Dr.

E) Property located at 14801 US Hwy 169 N Birds Eye view. Owned by MN Valley Landscape. Currently a rental home.

Attachment N – DNR and MnDOT OES Correspondence

Adam Smith

From: Dalton, Richard (DOT) <richard.dalton@state.mn.us>
Sent: Monday, March 06, 2017 9:30 AM
To: Adam Smith; Leete, Peter (DOT)
Subject: FW: 7005-121 (TH 169/ TH41 / CSAH 78) - FOCUSED, Updated ENM (Early Notification Memo) for review and response by 2/14/2017
Attachments: DNR GP2004-0001copy.pdf; DNRbasemap(Oct 2016).pdf

Thanks Peter.

Adam – for your use in the Cat Ex document.

From: Leete, Peter (DOT)
Sent: Monday, March 06, 2017 9:20 AM
To: Dalton, Richard (DOT) <richard.dalton@state.mn.us>
Subject: RE: 7005-121 (TH 169/ TH41 / CSAH 78) - FOCUSED, Updated ENM (Early Notification Memo) for review and response by 2/14/2017

Rick,
I think my previous comments are still valid. I do not have any particular requirements for proposed work on 'Picha Creek' at this time. Though my generic paragraph when a permit is known to be required is:

The unnamed creek (locally known as Picha Creek) is a Public Waters, as such a DNR Public Waters Work Permit will be required. Authorization for the project under the DNR General Permit (GP2004-0001) will require final review at a later date. Please enter the project into the DNR online permitting system (MPARS) when there is enough information to do so: www.dnr.state.mn.us/mpars. A copy of GP2004-0001 is attached, please review all the conditions of this permit and integrate their requirements into project design. Please contact me if you have questions on any of its requirements. Specific items to incorporate into design and construction are:

a. As the project moves forward, design of the crossing should meet the conditions listed in GP 2004-0001: http://files.dnr.state.mn.us/waters/watermgmt_section/pwpermits/General_Permit_2004-0001.pdf. Additional information, including options on how to meet the conditions of the GP are presented in the collection of ' Best Practices for Meeting GP 2004-0001', at http://www.dnr.state.mn.us/waters/watermgmt_section/pwpermits/gp_2004_0001_manual.html

b. We typically limit work in the water (Work Exclusion dates) to allow for undisturbed fish migration and spawning. These dates are (March15 through June 15). While we may revise these dates for a particular project, there may still be limitations on the types of work during this time.

   Please be aware that the MPCA NPDES general permit for authorization to discharge stormwater associated with construction activities (permit MN R10001) recognizes the DNR "work in water restrictions" during specified fish migration and spawning time frames 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 soil disturbing activity has ceased (and be completed within 24 hours).

c. Construction and demolition methods shall be submitted for review and approval at a later date. See the GP2004-0001 condition 'TEMPORARY IMPACTS DURING CONSTRUCTION' and items 'A' though 'L' for

subjected conditions. This is normal procedure for bridge or culvert projects as we recognize that construction methods are not finalized until a contractor is chosen. Construction contractors shall be made aware of this condition as they may be held responsible for compliance.

a. Revegetation of disturbed soils should include native mixes in areas that are not proposed for mowed turf grass. Please utilize the native recommendations developed by BWSR (http://www.bwsr.state.mn.us/native_vegetation/) or MnDOT' in the 'Vegetation Establishment Recommendations' – dated November 13, 2015 (http://www.dot.state.mn.us/environment/erosion/seedmixes.html). In addition, for meeting DNR concerns, revegetation may include woody vegetation (trees and shrubs) in addition to grasses and/or forbs. Please contact your Districts representatives for the Erosion Control & Stormwater Management Unit, Roadside Vegetation Management Unit, and the Districts Maintenance staff to help determine appropriate permanent revegetation plans. Additionally, any use of Category 3 or 4 erosion control blanket shall be limited to 'bio-netting' or 'naturalnetting' types (category 3N or 4N), and specifically not allow plastic mesh netting.

Contact me if you have questions

Peter Leete
Transportation Hydrologist (DNR-MnDOT Liaison)
DNR Ecological & Water Resources
Ph: 651-366-3634

From: Dalton, Richard (DOT)
Sent: Friday, March 03, 2017 1:19 PM
To: Leete, Peter (DOT) <peter.leete@state.mn.us>
Cc: Adam Smith <ASmith@wsbeng.com>
Subject: FW: 7005-121 (TH 169/ TH41 / CSAH 78) - FOCUSED, Updated ENM (Early Notification Memo) for review and response by 2/14/2017

Hi Peter – I am reviewing the draft Cat Ex. I see you did not respond to the 4th ENM I sent you on this project (sorry about so many changes), which will replace culverts under the Union Pacific Railroad Spur. The culverts carry Picha Creek, which a PWI watercourse. I assume there will be DNR requirements regarding the culvert replacement?

Do you want to send an update to the DNR ENM Response?

The ENM for this project is at eDOCs 1614317. Within MnDOT, view eDOCs 1614317 here. Your previous responses are contain in eDOCs 1614317.

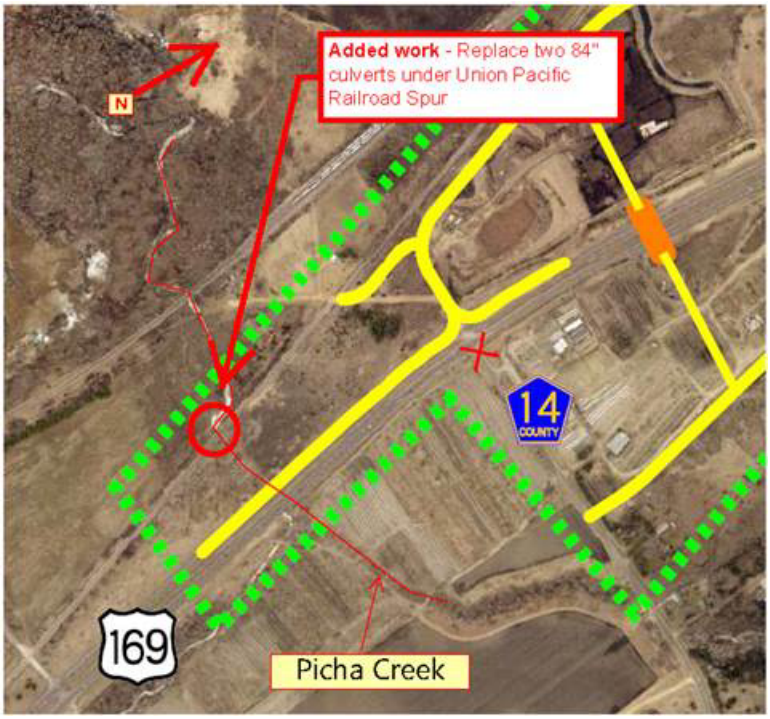
From: Dalton, Richard (DOT)
Sent: Monday, January 30, 2017 8:52 AM
To: Johnson, Craig (DOT) <craig.johnson@state.mn.us>; Smith, Christopher E (DOT) <Christopher.E.Smith@state.mn.us>; Leete, Peter (DOT) <peter.leete@state.mn.us>; Boock, Alyssa (DOT) <Alyssa.Boock@state.mn.us>; Kramer, Marian (DOT) <Marian.Kramer@state.mn.us>; Jarman, Sarah (DOT) <Sarah.Jarman@state.mn.us>; Markeson, Christina (DOT) <Tina.Markeson@state.mn.us>; Aguirre, Matthew (DOT) <matt.aguirre@state.mn.us>; Heinz, Katherine (DOT) <katherine.heinz@state.mn.us>; Shekur, Hailu (DOT) <hailu.shekur@state.mn.us>; Ginsberg, Abbi (FHWA) <Abbi.Ginsberg@dot.gov>; Moynihan, Debra (DOT) <Debra.Moynihan@state.mn.us>
Cc: Natalie Ries (nataliemries@gmail.com) <nataliemries@gmail.com>; Turner Bargen, Mackenzie M (DOT) <mackenzie.turnerbargen@state.mn.us>; Langenbach, Diane (DOT) <diane.langenbach@state.mn.us>; Bergem,

Phillip (DOT) <phillip.bergem@state.mn.us>; Jenson, Craig (CJenson@co.scott.mn.us) <CJenson@co.scott.mn.us>; Adam Smith <ASmith@wsbeng.com>; Jack Corkle <JCorkle@wsbeng.com>
Subject: 7005-121 (TH 169/ TH41 / CSAH 78) - FOCUSED, Updated ENM (Early Notification Memo) for review and response by 2/14/2017

Hi – we need to propose adding more work to this project; this is the TH 169/TH 41 project south of Shakopee. I am using this e-mail to tell you about what is proposed, rather than the ENM memo format.

The added work will replace two 84" culverts under the Union Pacific Railroad Spur, at a point roughly 1000 feet south of the TH 169/CSAH 14 intersection, near the south end of this project. These culverts are under-sized and causing flooding along this section of TH 169.

You can view a close-up of this area in Google maps at https://goo.gl/maps/2nrFwD8MPKs ; then zoom out to get your bearings.
The figure below illustrates the location of the two culverts; this figure was clipped from the south end of Figure 1 in the previous ENM. You can also view the area in Georilla here.



