Item 8F.
BCWMC 11-16-16

Minnesota Wetland Conservation Act
Notice of Application

Local Government Unit (LGU)	Address
City of Plymouth	**3400 Plymouth Blvd.** **Plymouth, MN 55447**

1. PROJECT INFORMATION

Applicant Name	Project Name	Date of Application	Application Number
Gary and Rita Brummer	**3301 Highway 169**	**10/16/16**	**NA**

Type of Application (check all that apply):

☒ Wetland Boundary or Type ☐ No-Loss ☐ Exemption ☐ Sequencing
☐ Replacement Plan ☐ Banking Plan

Summary and description of proposed project (attach additional sheets as necessary):

One wetland was delineated on-site. Wetland 1 is a Type 1/2/3, Floodplain Forest/Fresh (Wet) Meadow/Shallow Marsh, PFO1A/PEM1B/PEM1C wetland dominated by reed canary grass and narrow leaf cattail with a wooded fringe.

2. APPLICATION REVIEW AND DECISION

Signing and mailing of this completed form to the appropriate recipients in accordance with 8420.0255, Subp. 3 provides notice that an application was made to the LGU under the Wetland Conservation Act as specified above. A copy of the application is attached. Comments can be submitted to:

Name and Title of LGU Contact Person	Comments must be received by (minimum 15 business-day comment period):
Derek Asche **Water Resources Manager**	**November 17, 2016**
Address (if different than LGU) **Plymouth City Hall** **3400 Plymouth Blvd.** **Plymouth, MN, 55447**	Date, time, and location of decision: **November 18, 2016** **9am** **Plymouth City Hall**
Phone Number and E-mail Address **763-509-5526** **dasche@plymouthmn.gov**	Decision-maker for this application: ☒ Staff ☐ Governing Board or Council

Signature: Derek Asche **Date:** 10/18/16

3. LIST OF ADDRESSEES

☒ SWCD TEP member: **Ms. Stacey Lijewski, HCD, 701 Fourth Avenue South, Suite 700, Minneapolis, MN, 55415-1600** (sent electronically)
☒ BWSR TEP member: **Ben Meyer, BWSR, 520 Lafayette Road North, St. Paul, MN, 55401-1397** (sent electronically)
☐ LGU TEP member (if different than LGU Contact):
☒ DNR TEP member: **Becky Horton, MN DNR, 1200 Warner Road, St. Paul, MN, 55106** (sent electronically)
☒ DNR Regional Office (if different than DNR TEP member)
Kate Drewry, Area Hydrologist, MN DNR, 1200 Warner Road, St. Paul, MN, 55106 (sent electronically)
☒ WD or WMO (if applicable):
BCWMC, c/o Laura Jester, Keystone Waters LLC, 16145 Hillcrest Lane, Eden Prairie, MN, 553467 (sent electronically)
☒ Applicant (notice only) and Landowner (if different):
Gary and Rita Brummer, 3301 Highway 169, Plymouth, MN, 55441 (sent electronically)
Jeff Hansen, 3110 Nathan Lane North, Plymouth, MN, 55441
☒ Members of the public who requested notice (notice only):
Meaghan Watson, Wenck Associates (sent electronically)
☒ Corps of Engineers Project Manager (notice only): **Melissa Jenny, Army Corps of Engineers, 180 5th Street East, Suite 700, St. Paul, MN, 55101-1678** (sent electronically)
☐ BWSR Wetland Bank Coordinator (wetland bank plan applications only)

4. MAILING INFORMATION

➢For a list of BWSR TEP representatives: www.bwsr.state.mn.us/contact/WCA_areas.pdf

➢For a list of DNR TEP representatives: www.bwsr.state.mn.us/wetlands/wca/DNR_TEP_contacts.pdf

➢Department of Natural Resources Regional Offices:

NW Region:	NE Region:	Central Region:	Southern Region:
Reg. Env. Assess. Ecol. Div. Ecol. Resources 2115 Birchmont Beach Rd. NE Bemidji, MN 56601	Reg. Env. Assess. Ecol. Div. Ecol. Resources 1201 E. Hwy. 2 Grand Rapids, MN 55744	Reg. Env. Assess. Ecol. Div. Ecol. Resources 1200 Warner Road St. Paul, MN 55106	Reg. Env. Assess. Ecol. Div. Ecol. Resources 261 Hwy. 15 South New Ulm, MN 56073

For a map of DNR Administrative Regions, see: http://files.dnr.state.mn.us/aboutdnr/dnr_regions.pdf

➢For a list of Corps of Project Managers: www.mvp.usace.army.mil/regulatory/default.asp?pageid=687
or send to:

➢

US Army Corps of Engineers
St. Paul District, ATTN: OP-R
180 Fifth St. East, Suite 700
St. Paul, MN 55101-1678

➢For Wetland Bank Plan applications, also send a copy of the application to:
Minnesota Board of Water and Soil Resources
Wetland Bank Coordinator
520 Lafayette Road North
St. Paul, MN 55155

5. ATTACHMENTS

In addition to the application, list any other attachments:
☒ **Wetland Delineation Report for 3301 Highway 169 dated October 2016 by Wenck Assoc.**
☐

PART ONE: Applicant Information

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

Applicant/Landowner Name: Gary and Rita Brummer
Mailing Address: 3301 Highway 169
Plymouth, MN 55441
Phone: 612-669-1800
E-mail Address: plymouthcommons@hotmail.com

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

Agent Name: Meaghan Watson, Wenck Associates, Inc
Mailing Address: 7500 Olson Memorial Highway
Golden Valley, MN 55427
Phone: 763.252.6986
E-mail Address: mwatson@wenck.com

PART TWO: Site Location Information

County: Hennepin **City/Township:** Plymouth
Parcel ID and/or Address: 3110 Nathan Lane, Plymouth, MN 55441
Legal Description (Section, Township, Range):
Lat/Long (decimal degrees):
Attach a map showing the location of the site in relation to local streets, roads, highways. SEE DELINEATION REPORT
Approximate size of site (acres) or if a linear project, length (feet): 4.75 acres

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

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

PART THREE: General Project/Site Information

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

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

PART FOUR: Aquatic Resource Impact[1] Summary

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

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

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

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

PART FIVE: Applicant Signature

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

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

Signature: _____ Date: 10-13-16

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

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

Project Name and/or Number:

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

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

☒ **Wetland Type Confirmation**

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

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

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

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

Technical Evaluation Panel Concurrence: Project Name and/or Number:

TEP member: Representing:

Concur with road authority's determination of qualification for the local road wetland replacement program? ☐ Yes ☐ No

Signature: _____ Date:

TEP member: Representing:

Concur with road authority's determination of qualification for the local road wetland replacement program? ☐ Yes ☐ No

Signature: _____ Date:

TEP member: Representing:

Concur with road authority's determination of qualification for the local road wetland replacement program? ☐ Yes ☐ No

Signature: _____ Date:

TEP member: Representing:

Concur with road authority's determination of qualification for the local road wetland replacement program? ☐ Yes ☐ No

Signature: _____ Date:

Upon approval and signature by the TEP, application must be sent to: **Wetland Bank Administration**
Minnesota Board of Water & Soil Resources
520 Lafayette Road North
Saint Paul, MN 55155

WENCK File #B6204-0001
October 2016

Brummer Property
Wetland Delineation Report - Revised

Prepared for:

Gary Brummer

3301 Highway 169
Plymouth, MN 55441

WENCK ASSOCIATES
Responsive partner.
Exceptional outcomes.

Prepared by:

WENCK Associates, Inc.
1800 Pioneer Creek Center
Maple Plain, MN 55359
Phone: 763-479-4200
Fax: 763-479-4242

Table of Contents

FIGURES

APPENDICES

1.0 Wetland Delineation Summary

- Wenck Associates, Inc. (Wenck) staff investigated potential wetland areas within a portion of the Brummer Property at 3110 Nathan Lane N in Plymouth, MN on August 16, 2016 (Figure 1).