Construction will likely use federal funds. It has not been decided whether the funds will be a) given to the railroad so the railroad can replace the culverts, or b) used by the TH 169 project's construction contractor will replace the culverts.

The ENM for this project is at eDOCs 1614317. Within MnDOT, view eDOCs 1614317 here. I will add the e-mail above to the front of eDOCs 1614317.

I would appreciate you updating your responses to this revised ENM by 2/14/2017. If you do *not* feel you need to update your ENM response, I would appreciate that too. Please call me if you have any questions.

Rick Dalton
651-234-7677

Andy Hingeveld

From: Leete, Peter (DOT) <peter.leete@state.mn.us>
Sent: Tuesday, November 29, 2016 2:22 PM
To: Dalton, Richard (DOT)
Subject: RE: 7005-121 (TH 169/ TH41 / CSAH 78) - Updated ENM (Early Notification Memo) for review and response by 12/19/2016
Attachments: FW_ DNR Comments on MnDOT Early Notification Memo, TH169 Intersection Reconstruction at TH41 (SP7005-121) Scott Co.pdf

Rick,
It looks like my previous review included both ends of the new project area along TH169. As for the spur south of TH41 (CSAH 78), it was not in the previous review, but I also see nothing of DNR concerns not already mentioned (PWI & NHIS checked). No additional review needed.

Contact me if you have questions

Peter Leete
Transportation Hydrologist (DNR-MnDOT Liaison)
DNR Ecological & Water Resources
Ph: 651-366-3634

From: Dalton, Richard (DOT)
Sent: Monday, November 28, 2016 12:53 PM
To: Johnson, Craig (DOT) <craig.johnson@state.mn.us>; Smith, Christopher E (DOT) <Christopher.E.Smith@state.mn.us>; Ginsberg, Abbi (FHWA) <Abbi.Ginsberg@dot.gov>
Cc: Moynihan, Debra (DOT) <Debra.Moynihan@state.mn.us>; Leete, Peter (DOT) <peter.leete@state.mn.us>; Boock, Alyssa (DOT) <Alyssa.Boock@state.mn.us>; Jarman, Sarah (DOT) <Sarah.Jarman@state.mn.us>; Markeson, Christina (DOT) <Tina.Markeson@state.mn.us>; Turner Bargen, Mackenzie M (DOT) <mackenzie.turnerbargen@state.mn.us>; Natalie Ries (nataliemries@gmail.com) <nataliemries@gmail.com>; Aguirre, Matthew (DOT) <matt.aguirre@state.mn.us>; Heinz, Katherine (DOT) <katherine.heinz@state.mn.us>; Shekur, Hailu (DOT) <hailu.shekur@state.mn.us>; Langenbach, Diane (DOT) <diane.langenbach@state.mn.us>; Bergem, Phillip (DOT) <phillip.bergem@state.mn.us>; Jenson, Craig (CJenson@co.scott.mn.us) <CJenson@co.scott.mn.us>; Adam Smith <ASmith@wsbeng.com>; Jack Corkle <JCorkle@wsbeng.com>
Subject: RE: 7005-121 (TH 169/ TH41 / CSAH 78) - Updated ENM (Early Notification Memo) for review and response by 12/19/2016

Hi – The project limits have been shortened on the north end of this project. The segment of TH 169 from the Mobil Manor Manufactured Home Community to CSAH 69 will be constructed as part of a cooperative agreement project in 2017. This segment includes both the frontage road and trail.

Attached is a slightly revised ENM dated today (November 28th) with new project limits. Figure 1 in the attached has a new map illustrating the paragraph above.

I will replace the November 21st ENM with the November 28th ENM in a new version of eDOCs 1614317, which contains previous ENM Updates and your responses to those ENMs. Within MnDOT, view eDOCs 1614317 here.

Rick Dalton
651-234-7677

From: Dalton, Richard (DOT)
Sent: Monday, November 21, 2016 2:16 PM
To: Johnson, Craig (DOT) <craig.johnson@state.mn.us>; Smith, Christopher E (DOT) <Christopher.E.Smith@state.mn.us>; Ginsberg, Abbi (FHWA) <Abbi.Ginsberg@dot.gov>
Cc: Moynihan, Debra (DOT) <Debra.Moynihan@state.mn.us>; Leete, Peter (DOT) <peter.leete@state.mn.us>; Boock, Alyssa (DOT) <Alyssa.Boock@state.mn.us>; Jarman, Sarah (DOT) <Sarah.Jarman@state.mn.us>; Markeson, Christina (DOT) <Tina.Markeson@state.mn.us>; Turner Bargen, Mackenzie M (DOT) <mackenzie.turnerbargen@state.mn.us>; Natalie Ries (nataliemries@gmail.com) <nataliemries@gmail.com>; Aguirre, Matthew (DOT) <matt.aguirre@state.mn.us>; Heinz, Katherine (DOT) <katherine.heinz@state.mn.us>; Shekur, Hailu (DOT) <hailu.shekur@state.mn.us>; Langenbach, Diane (DOT) <diane.langenbach@state.mn.us>; Bergem, Phillip (DOT) <phillip.bergem@state.mn.us>; Jenson, Craig (CJenson@co.scott.mn.us) <CJenson@co.scott.mn.us>; Adam Smith <ASmith@wsbeng.com>; Jack Corkle <JCorkle@wsbeng.com>
Subject: 7005-121 (TH 169/ TH41 / CSAH 78) - Updated ENM (Early Notification Memo) for review and response by 12/19/2016

Hi – This project is along TH 169 near TH 41, southwest of Shakopee. You have reviewed this project previously.

Scott County is expanding the project's limits eastward on CSAH 78 to CSAH 69 (an addition of approximately 0.5 miles). This addition is to address a sight distance problem along this section of CSAH 78. This addition is shown in Figure 1 of the attached ENM, and in the figure below (clipped from Figure 1). The addition is within the bright blue dotted line.

A copy of this updated November 2016 ENM, along with the previous ENMs and your responses to earlier ENMs can be found in eDOCs 1614317; within MnDOT, click here to open a copy of this document.

Craig and Chris –

- your previous Section 106 and Section 7 letters included copies of the previous Figure 1, so they at least need to be updated with the revised Figure 1 in the attached Updated ENM.
- You will also need to re-review the project for this expansion.
- Chris, there are trees in the extension area that may need to be removed, so the tree impacts may increase from 0.90 acres to something closer to 1 acre; WSB is still looking into this.
- Please send updated Section 106 and Section 7 letters by 12/19/2016.

Abbi – this update is mostly an FYI, but if you have concerns, please contact me.

Deb, Peter Leete, Alyssa Boock (filling in for Sarah Jarman), and others – For you , this should be an FYI as well.

- Alyssa, Scott County is doing the Phase 1, so their Phase 1 will need to expand to include the extension area.
- Natalie, Katie, and Hailu – the county is doing the traffic noise study, wetland delineation and hydraulic analysis, so the expanded project area should be included in those studies.

Feel free to call me if you have questions.

Rick Dalton
651-234-7677

The Minnesota Department of Transportation invites you to take our two-minute survey to help us improve our services. MnDOT Internal Customer Survey
Thank you for telling us about your experience.

From:	Adam Smith
To:	Leete, Peter (DOT)
Subject:	FW: DNR Comments on MnDOT Early Notification Memo, TH169 Intersection Reconstruction at TH41 (SP7005-121) Scott Co
Date:	Wednesday, November 09, 2016 9:10:35 AM
Attachments:	MNDOT_DOCS-#1614317-v3-ENM_7005-121_(TH_169__TH41___CSAH_78_interchange).PDF DNRbasemap(Oct 2016).pdf

Adam Smith
Transportation Planner
d: 763-762-2820 | c: 612-499-8097
WSB & Associates, Inc. | 701 Xenia Avenue South, Suite 300 | Minneapolis, MN 55416

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From: Leete, Peter (DOT) [mailto:peter.leete@state.mn.us]
Sent: Thursday, October 06, 2016 12:23 PM
To: Dalton, Richard (DOT)
Cc: Hintzman, Rachel (DNR); Straumanis, Sarma (DOT); Smith, Christopher E (DOT); Orne, Benjamin G MVP; Joyal, Lisa (DNR); Horton, Becky (DNR); Ellison, Daryl G (DNR); Skancke, Jennie (DNR); Regenscheid, Diana H (DNR); Hoaglund, Erica (DNR)
Subject: DNR Comments on MnDOT Early Notification Memo, TH169 Intersection Reconstruction at TH41 (SP7005-121) Scott Co

Rick,
This email is the DNR response for your project records. I have not sent this Early Notification Memo (ENM) out for full DNR review. The following comments are based on information provided in the submitted documents regarding a proposed separated grade interchange TH 169-TH 41-CSAH 78, along with new frontage roads and overpass at CSAH 14. Please incorporate the following comments into final designs and special provisions as they are developed:

1. For MnDOT planning purposes, attached to this email is a map of the project area (DNRbasemap.pdf) showing nearby locations of DNR areas concern (if they exist), such as Public Waters (in blue), waterbodies designated as infested with aquatic invasive species (AIS), snowmobile Trails (in pink), and various green shaded polygons for Sites of Biodiversity Significance. This map may be shared or included in project documentation, as all information is from publically available data layers. The Natural Heritage Information System (NHIS) database has been reviewed, though in order to prevent the inadvertent release of a rare features location, those details are not shown on the map. Comments on potential impacts to rare features listed in the NHIS comments are below. If you have questions regarding proposed work near any of the data shown, please give me a call.