- The National Wetlands Inventory (NWI) (Figure 2) indicated the presence of a large multi-type wetland complex within the project boundary, identified as PEM1C/PEM1A/PABG wetland occupying the majority of the investigated area.

- The Hennepin County Soil Survey (Figure 3) identified hydric Houghton and Muskego soil series predominantly within the central portion of the investigated area. The remainder of the site was identified as non-hydric soil series Urban land-Udorthents complex and a small area of partially hydric Hamel series.

- There are no MN DNR Public Waters identified within the investigated area. The DNR Public Waters Inventory (PWI) (Figure 4) shows the presence of Medicine Lake (27010400) and an unnamed basin (27063100) located approximately 1500 feet southwest of the property.

- One wetland was identified within the investigated area and is summarized below in Table 1.

Table 1. Summary of Wetland Types

Wetland ID	Circular 39	Eggers and Reed	Cowardin
Wetland 1	Type 1/2/3	Floodplain Forest/Fresh (Wet) Meadow/Shallow Marsh	PFO1A/PEM1B/PEM1C

2.0 Site Description

The area investigated for the presence of wetlands is a 4.1 acre portion of an approximately 4.74 acre private property. The property is located between a single family residential neighborhood to the west and south, a multi-family residential area to the north, and US Highway 169 to the east. The investigated area is located in the City of Plymouth, 4.0 miles north of Highway 55 and US-169 and immediately east of 31st Ave N (See Figure 1). The eastern fringe of the property was heavily wooded, with variable topography surrounding the central basin. Land cover in the surrounding area is a mix of high density residential, park and recreational areas, and institutional property.

The project site was investigated following methodology outlined in Section 3.0 to determine the presence and extent of wetlands on the site. A discussion of site investigation results are included in Section 4.0.

3.0 Methodology

Wetlands are defined in the Federal Register (1982) as "areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas."

An area must have 3 elements present in order to be delineated as a wetland:

1) Greater than 50% dominance of hydrophytic plant species.
2) A hydric soil substrate.
3) Wetland hydrology during the growing season.

This wetland investigation was conducted using the on-site methodology set forth in the 1987 U.S. Army Corps of Engineers (COE) Wetlands Delineation Manual (1987 Manual) and the 2010 U.S. Army Corps of Engineers Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Midwest (Regional Supplement). Potential wetland areas were examined according to guidelines set forth in these documents. These areas were established based on observation of vegetation, soils, and hydrology. The presence and boundaries of wetlands were determined through the analysis of onsite investigation data, which is described below. Data sheets were completed for each transect sample point and are included as Appendix A.

Plant species at both wetland and upland transect points were identified and assigned a wetland indicator status according to the North American Digital Flora: National Wetland Plant List, version 2.4.0 U.S. Army Corps of Engineers, Engineer Research and Development Center, Cold Regions Research and Engineering Laboratory, Hanover, NH, and BONAP, Chapel Hill, NC. (2014). In the text of this report and on the enclosed data forms, the plant indicator status follows the plant's scientific or common name unless a status has not been assigned. According to the 1987 Manual and Regional Supplement, the hydrophytic plant criteria are met when more than 50% of the dominant species within the vegetative strata were assigned an obligate (OBL), facultative wet (FACW), or facultative (FAC) wetland status.

The presence of current wetland hydrology was determined through direct observation of the primary or secondary wetland hydrology indicators as defined in the 1987 Manual and Regional Supplement. The presence of a single primary indicator is sufficient to conclude that wetland hydrology is present. The direct observation of two or more secondary wetland hydrology indicators is required to conclude that wetland hydrology is present.

Hydric soils were determined through use of the Version 7.0, NRCS Field Indicators of Hydric Soils in the United States. Soils were examined and classified by digging soil pits at sample point transects using a Dutch auger. If the soils exhibited indicators of hydric soils as defined by USDA Soil Conservation Service (1994) - a soil that formed under conditions of saturation, flooding or ponding long enough during the growing season to develop anaerobic conditions in the upper part - they were determined to be hydric.

Precipitation from a nearby climate data recording station was compiled to determine climatic conditions prior to the August 16, 2016 site visit. The 30-Day rolling total and 3 Month Prior

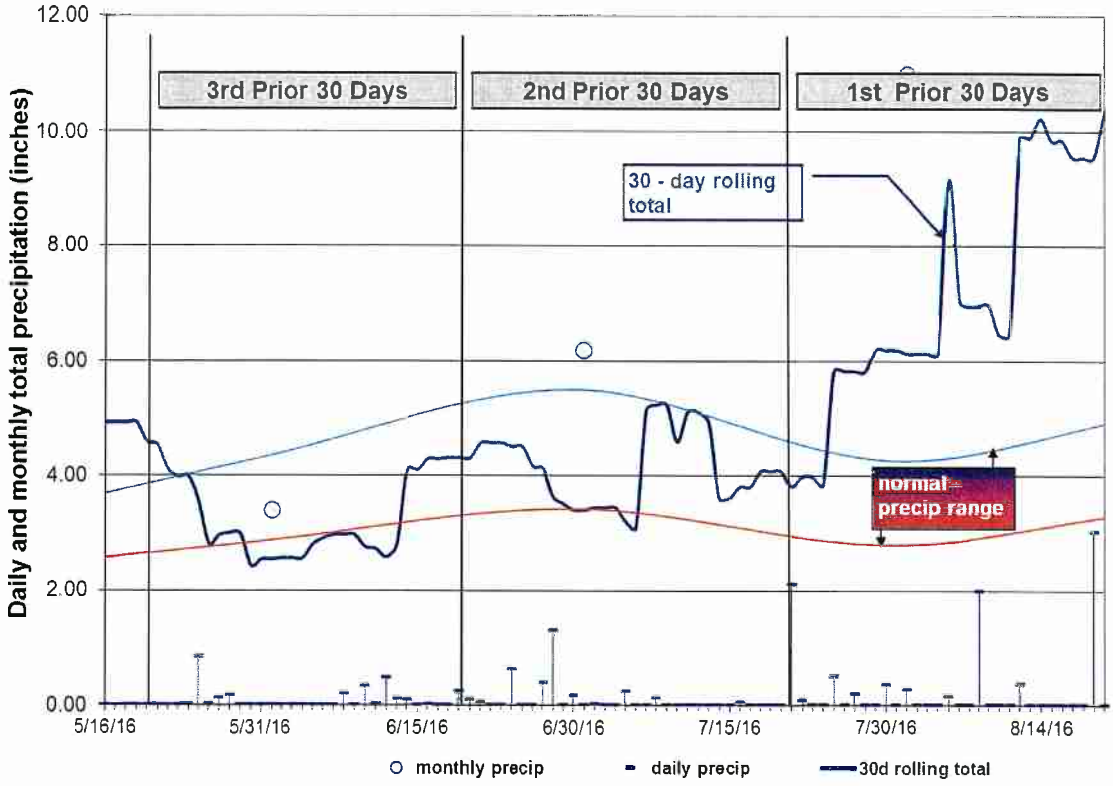
analysis methods were combined in order to analyze the data obtained from the climate station.

Wetlands are classified in the Results section by the Eggers and Reed, Circular 39, and Cowardin classification systems based on observed field conditions.

4.1 PRECIPITATION CONDITIONS

As shown below in Figure 1, precipitation conditions were within the normal precipitation range through the end of the month of July. Precipitation levels were above the normal range in the month prior to the site visit. Data are in Appendix C.