2. At the western end of the project area, there is an Unnamed Watercourse that flows into Sand Creek within the Minnesota Valley National Wildlife Refuge. This is a DNR Public Waters. For location info, see the attached map. The Early Notification Memo does not state whether there will be work at this location or not. Should plans include in-water work, including stormwater discharge to this watercourse, please contact me as further review for permit requirement will be required. Please be aware that this stream flows into the MPCA NPDES general permit for authorization to discharge stormwater associated with construction activities (permit MN R10001) recognizes the DNR "work in water restrictions" during specified fish migration and spawning time frames 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 soil disturbing activity has ceased (and be completed within 24 hours). The restriction dates for streams in this area are March 15 through June 15.

3. The Minnesota Natural Heritage Information System (NHIS) has been queried to determine if any rare plant or animal species, native plant communities, or other significant natural features are known to occur within an approximate one-mile radius of the project area. There were over seventy (70) rare features identified in this query. In order to prevent the inadvertent release of the location of specific listed or rare species contained in the NHIS, I have not identified the species or their location on the attached 'DNRbasemap.pdf'. If these details are needed for documentation, please contact me. Please note that the following rare features were identified in the query and *may* be impacted by the proposed project. Suggested avoidance and/or protection measures are also identified:

   A. The vast majority of rare features identified in the NHIS search reside within the Minnesota River and surrounding floodplain and bluffs. The entire river valley is also considered a regionally significant ecological corridor. To complement this resource, recommendations for this project are:
      a. Revegetation of disturbed soils should include native mixes in areas that are not proposed for mowed turf grass. Please utilize the native recommendations developed by BWSR (http://www.bwsr.state.mn.us/native_vegetation/) or MnDOT' in the 'Vegetation Establishment Recommendations' – dated November 13, 2015 (http://www.dot.state.mn.us/environment/erosion/seedmixes.html). In addition, for meeting DNR concerns, revegetation may include native woody vegetation (trees and shrubs) in addition to grasses and/or forbs. Please contact your Districts representatives for the Erosion Control & Stormwater Management Unit, Roadside Vegetation Management Unit, and the Districts Maintenance staff to help determine appropriate permanent revegetation plans.
      b. Additionally, the use of erosion control blanket should be limited to 'bio-netting' or 'naturalnetting' types (category 3N or 4N), and specifically not allow plastic mesh netting.

   B. The northern long-eared bat (*Myotis septentrionalis*), federally listed as threatened and state-listed as special concern, can be found throughout Minnesota. During the winter this species hibernates in caves and mines, and during the active season (approximately April-October) it roosts underneath bark, in cavities, or in crevices of both live and dead trees. Pup rearing is during June and July. Activities that may impact this species include, but are not limited to, any disturbance to hibernacula and destruction/degradation of habitat

(including tree removal).

The U.S. Fish and Wildlife Service (USFWS) has published a final 4(d) rule that identifies prohibited take. To determine whether you need to contact the USFWS, please refer to the USFWS Key to the Northern Long-Eared Bat 4(d) Rule (see links below). Please note that the NHIS does show known bat concentrations along nearby Gifford Lake. Though at the time of the most recent survey (2002), there were no occurrences of northern long-eared bat roosts or hibernacula within the area.

Links: USFWS Key to the Northern Long-Eared Bat 4(d) Rule for Non-Federal Activities
http://www.fws.gov/midwest/endangered/mammals/nleb/KeyFinal4dNLEB.html
USFWS Key to the Northern Long-Eared Bat 4(d) Rule for Federal Actions

http://www.fws.gov/midwest/endangered/mammals/nleb/KeyFinal4dNLEBFedProjects.html
USFWS Northern Long-eared Bat Website
http://www.fws.gov/midwest/endangered/mammals/nleb/index.html
USFWS Northern Long-eared Bat Fact Sheet
http://www.fws.gov/midwest/endangered/mammals/nleb/nlebFactSheet.html

The Natural Heritage Information System (NHIS) is not an exhaustive inventory and thus does not represent all of the occurrences of rare features within the state. If information becomes available indicating additional listed species or other rare features, further review may be necessary.

4. The project area is adjacent to the Minnesota River State Recreation Area and Minnesota River State Trail. While the project does not directly impact these recreational resources, MnDOT should be aware of these areas and plan accordingly for access both during and after construction. Please contact the DNR Area Parks and Trails Supervisor as project plans are developed: Rachel Hintzman, at rachel.l.hintzman@state.mn.us or +1 (651) 259-5875.

5. Please remind contractors that a separate water use permit is required for withdrawal of more than 10,000 gallons of water per day or 1 million gallons per year from surface water or ground water. GP1997-0005 (temporary water appropriations) covers a variety of activities associated with road construction and should be applied of if applicable. An individual appropriations permit may be required for projects lasting longer than one year or exceeding 50 million gallons. Information is located at:
http://www.dnr.state.mn.us/waters/watermgmt_section/appropriations/permits.html

This ENM has not been circulated to DNR field staff for comment. I will let you know if any additional comments on design requirements are returned to me due to this email.

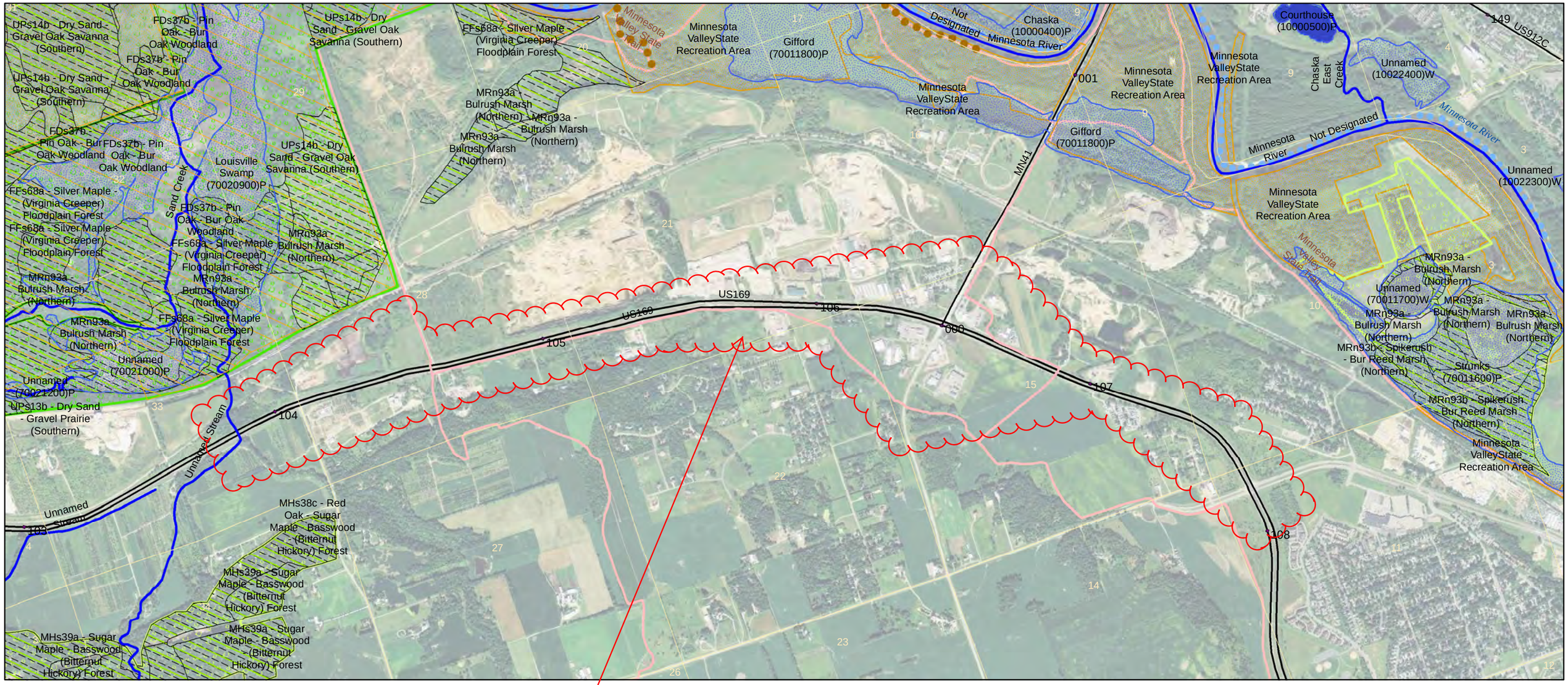
DNR folks, if I've missed anything, or have any suggestions for MnDOT to consider, please respond ASAP to Rick, and myself.

Contact me if you have questions

Peter Leete
Transportation Hydrologist (DNR-MnDOT Liaison)
DNR Ecological & Water Resources
Ph: 651-366-3634

The Minnesota Department of Transportation invites you to take our two-minute survey to help us improve our services. MnDOT Internal Customer Survey

Thank you for telling us about your experience.