Table 1. Combined 30-Day Rolling Total and 3 Month Prior Precipitation Analysis



4.2 DELINEATED WETLANDS

Wenck investigated the potential wetland areas and determined that that wetland criteria were present in two areas. None of the potential wetland areas investigated were determined to be non-wetland. The delineated boundaries of Wetlands A and B are shown in Figure 5 and described below. The wetland classifications are shown in Table 2 below. See Appendix A for field data forms.

Table 2. Wetland Classifications

Wetland ID	Circular 39	Eggers and Reed	Cowardin
Wetland 1	Type 1/2/3	Floodplain Forest/Shallow Marsh	PFO1A/PEM1B/PEM1C

Wetland 1

Wetland 1 is an approximately 2.9 acre wetland basin wetland in the center of the property. Wetland 1 is a large basin of variable topography with a wooded fringe and an open water community in the center.

The NWI identified the area as a PEM1C/PEM1A/PABG community, transitioning from deep marsh to seasonally flooded basin. The soil survey mapped the area as containing the totally hydric soil map unit L50A Houghton and Muskego soils, non-hydric map units U1A Urban land-Udorthents, L22C2 Lester loam, and L60B Angus-Moon complex. A small portion of the site includes the partially hydric soil map unit L36A Hamel overwash complex. The soil borings conducted in Wetland 1 found 10YR 2/1 loam from 0 to 16 inches over a depleted horizon with common redoximorphic depletions and concentrations from 16 to 20 inches in depth. This location met hydric soil indicator A12 Thick Dark Surface.

The overall wetland vegetation community was dominated by non-native reed canary grass (*Phalaris arundinacea,* FACW) with narrow-leaf cattail (*Typha angustifolia,* OBL) in the deeper areas of the basin. Other hydrophytic species present were jewelweed (*Impatiens capensis,* FACW) and stinging nettle (*Urtica dioica,* FACW). Wooded fringe vegetation included tree species such as cottonwood (*Populus deltoides,* FAC), buckthorn trees (*Rhamnus cathartica,* FAC), box elder (*Acer negundo,* FAC) and green ash (*Fraxinus pennsylvanica,* FACW). Wetland 1 is bordered by wooded communities along the fringes and at areas of topographic high ground.

Indicators of wetland hydrology observed included A2 – high water table, A3 – saturation, D5-FAC-neutral vegetation and D2-geomorphic position. Standing water was observed down the swale from the sample points. The water table was observed at 3 inches depth in the boring.

The wetland boundary was delineated based on the observation of distinct changes in topography and vegetative cover. Wetland 1 exhibited highly variable topography along the fringes, where wetland transitioned into upland and contained upland plant species, such as sweet clover (*Melilotus officinalis,* FACU) and Virginia creeper (*Parthenocissus quinquefolia,* FACU).

Photo 1. Wetland 1 facing east across basin towards wooded fringe.

Photo 2. Wetland 1 facing east. Area was saturated with increasing surface water towards basin interior.

Photo 3. Wetland 1 facing northwest from UP-2.

Photo 4. Wetland 1 facing east from Nathan Lane.

5.0 Conclusion

The boundaries of one wetland was identified and delineated per the scope of this report. Activities which impact or potentially impact wetlands may be regulated by the USACE (under Section 404 of the Clean Water Act) and by the Local Government Unit administering the Wetland Conservation Act. No grading or filling in wetland basins should commence until all necessary permits have been obtained or a finding of no jurisdiction has been obtained from applicable regulatory agencies. This wetland delineation meets the standards and criteria described in the 1987 Manual and Regional Supplement and the results represent the conditions present at the time of the field investigation.

Sincerely,

Wenck Associates, Inc.