0 0.25 0.5 1 Miles

N

Approximate Project Area

TH169 Intersection Reconstruction at TH41 (SP7005-121)

- National Wildlife Refuges
- Public Water Watercourse
- Public Waters Basins
- State-designated trout lakes
- DNR Native Plant Communities (single symbol)
- Site of Biodiversity Significance - Outstanding
- Site of Biodiversity Significance - High
- Site of Biodiversity Significance - Moderate
- Minnesota State Trails
- State Park Recreation Areas
- Minnesota Water Trails
- Local Snowmobile Trails

Peter Leete, Transportation Hydrologist
(MnDNR-MnDOT Liaison)

Date: 10/6/2016

DEPARTMENT OF TRANSPORTATION

March 24, 2017

No Effect Determination – Rusty-patched Bumble Bee (*Bombus affinis*)

Project(s):

State Project #	District	Road	County	Short Description
0205-101	Metro	NA	Anoka	Install traffic control devices.
3111-30	1	65	Aitkin / Itasca	Repaving, culvert repairs, and associated improvements.
0411-17	2	71	Beltrami / Itasca	Roadway surfacing, turn lane construction, and associated improvements.
1008-85 / 010-596-011	Metro	41	Carver	Project reconstructs and expands a portion of TH 41 between TH 212 and CSAH 14. ***A small portion of the project is within a HPA, but action area is unsuitable paved and mowed turf-grass habitat.***
1120-56	2	371	Cass	Urban roadway reconstruction and associated improvements.
8822-193	2	Various	Clearwater / Itasca	The project consists of lining 70 centerline culverts in various locations throughout MnDOT District 2 with a UV Cured-In-Place (CIPP) liner.
1985-149	Metro	494	Dakota	Construct auxiliary lane, entrance improvements, noise barrier construction, bridge widening and repair, mill and overlay, sewer and drainage, lighting upgrades, signage, curb and gutter, and associated activities.
1981-124	Metro	35W	Dakota / Hennepin	Minnesota River bridge replacement and associated activities.
2305-28	6	30	Fillmore / Olmsted	Culvert lining and associated repairs.
2726-74	Metro	47	Hennepin	Roadway surfacing and associated improvements.
6280-390	Metro	35E	Ramsey	Bridge rehab. Bridge #9534.
7005-121	Metro	169	Scott	New intersections, roadway alignments, ditch grading, culvert replacement, wetland impacts, trail construction, and associated improvements (TIED TO 010-596-011)
8282-129	Metro	94	Washington	Truck station parking expansion and associated improvements.
8217-4654D	Metro	36	Washington	Historic lift bridge renovation.
8214-114AK, 8214-169, & 8214-172	Metro	NA	Washington	St. Croix Crossing - Loop Trail Project

In response to your request, the above referenced action has been reviewed for potential effect to federally-listed threatened, endangered, proposed, candidate species and listed critical habitat. As a result of this review, a determination of **No Effect** has been made.

Rationale for Determination: No known occurrences for rusty-patched bumble bee (RPBB) and/or suitable habitat(s) exist within the action area.

- Project within USFWS identified High Potential Area: **No (unless otherwise noted above)**

All other species previously reviewed for Section 7 compliance not re-reviewed here.

Federally-Listed Species/Designated Critical Habitat in the Action Area

Section 7 of Endangered Species Act of 1973, as amended (Act), requires each Federal agency to review any action that it funds, authorizes or carries out to determine whether it may affect threatened, endangered, proposed species, or listed critical habitat. Federal agencies (or their designated representatives) must consult with the U.S. Fish and Wildlife Service (Service) if any such effects may occur as a result of their actions. Consultation with the Service is not necessary if the proposed action will not directly or indirectly affect listed species or critical habitat. If a federal agency finds that an action will have no effect on listed species or critical habitat, it should maintain a written record of that finding that includes the supporting rationale.

All species previously reviewed for Section 7 compliance not re-reviewed here.

Based on the information that you provided and the nature of the activities proposed, MnDOT on behalf of the FHWA, has made a determination of No Effect for the above referenced project. No further action under Section 7 of the Act is required. However, if information becomes available indicating that federally-listed species or designated critical habitat may be affected, please contact this office and consultation with the Service will be initiated if necessary.

Please contact me if there are questions or concerns.

Thank you,

Christopher E Smith Digitally signed by Christopher E Smith
DN: cn=Christopher E Smith
Date: 2017.03.24 13:00:00 -05'00'

Christopher E. Smith, M.Sc., CWB®
Wildlife Ecologist | Office of Environmental Stewardship
Minnesota Department of Transportation
395 John Ireland Blvd., MS 620 | Saint Paul, MN 55155
E-mail: Christopher.E.Smith@state.mn.us | Phone: 651-366-3605

Adam Smith

From: Smith, Christopher E (DOT) <Christopher.E.Smith@state.mn.us>
Sent: Monday, December 19, 2016 12:41 PM
To: Delphey, Phil
Cc: Adam Smith; Dalton, Richard (DOT)
Subject: SP 7005-121, ESA (Section 7) - Notice of Determination - Update
Attachments: 7005-121_ESA(Section_7)-Notice_of_Determination-Update.pdf

Hi Phil-

Here is an updated determination for a project that has had a change in project scope. My determination is that this project may affect northern long-eared bats but will not cause prohibited incidental take.

Adam / Rick-

I am sending this notice in accordance with the framework for informal consultation under the Final 4(d) Rule for northern long-eared bats, which was published in January, 2016. This notice starts a 30 day review period in which the Fish and Wildlife Service may advise us of any additional concerns. If we do not hear from USFWS within 30 days, we will consider our Section 7 review to be complete and you may proceed with this project as proposed.

Please let me know if you have questions or concerns.

Thank you,
Chris

--
Christopher E. Smith, M.Sc., CWB®
Wildlife Ecologist | Office of Environmental Stewardship
Minnesota Department of Transportation
395 John Ireland Blvd., MS 620
Saint Paul, MN 55155

E-mail: Christopher.E.Smith@state.mn.us
Phone: 651-366-3605

The Minnesota Department of Transportation invites you to take our two-minute survey to help us improve our services. MnDOT External Customer Survey
Thank you for telling us about your experience

Minnesota Department of Transportation
395 John Ireland Boulevard
Saint Paul, MN 55155

December 19, 2016

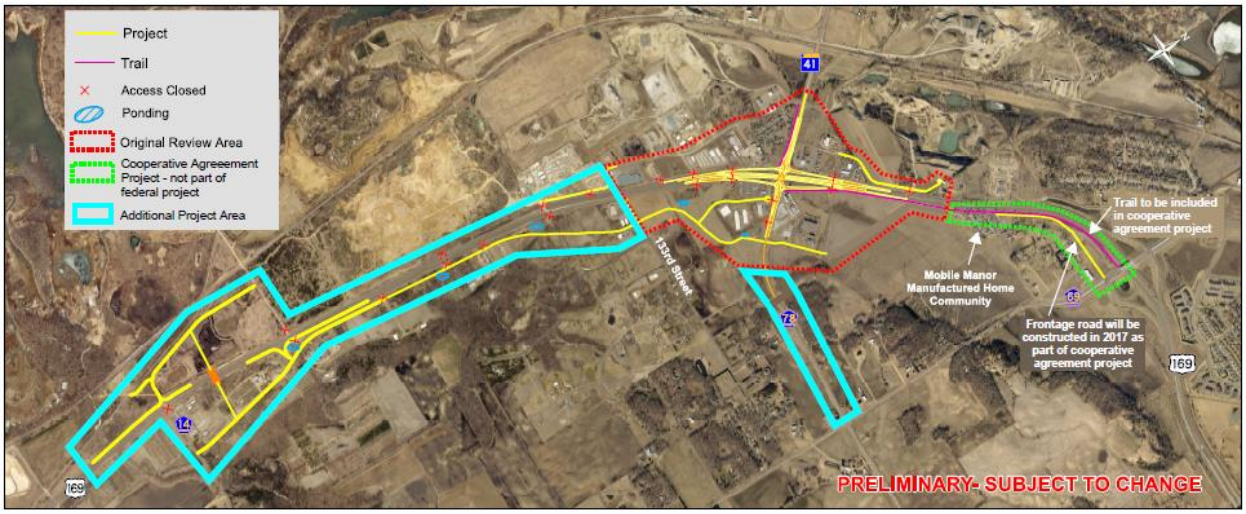
Phil Delphey
Fish and Wildlife Biologist
U.S. Fish and Wildlife Service
Twin Cities ES Field Office
4101 American Blvd East
Bloomington, MN 55425-1665

Notification of Determination – May affect, but will not cause prohibited incidental take – northern long-eared bat (*Myotis septentrionalis*)

S.P. 7005-121, TH 169 / TH 41 / CSAH 78
Scott County, Minnesota

Project Description

The project proposes a new intersection at TH 169 / TH 41 / CSAH 78. The new intersection will include modifications to roadway alignments, ditch grading, roadway widening, culvert replacement, wetland fill or excavation, building demolition, new roadway connections, multiuse trail, and associated activities. Project includes bridge work and up to 8.5 acres of tree removal.



Proposed action area.

Conservation Measures

- Tree removal to avoid bat pupping season – no tree removal June 1 to August 15, inclusive.

Species List for the Project County

According to the official County Distribution of Minnesota Federally-Listed Threatened, Endangered, Proposed, and Candidate Species list (revised in October 2016), maintained by the Service, the project county is within the distribution range of the following:

Revised October 2016

County	Species	Status	Habitat
Scott	Northern long-eared bat *Myotis septentrionalis*	Threatened	Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer.

Information to Determine NLEB 4(d) Rule Compliance:	**YES**	**NO**
1. Does the project occur wholly outside of the WNS Zone?	☐	☒
2. Have you contacted the appropriate agency to determine if your project is near known hibernacula or maternity roost trees?	☒	☐
3. Could the project disturb hibernating NLEBs in a known hibernaculum?	☐	☒
4. Could the project alter the entrance or interior environment of a known hibernaculum?	☐	☒
5. Does the project remove any trees within 0.25 miles of a known hibernaculum at any time of year?	☐	☒
6. Would the project cut or destroy known occupied maternity roost trees, or any other trees within a 150-foot radius from the maternity roost tree from June 1 through July 31.	☐	☒

You are eligible to use this form if you have answered yes to question #1 **or** yes to question #2 **and** no to questions 3, 4, 5 and 6. The remainder of the form will be used by the USFWS to track our assumptions in the Biological Opinion.

Streamlined NLEB Consultation Table - General Project Information	**YES**	**NO**
Does the project occur within 0.25 miles of a known hibernaculum?	☐	☒
Does the project occur within 150 feet of a known maternity roost tree?	☐	☒
Does the project include forest conversion[1]? (if yes, report acreage below)	☒	☐
Estimated total acres of forest conversion (including winter)	8.5	
If known, estimated acres[2] of forest conversion from April 1 to October 31	8.5	
If known, estimated acres of forest conversion from June 1 to July 31[3]	0	
Does the project include timber harvest? (if yes, report acreage below)	☐	☒
Estimated total acres of timber harvest		
If known, estimated acres of timber harvest from April 1 to October 31		
If known, estimated acres of timber harvest from June 1 to July 31		
Does the project include prescribed fire? (if yes, report acreage below)	☐	☒
Estimated total acres of prescribed fire		
If known, estimated acres of prescribed fire from April 1 to October 31		
If known, estimated acres of prescribed fire from June 1 to July 31		
Does the project install new wind turbines? (if yes, report capacity in MW below)	☐	☒
Estimated wind capacity (MW)		

[1] Any activity that temporarily or permanently removes suitable forested habitat, including, but not limited to, tree removal from development, energy production and transmission, mining, agriculture, etc. (see page 48 of the Biological Opinion).
[2] If the project removes less than 10 trees and the acreage is unknown, report the acreage as less than 0.1 acre.
[3] If the activity includes tree clearing in June and July, also include that acreage in April to October.

Notice of Determination

Northern Long-eared Bat— May affect, but will not cause prohibited incidental take.

According to the information provided, this project will include bridge work and tree removal. There are no known locations of NLEB roost trees or hibernacula in the vicinity of this project (MNDNR 2016). By signing this form, MnDOT on behalf of the FHWA, determines that this project may affect the NLEB, but that any resulting incidental take of the NLEB is not prohibited by the final 4(d) rule.

If the USFWS does not respond within 30 days from submittal of this form, MnDOT may presume that its determination is informed by the best available information and that its project responsibilities under 7(a)(2) with respect to the NLEB are fulfilled through the USFWS January 5, 2016, Programmatic Biological Opinion. MnDOT will update this determination annually for multi-year activities.

MnDOT, on behalf of the FHWA, understands that the USFWS presumes that all activities are implemented as described herein. The action agency will promptly report any departures from the described activities to the appropriate USFWS Field Office. MnDOT will provide the appropriate USFWS Field Office with the results of any surveys conducted for the NLEB. **Involved parties will promptly notify the appropriate USFWS Field Office, and MnDOT Office of Environmental Stewardship, upon finding a dead, injured, or sick NLEB.**

Please contact me if there are any questions or concerns.

Christopher E. Smith, M.Sc., CWB®
Wildlife Ecologist | Office of Environmental Stewardship
Minnesota Department of Transportation
395 John Ireland Blvd., MS 620
Saint Paul, MN 55155

E-mail: Christopher.E.Smith@state.mn.us
Phone: 651-366-3605

Adam Smith

From: Smith, Christopher E (DOT) <Christopher.E.Smith@state.mn.us>
Sent: Monday, October 17, 2016 9:27 AM
To: Delphey, Phil
Cc: Adam Smith; Dalton, Richard (DOT); Gombold, Brigid (DOT)
Subject: SP 7005-121 ESA (Section 7) - Notice of Determination
Attachments: 7005-121_ESA(Section_7)-Notice_of_Determination2.pdf

Hi Phil-

Attached is an updated determination for a project with a change in scope. The project may affect northern long-eared bats but will not cause prohibited incidental take.

Adam-

I am sending this notice in accordance with the framework for informal consultation under the Final 4(d) Rule for northern long-eared bats, which was published in January. This notice starts a 30 day review period in which the Fish and Wildlife Service may advise us of any additional concerns. If we do not hear from Andrew within 30 days, we will consider our Section 7 review to be complete and you may proceed with this project as proposed.

Please let me know if you have any questions or concerns.

Thank you,
Chris
--
Christopher E. Smith, M.Sc., CWB®
Wildlife Ecologist | Office of Environmental Stewardship
Minnesota Department of Transportation
395 John Ireland Blvd., MS 620
Saint Paul, MN 55155

E-mail: Christopher.E.Smith@state.mn.us
Phone: 651-366-3605

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Minnesota Department of Transportation
395 John Ireland Boulevard
Saint Paul, MN 55155

October 17, 2016

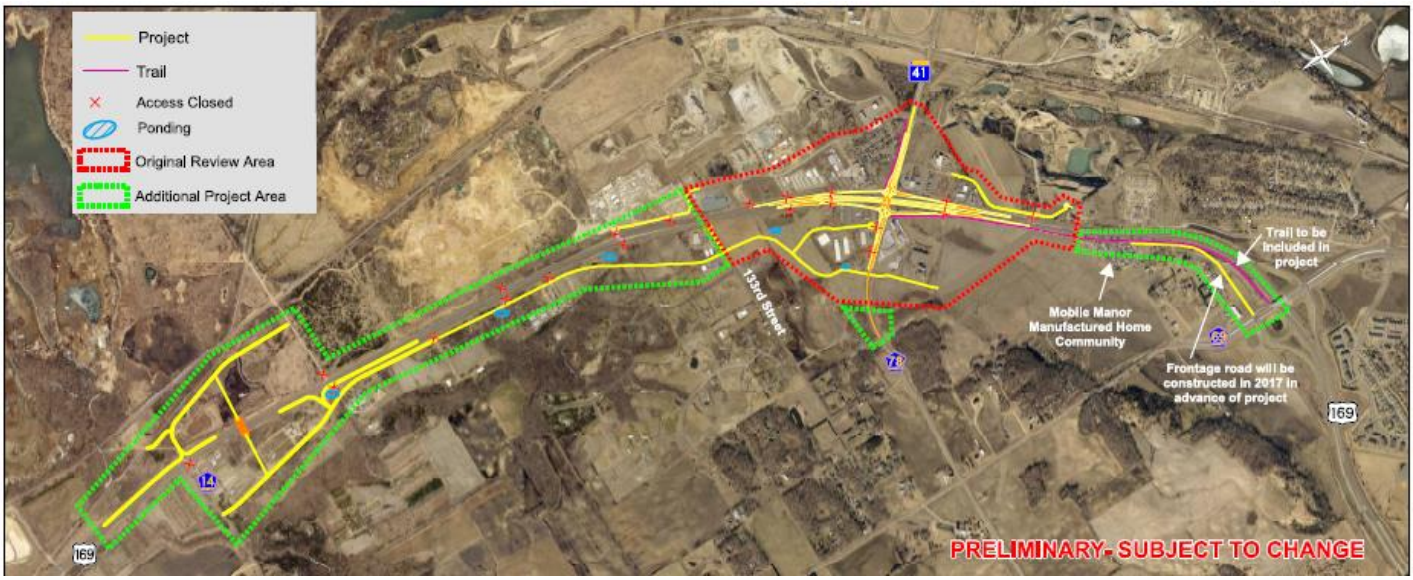
Phil Delphey
Fish and Wildlife Biologist
U.S. Fish and Wildlife Service
Twin Cities ES Field Office
4101 American Blvd East
Bloomington, MN 55425-1665

Notification of Determination – May affect, but will not cause prohibited incidental take – northern long-eared bat (*Myotis septentrionalis*)

S.P. 7005-121, TH 169 / TH 41 / CSAH 78
Scott County, Minnesota

Project Description

The project proposes a new intersection at TH 169 / TH 41 / CSAH 78. The new intersection will include modifications to roadway alignments, ditch grading, roadway widening, culvert replacement, wetland fill or excavation, building demolition, new roadway connections, multiuse trail, and associated activities. Project includes bridge work and up to 0.90 acres of tree removal.