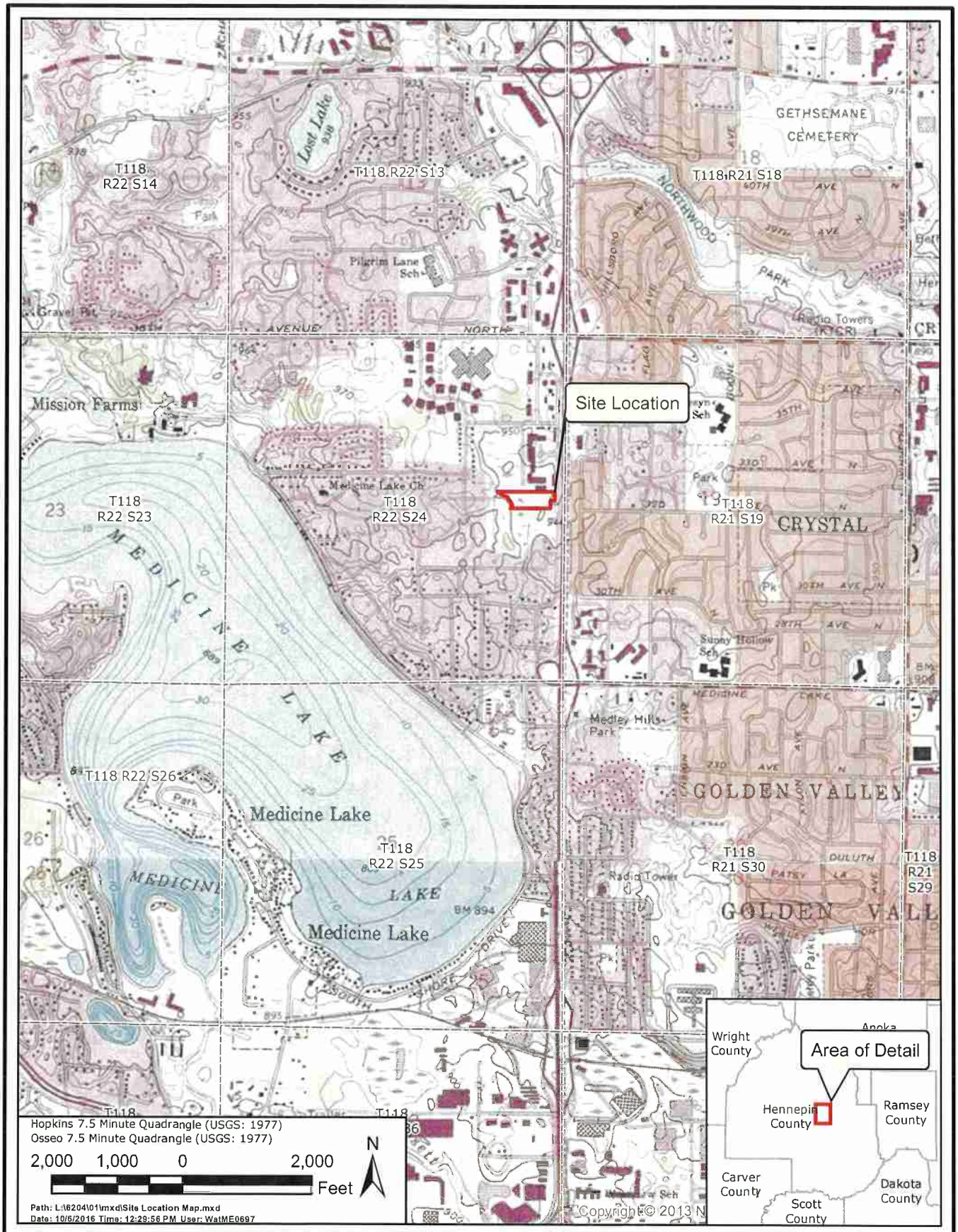
October 6, 2016

Meaghan Watson

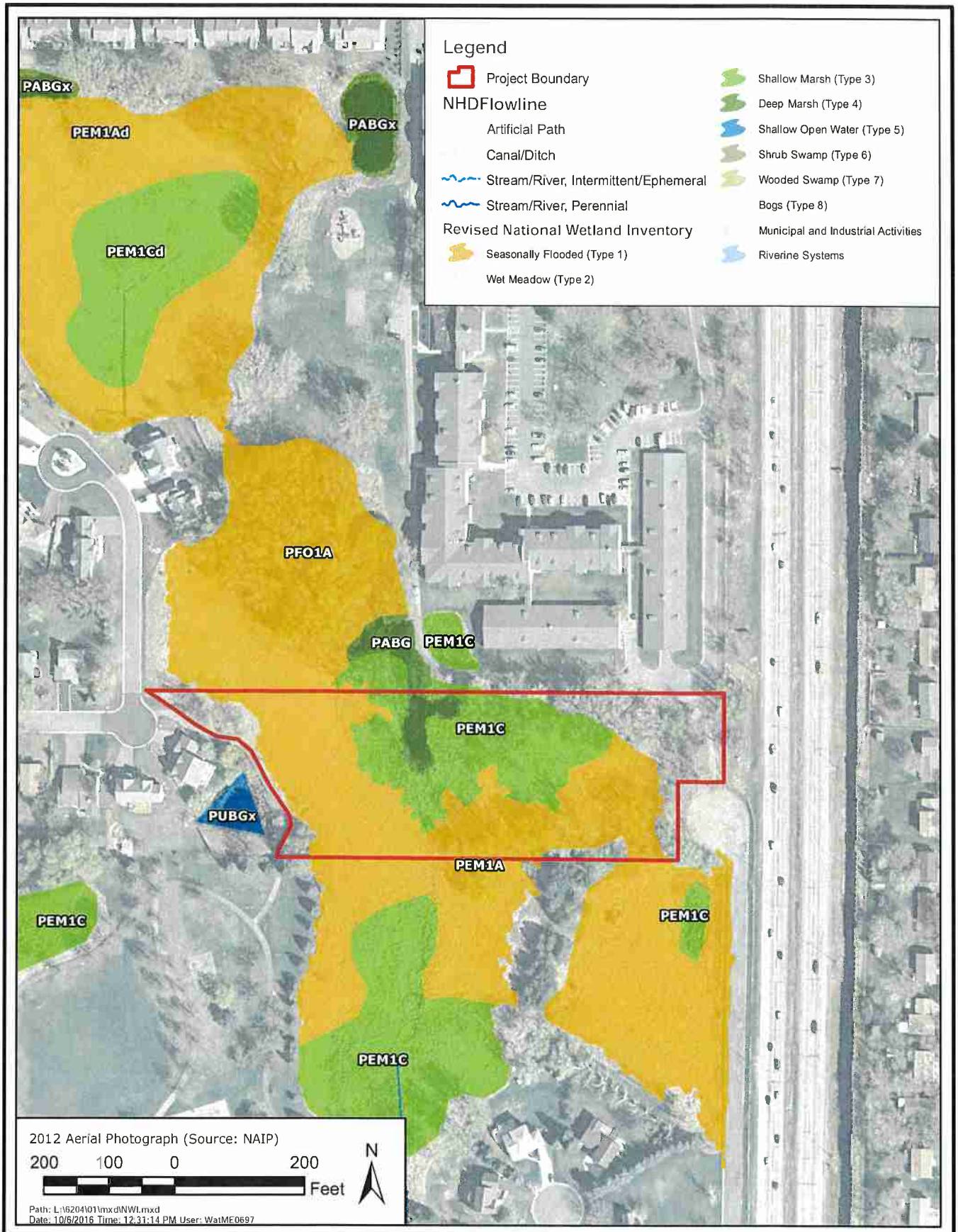
Date

MN Certified Wetland Delineator In Training #5202

Figures



GARY BRUMMER	WENCK ASSOCIATES Responsive partner. Exceptional outcomes.	SEP 2016
Site Location Map		Figure 1



GARY BRUMMER

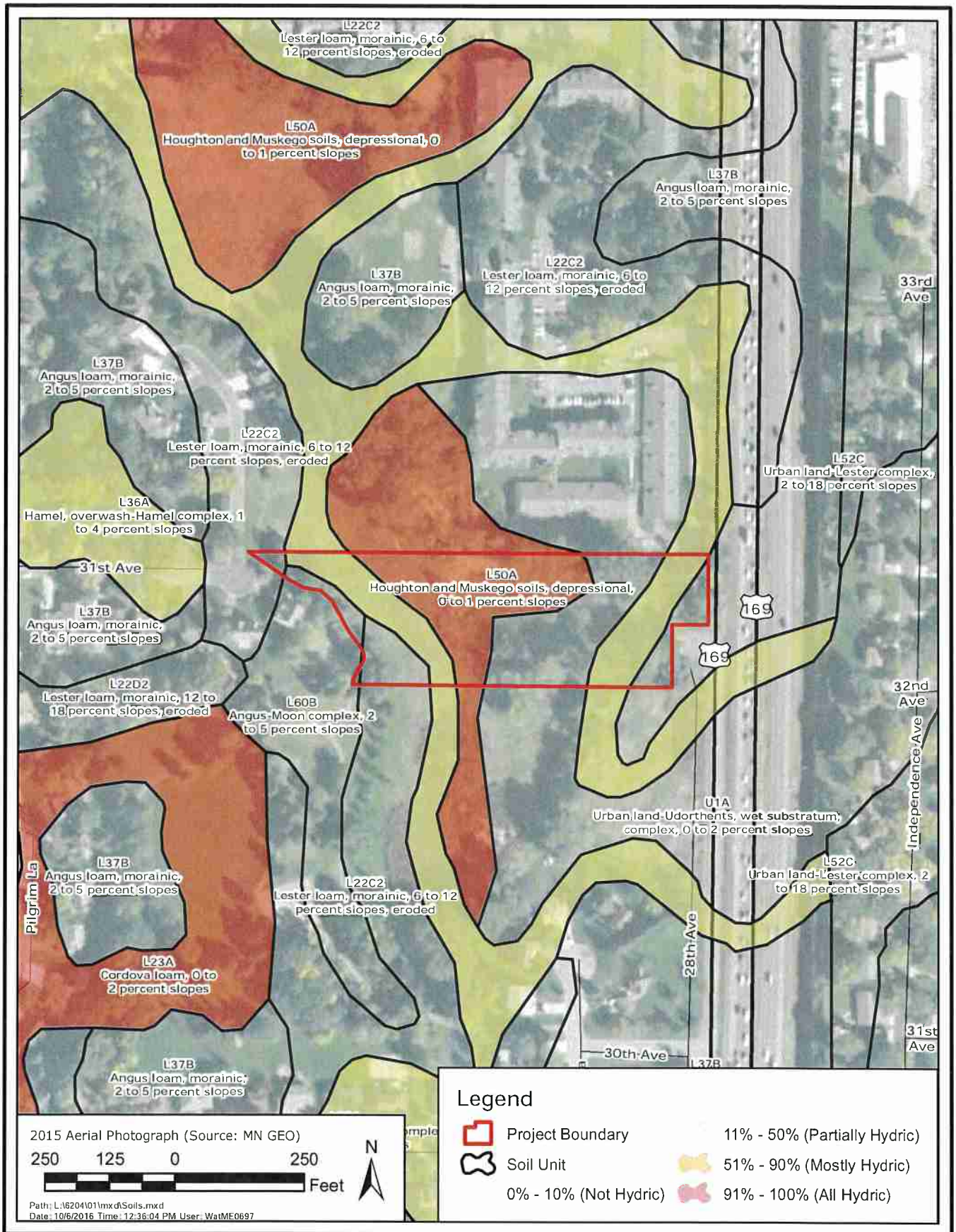
National Wetland Inventory & National Hydrologic Dataset

WENCK ASSOCIATES

Responsive partner. Exceptional outcomes.