Proposed action area.

Conservation Measures

- Tree removal to avoid bat pupping season – no tree removal June 1 to August 15, inclusive.

Species List for the Project County

According to the official County Distribution of Minnesota Federally-Listed Threatened, Endangered, Proposed, and Candidate Species list (revised in October 2016), maintained by the Service, the project county is within the distribution range of the following:

Revised October 2016

County	Species	Status	Habitat
Scott	Northern long-eared bat *Myotis septentrionalis*	Threatened	Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer.

Information to Determine NLEB 4(d) Rule Compliance:	**YES**	**NO**
1. Does the project occur wholly outside of the WNS Zone?	☐	☒
2. Have you contacted the appropriate agency to determine if your project is near known hibernacula or maternity roost trees?	☒	☐
3. Could the project disturb hibernating NLEBs in a known hibernaculum?	☐	☒
4. Could the project alter the entrance or interior environment of a known hibernaculum?	☐	☒
5. Does the project remove any trees within 0.25 miles of a known hibernaculum at any time of year?	☐	☒
6. Would the project cut or destroy known occupied maternity roost trees, or any other trees within a 150-foot radius from the maternity roost tree from June 1 through July 31.	☐	☒

You are eligible to use this form if you have answered yes to question #1 **or** yes to question #2 **and** no to questions 3, 4, 5 and 6. The remainder of the form will be used by the USFWS to track our assumptions in the Biological Opinion.

Streamlined NLEB Consultation Table - General Project Information	**YES**	**NO**
Does the project occur within 0.25 miles of a known hibernaculum?	☐	☒
Does the project occur within 150 feet of a known maternity roost tree?	☐	☒
Does the project include forest conversion[1]? (if yes, report acreage below)	☒	☐
Estimated total acres of forest conversion (including winter)	0.90	
If known, estimated acres[2] of forest conversion from April 1 to October 31	0.90	
If known, estimated acres of forest conversion from June 1 to July 31[3]	0	
Does the project include timber harvest? (if yes, report acreage below)	☐	☒
Estimated total acres of timber harvest		
If known, estimated acres of timber harvest from April 1 to October 31		
If known, estimated acres of timber harvest from June 1 to July 31		
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Estimated total acres of prescribed fire		
If known, estimated acres of prescribed fire from April 1 to October 31		
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Does the project install new wind turbines? (if yes, report capacity in MW below)	☐	☒
Estimated wind capacity (MW)		

[1] Any activity that temporarily or permanently removes suitable forested habitat, including, but not limited to, tree removal from development, energy production and transmission, mining, agriculture, etc. (see page 48 of the Biological Opinion).
[2] If the project removes less than 10 trees and the acreage is unknown, report the acreage as less than 0.1 acre.
[3] If the activity includes tree clearing in June and July, also include that acreage in April to October.

Notice of Determination

Northern Long-eared Bat— May affect, but will not cause prohibited incidental take.

According to the information provided, this project will include bridge work and tree removal. There are no known locations of NLEB roost trees or hibernacula in the vicinity of this project (MNDNR 2016). By signing this form, MnDOT on behalf of the FHWA, determines that this project may affect the NLEB, but that any resulting incidental take of the NLEB is not prohibited by the final 4(d) rule.

If the USFWS does not respond within 30 days from submittal of this form, MnDOT may presume that its determination is informed by the best available information and that its project responsibilities under 7(a)(2) with respect to the NLEB are fulfilled through the USFWS January 5, 2016, Programmatic Biological Opinion. MnDOT will update this determination annually for multi-year activities.

MnDOT, on behalf of the FHWA, understands that the USFWS presumes that all activities are implemented as described herein. The action agency will promptly report any departures from the described activities to the appropriate USFWS Field Office. MnDOT will provide the appropriate USFWS Field Office with the results of any surveys conducted for the NLEB. **Involved parties will promptly notify the appropriate USFWS Field Office, and MnDOT Office of Environmental Stewardship, upon finding a dead, injured, or sick NLEB.**

Please contact me if there are any questions or concerns.

Christopher E. Smith, M.Sc., CWB®
Wildlife Ecologist | Office of Environmental Stewardship
Minnesota Department of Transportation
395 John Ireland Blvd., MS 620
Saint Paul, MN 55155

E-mail: Christopher.E.Smith@state.mn.us
Phone: 651-366-3605

Adam Smith

From: Smith, Christopher E (DOT) <Christopher.E.Smith@state.mn.us>
Sent: Friday, September 16, 2016 4:05 PM
To: Andrew Horton (andrew_horton@fws.gov)
Cc: Adam Smith; Dalton, Richard (DOT); Gombold, Brigid (DOT)
Subject: SP 7005-121, ESA (Section 7) - Notice of Determination
Attachments: 7005-121_ESA(Section_7)-Notice_of_Determination.pdf

Hi Andrew-

Here is my determination that this project may affect northern long-eared bats but will not cause prohibited incidental take.

Adam and others –

I am sending this notice in accordance with the framework for informal consultation under the Final 4(d) Rule for northern long-eared bats, which was published in January. This notice starts a 30 day review period in which the Fish and Wildlife Service may advise us of any additional concerns. If we do not hear from Andrew within 30 days, we will consider our Section 7 review to be complete and you may proceed with this project as proposed.

Please let me know if you have any questions or concerns.

Thank you,
Chris
--
Christopher E. Smith, M.Sc., CWB®
Wildlife Ecologist | Office of Environmental Stewardship
Minnesota Department of Transportation
395 John Ireland Blvd., MS 620
Saint Paul, MN 55155

E-mail: Christopher.E.Smith@state.mn.us
Phone: 651-366-3605

Minnesota Department of Transportation
395 John Ireland Boulevard
Saint Paul, MN 55155

September 16, 2016

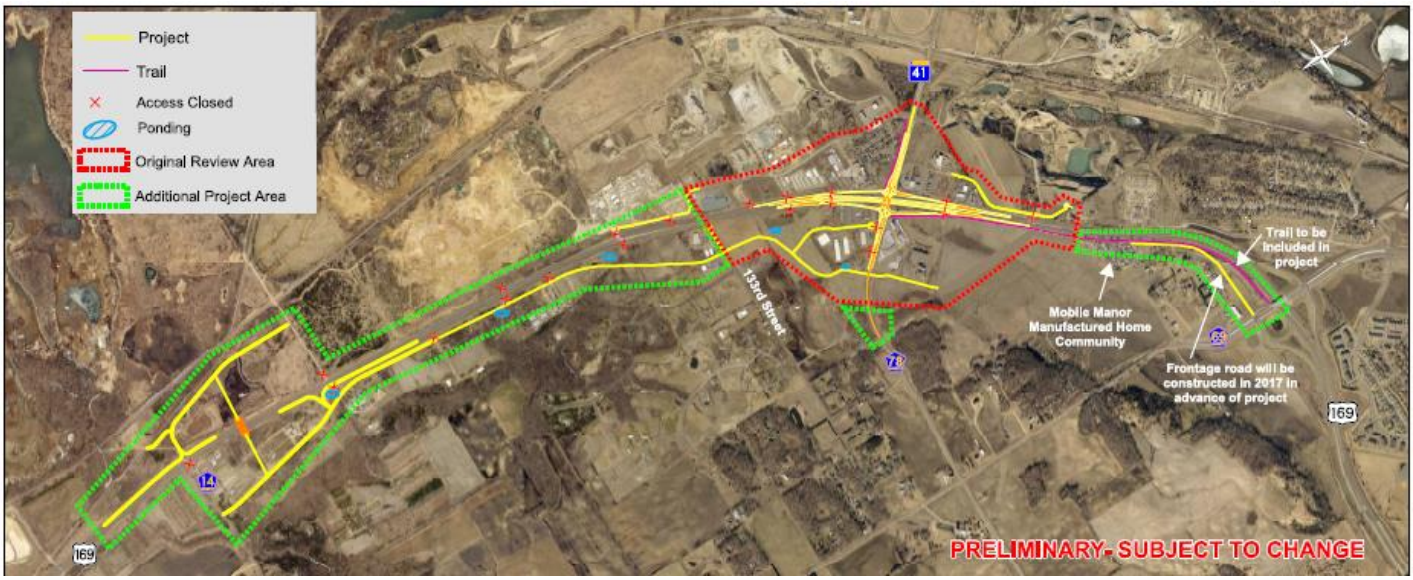
Andrew Horton
Fish and Wildlife Biologist
U.S. Fish and Wildlife Service
Twin Cities ES Field Office
4101 American Blvd East
Bloomington, MN 55425-1665

Notification of Determination – May affect, but will not cause prohibited incidental take – northern long-eared bat (*Myotis septentrionalis*)

S.P. 7005-121, TH 169 / TH 41 / CSAH 78
Scott County, Minnesota

Project Description

The project proposes a new intersection at TH 169 / TH 41 / CSAH 78. The new intersection will include modifications to roadway alignments, ditch grading, roadway widening, culvert replacement, wetland fill or excavation, building demolition, new roadway connections, multiuse trail, and associated activities. Project includes bridge work and up to 0.90 acres of tree removal.