SEP 2016

Figure 2



GARY BRUMMER

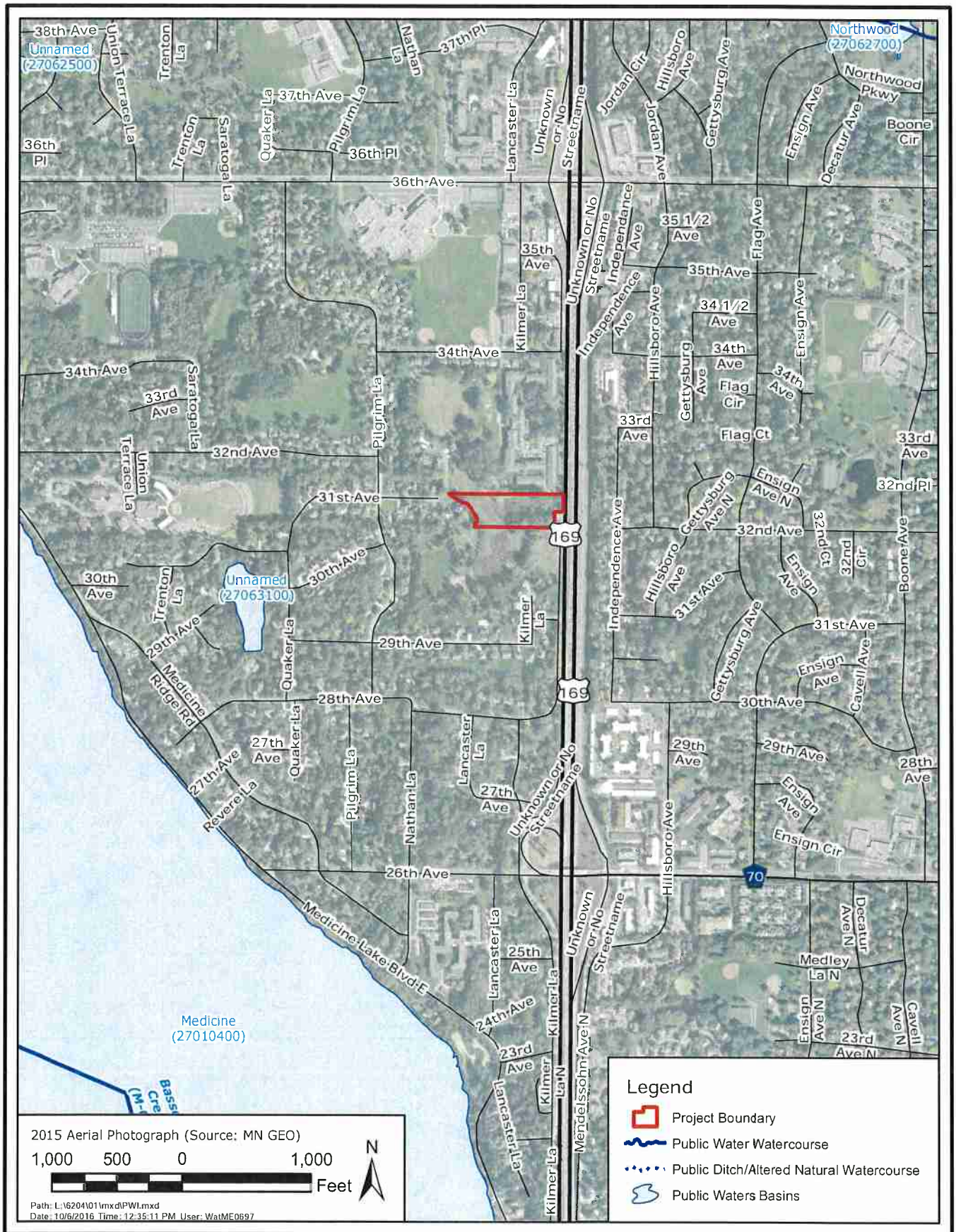
Hennepin County Soil Survey

WENCK ASSOCIATES

Responsive partner. Exceptional outcomes.

SEP 2016

Figure 3



GARY BRUMMER

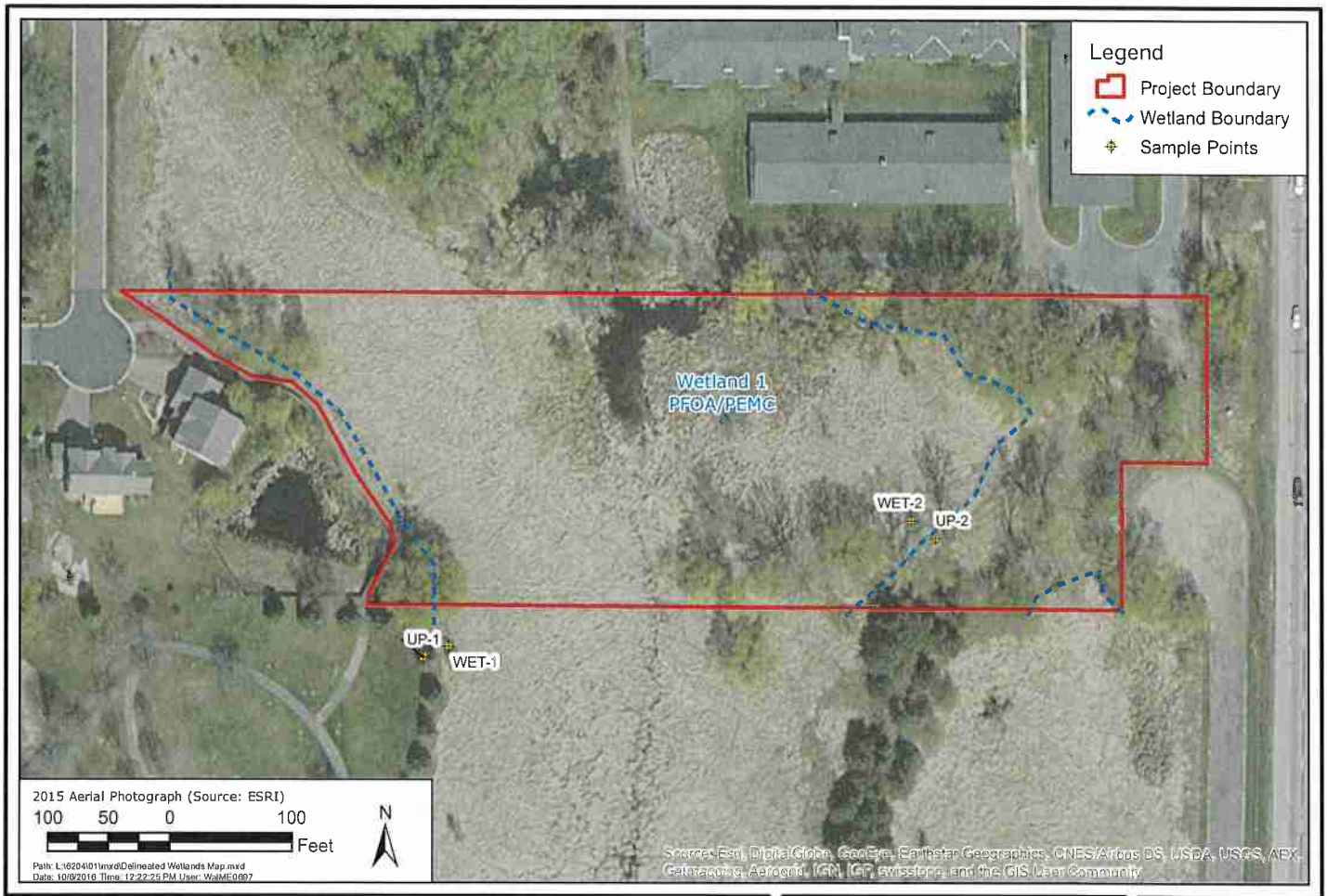
Public Waters Inventory

WENCK ASSOCIATES

Responsive partner. Exceptional outcomes.