Proposed action area.

Conservation Measures

- Winter tree removal – tree removal November 1 to March 31, inclusive.

Species List for the Project County

According to the official County Distribution of Minnesota Federally-Listed Threatened, Endangered, Proposed, and Candidate Species list (revised in August 2016), maintained by the Service, the project county is within the distribution range of the following:

Revised August 2016

County	Species	Status	Habitat
Scott	Northern long-eared bat *Myotis septentrionalis*	Threatened	Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer.

Information to Determine NLEB 4(d) Rule Compliance:	**YES**	**NO**
1. Does the project occur wholly outside of the WNS Zone?	☐	☒
2. Have you contacted the appropriate agency to determine if your project is near known hibernacula or maternity roost trees?	☒	☐
3. Could the project disturb hibernating NLEBs in a known hibernaculum?	☐	☒
4. Could the project alter the entrance or interior environment of a known hibernaculum?	☐	☒
5. Does the project remove any trees within 0.25 miles of a known hibernaculum at any time of year?	☐	☒
6. Would the project cut or destroy known occupied maternity roost trees, or any other trees within a 150-foot radius from the maternity roost tree from June 1 through July 31.	☐	☒

You are eligible to use this form if you have answered yes to question #1 **or** yes to question #2 **and** no to questions 3, 4, 5 and 6. The remainder of the form will be used by the USFWS to track our assumptions in the Biological Opinion.

Streamlined NLEB Consultation Table - General Project Information	**YES**	**NO**
Does the project occur within 0.25 miles of a known hibernaculum?	☐	☒
Does the project occur within 150 feet of a known maternity roost tree?	☐	☒
Does the project include forest conversion[1]? (if yes, report acreage below)	☒	☐
Estimated total acres of forest conversion (including winter)	0.90	
If known, estimated acres[2] of forest conversion from April 1 to October 31	0	
If known, estimated acres of forest conversion from June 1 to July 31[3]	0	
Does the project include timber harvest? (if yes, report acreage below)	☐	☒
Estimated total acres of timber harvest		
If known, estimated acres of timber harvest from April 1 to October 31		
If known, estimated acres of timber harvest from June 1 to July 31		
Does the project include prescribed fire? (if yes, report acreage below)	☐	☒
Estimated total acres of prescribed fire		
If known, estimated acres of prescribed fire from April 1 to October 31		
If known, estimated acres of prescribed fire from June 1 to July 31		
Does the project install new wind turbines? (if yes, report capacity in MW below)	☐	☒
Estimated wind capacity (MW)		

[1] Any activity that temporarily or permanently removes suitable forested habitat, including, but not limited to, tree removal from development, energy production and transmission, mining, agriculture, etc. (see page 48 of the Biological Opinion).
[2] If the project removes less than 10 trees and the acreage is unknown, report the acreage as less than 0.1 acre.
[3] If the activity includes tree clearing in June and July, also include that acreage in April to October.

Notice of Determination

Northern Long-eared Bat— May affect, but will not cause prohibited incidental take.

According to the information provided, this project will include bridge work and tree removal. There are no known locations of NLEB roost trees or hibernacula in the vicinity of this project (MNDNR 2016). By signing this form, MnDOT on behalf of the FHWA, determines that this project may affect the NLEB, but that any resulting incidental take of the NLEB is not prohibited by the final 4(d) rule.

If the USFWS does not respond within 30 days from submittal of this form, MnDOT may presume that its determination is informed by the best available information and that its project responsibilities under 7(a)(2) with respect to the NLEB are fulfilled through the USFWS January 5, 2016, Programmatic Biological Opinion. MnDOT will update this determination annually for multi-year activities.

MnDOT, on behalf of the FHWA, understands that the USFWS presumes that all activities are implemented as described herein. The action agency will promptly report any departures from the described activities to the appropriate USFWS Field Office. MnDOT will provide the appropriate USFWS Field Office with the results of any surveys conducted for the NLEB. **Involved parties will promptly notify the appropriate USFWS Field Office, and MnDOT Office of Environmental Stewardship, upon finding a dead, injured, or sick NLEB.**

Please contact me if there are any questions or concerns.

Christopher E. Smith, M.Sc., CWB®
Wildlife Ecologist | Office of Environmental Stewardship
Minnesota Department of Transportation
395 John Ireland Blvd., MS 620
Saint Paul, MN 55155

E-mail: Christopher.E.Smith@state.mn.us
Phone: 651-366-3605

Attachment O – MnDOT Cultural Resource Unit Response

Minnesota Department of Transportation

Office of Environmental Stewardship
Mail Stop 620
395 John Ireland Boulevard
St. Paul, MN 55155-1800

Office Tel: (651) 366-3614
Fax: (651) 366-3603

February 1, 2017

Rick Dalton
MnDOT Metro District
1500 W. CR B2
Roseville, MN 55113

Re: S.P. 7005-121. New interchange at TH 169/TH 41/CSAH 78, Scott County

Dear Mr. Dalton:

We have reviewed the above-referenced undertaking pursuant to our FHWA delegated responsibilities for compliance with Section 106 of the National Historic Preservation Act, as amended (36 CFR 800), and as per the terms of the 2005 Section 106 Programmatic Agreement between the FHWA and the Minnesota State Historic Preservation Office (SHPO). The Section 106 review fulfills MnDOT's responsibilities under the Minnesota Historic Sites Act (MS 138.665-.666), the Field Archaeology Act of Minnesota (MS 138.40); and the Private Cemeteries Act (MS 307.08, Subd. 9 and 10).

This project, which was previously reviewed by us on 9/18/2015, 10/18/2016, and 11/21/2016 has been expanded to include the replacement of two culverts under the Union Pacific Railroad spur line.

The area of potential effects (APE) for the project consists of the proposed construction area. Because all work will occur within areas previously disturbed by road and commercial construction, and agricultural production, it is unlikely that the APE contains intact, significant archaeological resources. No historic structures are located within the APE. Based on our existing programmatic agreements with various tribal groups, there are no tribes that want to be consulted on projects in this area of the state and/or projects with the proposed scope of work.

The finding of this office is that there will be **no historic properties affected** by the project as currently proposed. If the project scope changes, please provide our office with the revised information and we will conduct an additional review.

Sincerely,

Craig Johnson
Archaeologist
Cultural Resources Unit (CRU)

MnDOT CRU Project File

Minnesota Department of Transportation

Office of Environmental Stewardship
Mail Stop 620
395 John Ireland Boulevard
St. Paul, MN 55155-1800

Office Tel: (651) 366-3614
Fax: (651) 366-3603

November 21, 2016

Rick Dalton
MnDOT Metro District
1500 W. CR B2
Roseville, MN 55113

Re: S.P. 7005-121. New interchange at TH 169/TH 41/CSAH 78, Scott County

Dear Mr. Dalton:

We have reviewed the above-referenced undertaking pursuant to our FHWA delegated responsibilities for compliance with Section 106 of the National Historic Preservation Act, as amended (36 CFR 800), and as per the terms of the 2005 Section 106 Programmatic Agreement between the FHWA and the Minnesota State Historic Preservation Office (SHPO). The Section 106 review fulfills MnDOT's responsibilities under the Minnesota Historic Sites Act (MS 138.665-.666), the Field Archaeology Act of Minnesota (MS 138.40); and the Private Cemeteries Act (MS 307.08, Subd. 9 and 10).

This project, which was previously reviewed by us on 9/18/2015 and 10/18/2016 has been expanded to include work on an additional 0.5 mile eastward on CSAH 78 to CSAH 69.

The area of potential effects (APE) for the project consists of the proposed construction area. Because all work will occur within areas previously disturbed by road and commercial construction, and agricultural production, it is unlikely that the APE contains intact, significant archaeological resources. No historic structures are located within the APE. Based on our existing programmatic agreements with various tribal groups, there are no tribes that want to be consulted on projects in this area of the state and/or projects with the proposed scope of work.

The finding of this office is that there will be **no historic properties affected** by the project as currently proposed. If the project scope changes, please provide our office with the revised information and we will conduct an additional review.

Sincerely,

Craig Johnson
Archaeologist
Cultural Resources Unit (CRU)

MnDOT CRU Project File

Minnesota Department of Transportation

Office of Environmental Stewardship
Mail Stop 620
395 John Ireland Boulevard
St. Paul, MN 55155-1800

Office Tel: (651) 366-3614
Fax: (651) 366-3603

October 18, 2016

Rick Dalton
MnDOT Metro District
1500 W. CR B2
Roseville, MN 55113

Re: S.P. 7005-121. New interchange at TH 169/TH 41/CSAH 78, Scott County

Dear Mr. Dalton:

We have reviewed the above-referenced undertaking pursuant to our FHWA-delegated responsibilities for compliance with Section 106 of the National Historic Preservation Act, as amended (36 CFR 800), and as per the terms of the 2005 Section 106 Programmatic Agreement between the FHWA and the Minnesota State Historic Preservation Office (SHPO). The Section 106 review fulfills MnDOT's responsibilities under the Minnesota Historic Sites Act (MS 138.665-.666), the Field Archaeology Act of Minnesota (MS 138.40); and the Private Cemeteries Act (MS 307.08, Subd. 9 and 10).