SEP 2016

Figure 4



GARY BRUMMER	WENCK ASSOCIATES Responsive partner. Exceptional outcomes.	SEP 2016
Delineated Wetlands		Figure 5

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Hennepin County, Minnesota

September 8, 2016

Appendix A

Field Data Forms

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: 3110 Nathan Lane, Plymouth | City/County: Hennepin | Sampling Date: 8/16/2016

Applicant/Owner: Gary Brummer | State: MN | Sampling Point: Up-1

Investigator(s): Meaghan Watson, Wenck Associates, Inc. | Section, Township, Range: Section 24, T118N, R22W

Landform (hillslope, terrace, etc.): backslope | Local relief (concave, convex, none): concave

Slope (%): 7 | Lat: 45.014628 | Long: -93.403655 | Datum: NAD 83

Soil Map Unit Name: Lester loam, morainic, 6 to 12 percent slopes, eroded | NWI Classification: NA

Subregion (MLRA or LRR): M | Are climatic/hydrologic conditions of the site typical for this time of the year? Y

Are vegetation [ ], soil [ ], or hydrology [ ] significantly disturbed? | Are "normal circumstances" present? Y

Are vegetation [ ], soil [ ], or hydrology [ ] naturally problematic? | (If needed, explain any answers in remarks.)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	Y	**Is the sampled area within a wetland?**	N
Hydric soil present?	N	Corps-regulated?:	
Indicators of wetland hydrology present?	N	Wetland Type:	NA

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

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species	Indicator Status
1			
2			
3			
4			
5			
	0	= Total Cover	
Sapling/Shrub stratum (Plot size: 15 ft)			
1			
2			
3			
4			
5			
	0	= Total Cover	
Herb stratum (Plot size: 5 ft)			
1 *Poa pratensis*	80	Y	FAC
2 *Glechoma hederacea*	10	N	FACU
3 *Plantago major*	10	N	FAC
4			
5			
6			
7			
8			
9			
10			
	100	= Total Cover	
Woody vine stratum (Plot size: 30 ft)			
1			
2			
	0	= Total Cover	

Bare ground: ____ %

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	0	x 2 =	0
FAC species	90	x 3 =	270
FACU species	10	x 4 =	40
UPL species	0	x 5 =	0
Column totals	100 (A)		310 (B)

Prevalence Index = B/A = 3.10

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: Up-1

Soil Series: _____ Series Drainage Class: _____

Taxonomy (Subgroup): _____

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

Depth (Inches)	Horizon	Matrix Color (moist)	Matrix %	Mottles Color (moist)	Mottles %	Mottles Type*	Mottles Loc**	Texture	Remarks
0-4	1	10YR 3/1						sandy loam	
4-20	2	10YR 4/3						sandy 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)**
- ☐ Other (explain in remarks)

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

Check here if indicators are not present: ☑

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 (not tilled) (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 of Stressed Plants (D1)
- ☐ Geomorphic Position (D2)
- ☐ FAC-Neutral Test (D5)

Check here if indicators are not present: ☑

Field Observations:

Surface water present?	Yes	☐	No	☑	Depth (inches):	
Water table present?	Yes	☐	No	☑	Depth (inches):	
Saturation present? (includes capillary fringe)	Yes	☐	No	☑	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: 3110 Nathan Lane, Plymouth | City/County: Anoka | Sampling Date: 8/16/2016

Applicant/Owner: Gary Brummer | State: MN | Sampling Point: Wet-1

Investigator(s): Meaghan Watson, Wenck Associates, Inc. | Section, Township, Range: Section 24, T118N, R22W

Landform (hillslope, terrace, etc.): footslope | Local relief (concave, convex, none): concave

Slope (%): 2 | Lat: 45.014654 | Long: -93.403576 | Datum: NAD 83

Soil Map Unit Name: Lester loam, morainic, 6 to 12 percent slopes, eroded | NWI Classification: PEM1A

Subregion (MLRA or LRR): M | Are climatic/hydrologic conditions of the site typical for this time of the year? Y

Are vegetation ☐, soil ☐, or hydrology ☐ significantly disturbed? | Are "normal circumstances" present? Y

Are vegetation ☐, soil ☐, or hydrology ☐ naturally problematic? | (If needed, explain any answers in remarks.)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	Y	**Is the sampled area within a wetland?**	N
Hydric soil present?	Y	Corps-regulated?:	
Indicators of wetland hydrology present?	Y	Wetland Type:	Type 2

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

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species	Indicator Status
1 *Acer nedundo*	5	Y	
2			
3			
4			
5			
	5	= Total Cover	

Sapling/Shrub stratum (Plot size: 15 ft)			
1			
2			
3			
4			
5			
	0	= Total Cover	

Herb stratum (Plot size: 5 ft)			
1 *Phalaris arundinacea*	80	Y	FACW
2 *Urtica dioica*	20	Y	FACW
3			
4			
5			
6			
7			
8			
9			
10			
	100	= Total Cover	

Woody vine stratum (Plot size: 30 ft)			
1 *Menispermum canadense*	5	Y	FAC
2			
	5	= Total Cover	

Bare ground: 0 %

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	100	x 2 =	200
FAC species	5	x 3 =	15
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column totals	105 (A)		215 (B)

Prevalence Index = B/A = 2.05

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-1

Soil Series: _____ Series Drainage Class: _____

Taxonomy (Subgroup):

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

Depth (Inches)	Horizon	Matrix Color (moist)		Matrix %	Mottles Color (moist)		Mottles %	Mottles Type*	Mottles Loc**	Texture	Remarks
0-16	1	10YR	2/1	100						loam	
16-22	2	10YR	4/1	95	7.5YR	4/6	5	C	M	sandy 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)**
- ☐ Other (explain in remarks)

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

Check here if indicators are not present: ☐

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 (not tilled) (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 of Stressed Plants (D1)
- ☑ Geomorphic Position (D2)
- ☑ FAC-Neutral Test (D5)

Check here if indicators are not present: ☐

Field Observations:

Surface water present?	Yes	☐	No	☑	Depth (inches):	
Water table present?	Yes	☑	No	☐	Depth (inches):	16
Saturation present? (includes capillary fringe)	Yes	☑	No	☐	Depth (inches):	12

Indicators of wetland hydrology present? Y

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

Remarks:

standing water further into basin

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site: 3110 Nathan Lane, Plymouth City/County: Hennepin Sampling Date: 8/16/2016

Applicant/Owner: Gary Brummer State: MN Sampling Point: Up-2

Investigator(s): Meaghan Watson, Wenck Associates, Inc. Section, Township, Range: Section 24, T118N, R22W

Landform (hillslope, terrace, etc.): summit Local relief (concave, convex, none): convex

Slope (%): 3 Lat: 45.014899 Long: -93.402039 Datum: NAD 83

Soil Map Unit Namen land-Udorthents, wet substratum, complex, 0 to 2 percent sl NWI Classification: NA

Subregion (MLRA or LRR): M Are climatic/hydrologic conditions of the site typical for this time of the year? Y

Are vegetation ☐, soil ☐, or hydrology ☐ significantly disturbed? Are "normal circumstances" present? Y

Are vegetation ☐, soil ☐, or hydrology ☐ naturally problematic? (If needed, explain any answers in remarks.)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	Y	**Is the sampled area within a wetland?**	N
Hydric soil present?	N	Corps-regulated?:	
Indicators of wetland hydrology present?	N	Wetland Type:	NA

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

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species	Indicator Status
1 *Acer negundo*	5	Y	FAC
2			
3			
4			
5			
	5	= Total Cover	
Sapling/Shrub stratum (Plot size: 15 ft)			
1 *Vitis riparia*	5	Y	FACW
2 *Rhamnus cathartica*	5	Y	FAC
3			
4			
5			
	10	= Total Cover	
Herb stratum (Plot size: 5 ft)			
1 *Solidago canadensis*	50	Y	FACU
2 *Phalaris arundinacea*	20	Y	FACW
3 *Galium aparine*	10	N	FACU
4 *Erigeron strigosus*	5	N	FACU
5 *Cirsium arvense*	5	N	FACU
6			
7			
8			
9			
10			
	90	= Total Cover	
Woody vine stratum (Plot size: 30 ft)			
1			
2			
	0	= Total Cover	

Bare ground: ____ %

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 4 (A)

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

Percent of Dominant Species that are OBL, FACW, or FAC: 80.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0
FACW species	25	x 2 =	50
FAC species	10	x 3 =	30
FACU species	70	x 4 =	280
UPL species	0	x 5 =	0
Column totals	105 (A)		360 (B)

Prevalence Index = B/A = 3.43

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: Up-2

Soil Series: _____ Series Drainage Class: _____

Taxonomy (Subgroup):

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

Depth (Inches)	Horizon	Matrix Color (moist)		%	Mottles Color (moist)		%	Type*	Loc**	Texture	Remarks
0-18	1	10YR	2/1							sandy loam	
18-24	2	10YR	4/4							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)**
- ☐ Other (explain in remarks)

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

Check here if indicators are not present: ☑

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 (not tilled) (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 of Stressed Plants (D1)
- ☐ Geomorphic Position (D2)
- ☐ FAC-Neutral Test (D5)

Check here if indicators are not present: ☑

Field Observations:

Surface water present?	Yes	☐	No	☑	Depth (inches):	_____
Water table present?	Yes	☐	No	☑	Depth (inches):	_____
Saturation present? (includes capillary fringe)	Yes	☐	No	☑	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: 3110 Nathan Lane, Plymouth | City/County: Anoka | Sampling Date: 8/16/2016

Applicant/Owner: Gary Brummer | State: MN | Sampling Point: Wet-2

Investigator(s): Meaghan Watson, Wenck Associates, Inc. | Section, Township, Range: Section 24, T118N, R22W

Landform (hillslope, terrace, etc.): footslope | Local relief (concave, convex, none): concave

Slope (%): 2 | Lat: 45.014939 | Long: -93.402118 | Datum: NAD 83

Soil Map Unit Namen land-Udorthents, wet substratum, complex, 0 to 2 percent sl | NWI Classification: PEM1A

Subregion (MLRA or LRR): M | Are climatic/hydrologic conditions of the site typical for this time of the year? Y

Are vegetation ☐, soil ☐, or hydrology ☐ significantly disturbed? | Are "normal circumstances" present? Y

Are vegetation ☐, soil ☐, or hydrology ☐ naturally problematic? | (If needed, explain any answers in remarks.)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	Y	**Is the sampled area within a wetland?**	N
Hydric soil present?	Y	Corps-regulated?:	
Indicators of wetland hydrology present?	Y	Wetland Type:	Type 2

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

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species	Indicator Status
1			
2			
3			
4			
5			
	0 = Total Cover		

Sapling/Shrub stratum (Plot size: 15 ft)			
1			
2			
3			
4			
5			
	0 = Total Cover		

Herb stratum (Plot size: 5 ft)			
1 *Impatiens capensis*	60	Y	FACW
2 *Phalaris arundinacea*	30	Y	FACW
3 *Solanum dulcamara*	5	N	FAC
4 *Solidago gigantea*	5	N	FACW
5 *Urtica dioica*	5	N	FACW
6			
7			
8			
9			
10			
	105 = Total Cover		

Woody vine stratum (Plot size: 30 ft)			
1			
2			
	0 = Total Cover		

Bare ground: 0 %

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across all Strata: 2 (B)

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

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0
FACW species	100	x 2 =	200
FAC species	5	x 3 =	15
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column totals	105 (A)		215 (B)

Prevalence Index = B/A = 2.05

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-2

Soil Series: _____ Series Drainage Class: _____

Taxonomy (Subgroup):

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

Depth (Inches)	Horizon	Matrix Color (moist)		Matrix %	Mottles Color (moist)		Mottles %	Type*	Loc**	Texture	Remarks
0-12	1	10YR	2/1	100						clay loam	
12-16	2	10YR	5/2	98	7.5YR	5/6	2	C	M	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)
- [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)**
- [ ] Other (explain in remarks)

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

Check here if indicators are not present: [ ]

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 (not tilled) (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 of Stressed Plants (D1)
- [x] Geomorphic Position (D2)
- [x] FAC-Neutral Test (D5)

Check here if indicators are not present: [ ]

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:

standing water further into basin

Appendix B

Soil Survey Data

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (http://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means

for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the

individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

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 1:12,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

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: Hennepin County, Minnesota
Survey Area Data: Version 11, Sep 18, 2015

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Aug 26, 2014—Sep 7, 2014

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.

Map Unit Legend

Hennepin County, Minnesota (MN053)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
L22C2	Lester loam, 6 to 10 percent slopes, moderately eroded	0.4	8.5%
L36A	Hamel, overwash-Hamel complex, 0 to 3 percent slopes	1.1	22.4%
L37B	Angus loam, 2 to 6 percent slopes	0.3	5.4%
L50A	Muskego and Houghton soils, 0 to 1 percent slopes	1.3	27.4%
L60B	Angus-Moon complex, 2 to 5 percent slopes	0.7	14.9%
U1A	Urban land-Udorthents, wet substratum, complex, 0 to 2 percent slopes	1.0	21.4%
Totals for Area of Interest		**4.7**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been

observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series.* Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases.* Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas.* Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Hennepin County, Minnesota

L22C2—Lester loam, 6 to 10 percent slopes, moderately eroded

Map Unit Setting

National map unit symbol: 2ttc4
Elevation: 690 to 1,840 feet
Mean annual precipitation: 24 to 37 inches
Mean annual air temperature: 43 to 52 degrees F
Frost-free period: 140 to 180 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Lester, moderately eroded, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Lester, Moderately Eroded

Setting

Landform: Ground moraines, hillslopes
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Interfluve, rise
Down-slope shape: Convex
Across-slope shape: Linear, convex
Parent material: Fine-loamy till

Typical profile

Ap - 0 to 6 inches: loam
Bt - 6 to 38 inches: clay loam
C - 38 to 79 inches: loam

Properties and qualities

Slope: 6 to 10 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: About 47 to 63 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 20 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: High (about 10.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Other vegetative classification: Sloping Upland, Acid (G103XS006MN)
Hydric soil rating: No

Minor Components

Storden, moderately eroded

Percent of map unit: 10 percent

Landform: Ground moraines
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Rise
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Hydric soil rating: No

Le sueur

Percent of map unit: 3 percent
Landform: Ground moraines, hillslopes
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve, talf
Down-slope shape: Convex, linear
Across-slope shape: Linear
Hydric soil rating: No

Hamel

Percent of map unit: 2 percent
Landform: Ground moraines
Landform position (three-dimensional): Dip
Down-slope shape: Concave, linear
Across-slope shape: Linear, concave
Hydric soil rating: Yes

L36A—Hamel, overwash-Hamel complex, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2tsjx
Elevation: 690 to 1,840 feet
Mean annual precipitation: 24 to 37 inches
Mean annual air temperature: 43 to 52 degrees F
Frost-free period: 140 to 180 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Hamel, overwash, and similar soils: 50 percent
Hamel and similar soils: 43 percent
Minor components: 7 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hamel, Overwash

Setting

Landform: Ground moraines
Landform position (three-dimensional): Dip
Down-slope shape: Concave, linear
Across-slope shape: Linear, concave
Parent material: Fine-loamy colluvium over loamy till

Typical profile

Ap - 0 to 12 inches: loam

A - 12 to 26 inches: loam
Btg - 26 to 48 inches: clay loam
Cg - 48 to 79 inches: clay loam