This project, which was previously reviewed by us on 9/18/2015 has been expanded to include a number of new frontage road segments and an overpass over TH 169 between CSAH 14 and 145th Street.

The area of potential effects (APE) for the project consists of the proposed construction area. Because all work will occur within areas previously disturbed by road and commercial construction, and agricultural production, it is unlikely that the APE contains intact, significant archaeological resources. No historic structures are located within the APE. Based on our existing programmatic agreements with various tribal groups, there are no tribes that want to be consulted on projects in this area of the state and/or projects with the proposed scope of work.

The finding of this office is that there will be **no historic properties affected** by the project as currently proposed. If the project scope changes, please provide our office with the revised information and we will conduct an additional review.

Sincerely,

Craig Johnson
Archaeologist
Cultural Resources Unit (CRU)

cc: Andy Hingeveld, Scott County
MnDOT CRU Project File

Tribal consultation letter

Minnesota Department of Transportation

Office of Environmental Stewardship
Mail Stop 620
395 John Ireland Boulevard
St. Paul, MN 55155

Office Tel: (651) 366-3614
Fax: (651) 366-3603

September 14, 2016

Re: S.P. 7005-121, Construction of a new interchange at TH 169/TH 14/CSAH 78. Jackson Township, Scott County

Dear Tribal Representative:

The Minnesota Department of Transportation and Scott County are propposing to construct a new interchange at the intersection of TH 169, TH 41, and Csah 78 near Chaska and Shakopee in Scott County using Federal Highway Administration (FHWA) funds. The project is not on tribal land. Section 106 requires Federal agencies to take into account the effects of their undertakings on historic properties (i.e., those resources eligible for or listed on the National Register of Historic Places). This process involves efforts to identify historic properties potentially affected by the undertaking, assess project effects, and seek ways to avoid, minimize or mitigate any adverse effects on historic properties. On behalf of the FHWA, which has delegated some of its Section 106 responsibilities to the MnDOT Cultural Resources Unit, we are now initiating review to determine the possible effects of the undertaking on historic properties. In accordance with the Section 106 regulations (36 CFR 800.2[c]) and the agreement between the FHWA and the Tribes, we are contacting you to see if you know of any historic properties of religious or historic significance in the area, and to see if you would like to participate in the Section 106 process for this project.

Since our first consultation letter to you on 8/14/2015, the project has been expanded to include a number of new frontage road segments and an overpass over TH 169 between CSAH 14 and 145th Street. The area of potential effect (APE) for this project is defined as the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties (including archaeological sites). Our office has defined the project APE as the proposed construction limits. Once the APE was established, we examined the State Historic Preservation Office database for previously recorded sites in the area. Based on these queries, there are no previously recorded archaeological resources within the APE, or adjacent to it.

We would appreciate any comments you may have about historic, cultural, and archaeological resources and other concerns regarding this project. Our planning schedule is such that we must initiate work on our environmental and historic preservation studies, so we hope to hear from you within **30 days** of receipt of this letter. If you indicate that you are not aware of any historic properties with religious or cultural significance and that you do not wish to comment on the project, or if our office does not receive a response within 30 days, we will conclude that you do not wish to be a consulting party for this project and no further project information will be forwarded.

Thank you for your attention to this request. We look forward to working with you on this project.

Sincerely,

Craig Johnson
Archaeologist
Cultural Resources Unit

Attachments

cc: Floyd Azure, Fort Peck Tribes
Roger Trudell, Santee Sioux Nation (email)
Rick Thomas, Santee Sioux Nation (email)
Robert Larsen, Lower Sioux Indian Community
Grace Goldtooth-Campos, Lower Sioux Indian Community (e-mail)
Dianne Desrosiers, Sisseton-Wahpeton Oyate Community (e-mail)
Jim Whitted, Sisseton-Wahpeton Oyate Community (e-mail)
Rick Dalton, MnDOT Metro

Minnesota Department of Transportation

Office of Environmental Stewardship
Mail Stop 620
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St. Paul, MN 55155-1800

Office Tel: (651) 366-3614
Fax: (651) 366-3603

September 18, 2015

Rick Dalton
MnDOT Metro District
1500 W. CR B2
Roseville, MN 55113

Re: S.P. 7005-121. New interchange at TH 169/TH 41/CSAH 78, Scott County

Dear Mr. Dalton:

We have reviewed the above-referenced undertaking pursuant to our FHWA-delegated responsibilities for compliance with Section 106 of the National Historic Preservation Act, as amended (36 CFR 800), and as per the terms of the 2005 Section 106 Programmatic Agreement between the FHWA and the Minnesota State Historic Preservation Office (SHPO). The Section 106 review fulfills MnDOT's responsibilities under the Minnesota Historic Sites Act (MS 138.665-.666), the Field Archaeology Act of Minnesota (MS 138.40); and the Private Cemeteries Act (MS 307.08, Subd. 9 and 10).

This project involves the construction of a new interchange at the junction of TH 169, TH 41, and CSAH 78. There are currently five options for the project, including a no-build. All build options involve the removal of the current intersection traffic lights by constructing grade-separated roadways. Previous Phase I and II archaeological and architectural history investigations for five alternative route corridors for the TH 41 Minnesota River crossing (S.P. 1008-60) near Chaska by The Louis Berger Group in 2004 – 2006 included the area around the current project in their area of potential effects (APE). No eligible structures were identified and the area was found to be either lacking in any archaeological sites or too disturbed to warrant additional survey. The architectural APE for their study included the area west of the intersection and about ¼ mile east of TH 169. Since there will be a road grade separation at the intersection, a review of architectural properties out to one mile from the intersection did not identify any eligible or potentially eligible structures.

The APE for the project consists of the proposed construction area. Because all work will occur within areas previously disturbed by road, industrial, or commercial construction, and a previous archaeological survey did not identify any archaeological sites, it is unlikely that the APE contains intact, significant archaeological resources. No historic structures are located within the APE. Based on our existing programmatic agreements with various tribal groups, there are no tribes that want to be consulted on projects in this area of the state and/or projects with the proposed scope of work.

The finding of this office is that there will be **no historic properties affected** by the project as currently proposed. If the project scope changes, please provide our office with the revised information and we will conduct an additional review.

Sincerely,

Craig Johnson
Archaeologist
Cultural Resources Unit (CRU)

cc: MnDOT CRU Project File

Tribal consultation letter

Minnesota Department of Transportation

Office of Environmental Stewardship
Mail Stop 620
395 John Ireland Boulevard
St. Paul, MN 55155

Office Tel: (651) 366-3614
Fax: (651) 366-3603

August 14, 2015

Re: S.P. 7005-121 Construction of a new interchange at TH 169/TH 41/CSAH 78, Jackson Township, Scott County

Dear Tribal Representative:

The Minnesota Department of Transportation is propposing to construct a new interchange at the intersection of TH 169, TH 41, and CSAH 78 near Chaska and Shakopee in Scott County using Federal Highway Administration (FHWA) funds. This undertaking is subject to review under Section 106 of the National Historic Preservation Act. The project is not on tribal land. Section 106 requires Federal agencies to take into account the effects of their undertakings on historic properties (i.e., those resources eligible for or listed on the National Register of Historic Places). This process involves efforts to identify historic properties potentially affected by the undertaking, assess project effects, and seek ways to avoid, minimize or mitigate any adverse effects on historic properties. On behalf of the FHWA, which has delegated some of its Section 106 responsibilities to the MnDOT Cultural Resources Unit, we are now initiating review to determine the possible effects of the undertaking on historic properties. In accordance with the Section 106 regulations (36 CFR 800.2[c]) and the agreement between the FHWA and the Tribe, we are contacting you to see if you know of any historic properties of religious or historic significance in the area, and to see if you would like to participate in the Section 106 process for this project.

The area of potential effect (APE) is defined as the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties (including archaeological sites). Our office has defined the project APE as the proposed construction limits. Once the APE was established, we examined the State Historic Preservation Office database for previously recorded sites in the area. Based on these queries, there are no previously recorded archaeological resources within the APE, or adjacent to it.

We would appreciate any comments you may have about historic, cultural, and archaeological resources and other concerns regarding this project. Our planning schedule is such that we must initiate work on our environmental and historic preservation studies, so we hope to hear from you within **30 days** of receipt of this letter. If you indicate that you are not aware of any historic properties with religious or cultural significance and that you do not wish to comment on the project, or if our office does not receive a response within 30 days, we will conclude that you do not wish to be a consulting party for this project and no further project information will be forwarded.

Thank you for your attention to this request. We look forward to working with you on this project.

Sincerely,

Craig Johnson
Archaeologist
Cultural Resources Unit

Attachments

cc: A.T. Stafne, Fort Peck Tribes
Roger Trudell, Santee Sioux Nation (email)
Rick Thomas, Santee Sioux Nation (email)
Denny Prescott, Lower Sioux Indian Community
Grace Goldtooth-Campos, Lower Sioux Indian Community (e-mail)
Dianne Desrosiers, Sisseton-Wahpeton Oyate Community (e-mail)
Jim Whitted, Sisseton-Wahpeton Oyate Community (e-mail)
Andy Hingeveld, Scott County
Rick Dalton, MnDOT Metro