Properties and qualities

Slope: 1 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: About 12 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 20 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: High (about 11.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D
Other vegetative classification: Level Swale, Neutral (G103XS001MN)
Hydric soil rating: No

Description of Hamel

Setting

Landform: Ground moraines
Landform position (three-dimensional): Dip
Down-slope shape: Concave, linear
Across-slope shape: Linear, concave
Parent material: Fine-loamy colluvium over loamy till

Typical profile

Ap - 0 to 10 inches: loam
A - 10 to 24 inches: loam
Btg - 24 to 46 inches: clay loam
Cg - 46 to 79 inches: clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: About 0 to 8 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 20 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: High (about 10.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D
Other vegetative classification: Level Swale, Neutral (G103XS001MN)

Hydric soil rating: Yes

Minor Components

Terril

Percent of map unit: 5 percent
Landform: Ground moraines
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Linear
Other vegetative classification: Sloping Upland, Neutral (G103XS002MN)
Hydric soil rating: No

Glencoe

Percent of map unit: 2 percent
Landform: Depressions
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: Pothole Marsh (R103XY002MN)
Other vegetative classification: Ponded If Not Drained (G103XS013MN)
Hydric soil rating: Yes

L37B—Angus loam, 2 to 6 percent slopes

Map Unit Setting

National map unit symbol: 2syrq
Elevation: 690 to 1,840 feet
Mean annual precipitation: 24 to 37 inches
Mean annual air temperature: 43 to 52 degrees F
Frost-free period: 140 to 180 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Angus and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Angus

Setting

Landform: Ground moraines, hillslopes
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve, rise
Down-slope shape: Convex
Across-slope shape: Linear, convex
Parent material: Fine-loamy till

Typical profile

Ap - 0 to 7 inches: loam

Bt - 7 to 37 inches: clay loam
BC - 37 to 50 inches: clay loam
C - 50 to 79 inches: loam

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: About 39 to 51 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 20 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: High (about 10.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Other vegetative classification: Sloping Upland, Acid (G103XS006MN)
Hydric soil rating: No

Minor Components

Angus, moderately eroded

Percent of map unit: 10 percent
Landform: Ground moraines, hillslopes
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Interfluve, rise
Down-slope shape: Convex
Across-slope shape: Linear, convex
Other vegetative classification: Sloping Upland, Acid (G103XS006MN)
Hydric soil rating: No

Le sueur

Percent of map unit: 5 percent
Landform: Ground moraines, hillslopes
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve, talf
Down-slope shape: Convex, linear
Across-slope shape: Linear
Other vegetative classification: Sloping Upland, Acid (G103XS006MN)
Hydric soil rating: No

Cordova

Percent of map unit: 5 percent
Landform: Ground moraines
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Linear
Other vegetative classification: Level Swale, Neutral (G103XS001MN)
Hydric soil rating: Yes

L50A—Muskego and Houghton soils, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2t3nt
Elevation: 690 to 1,840 feet
Mean annual precipitation: 24 to 37 inches
Mean annual air temperature: 43 to 52 degrees F
Frost-free period: 140 to 180 days
Farmland classification: Not prime farmland

Map Unit Composition

Muskego, surface drained, and similar soils: 45 percent
Houghton, ponded, and similar soils: 40 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Muskego, Surface Drained

Setting

Landform: Depressions
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Organic material over coprogenic material

Typical profile

Oap - 0 to 10 inches: muck
Oa - 10 to 28 inches: muck
Lco - 28 to 79 inches: coprogenous mucky silt loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Calcium carbonate, maximum in profile: 80 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Very high (about 17.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6w
Hydrologic Soil Group: C/D
Other vegetative classification: Organic (G103XS014MN)
Hydric soil rating: Yes

Description of Houghton, Ponded

Setting

Landform: Marshes
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Organic material

Typical profile

Oa1 - 0 to 9 inches: muck
Oa2 - 9 to 79 inches: muck

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 6.00 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Very high (about 23.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8w
Hydrologic Soil Group: A/D
Other vegetative classification: Not Suited (G103XS024MN)
Hydric soil rating: Yes

Minor Components

Klossner, drained

Percent of map unit: 10 percent
Landform: Depressions
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Organic (G103XS014MN)
Hydric soil rating: Yes

Glencoe

Percent of map unit: 5 percent
Landform: Depressions
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: Pothole Marsh (R103XY002MN)
Other vegetative classification: Ponded If Not Drained (G103XS013MN)
Hydric soil rating: Yes

L60B—Angus-Moon complex, 2 to 5 percent slopes

Map Unit Setting

National map unit symbol: gl9p
Mean annual precipitation: 23 to 35 inches
Mean annual air temperature: 43 to 50 degrees F
Frost-free period: 124 to 200 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Angus and similar soils: 65 percent
Moon and similar soils: 30 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Angus

Setting

Landform: Hills on moraines
Landform position (two-dimensional): Backslope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Till

Typical profile

Ap - 0 to 8 inches: loam
Bt - 8 to 35 inches: clay loam
BC - 35 to 40 inches: clay loam
C - 40 to 80 inches: loam

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 43 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 20 percent
Gypsum, maximum in profile: 1 percent
Available water storage in profile: High (about 10.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Other vegetative classification: Sloping Upland, Acid (G103XS006MN)
Hydric soil rating: No

Description of Moon

Setting

Landform: Hills on moraines
Landform position (two-dimensional): Summit
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Outwash over till

Typical profile

Ap - 0 to 8 inches: loamy fine sand
E - 8 to 24 inches: loamy fine sand
2Bt - 24 to 46 inches: sandy clay loam
2C - 46 to 60 inches: loam

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: About 30 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 20 percent
Gypsum, maximum in profile: 1 percent
Available water storage in profile: Moderate (about 8.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: A
Other vegetative classification: Sloping Upland, Acid (G103XS006MN)
Hydric soil rating: No

Minor Components

Hamel

Percent of map unit: 5 percent
Landform: Drainageways on moraines
Down-slope shape: Concave
Across-slope shape: Linear
Other vegetative classification: Level Swale, Neutral (G103XS001MN)
Hydric soil rating: Yes

U1A—Urban land-Udorthents, wet substratum, complex, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: rvkn
Mean annual precipitation: 23 to 35 inches
Mean annual air temperature: 43 to 50 degrees F
Frost-free period: 155 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 80 percent
Udorthents, wet substratum, and similar soils: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Setting

Landform: Outwash plains, moraines, stream terraces

Description of Udorthents, Wet Substratum

Setting

Landform: Outwash plains, moraines, stream terraces
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Variable soil material

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

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.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

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. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

Appendix C

Precipitation Data

Minnesota Climatology Working Group

State Climatology Office - DNR Division of Ecological and Water Resources University of Minnesota

Wetland Delineation Precipitation Data Retrieval from a Gridded Database

Obtaining a long-term precipitation data time-series for wetland delineation efforts can be a difficult and time-consuming process. Locating the nearest precipitation monitoring station to the wetland often proves challenging. Once a nearby monitoring location is identified, retrieving the data, accounting for gaps in the record, and generating the summary statistics can provide further challenges.

By offering access to "synthetic" data, this application assists users in overcoming some the challenges inherent in assembling a precipitation data set. The synthetic data are made up of regularly-spaced grid nodes whose values were calculated using data interpolated from Minnesota's outstanding, but spatially and temporally irregular, precipitation data base.

Click to learn more about **Precipitation Grids**.

select a wetland location

Precipitation data for target wetland location:

county: Hennepin

township number: 118N

township name: Plymouth

range number: 22W

nearest community: **Mission Farms**

section number: 24

To create a **precipitation documentation worksheet** using the three-prior-month (NRCS) method, select the date of the site visit or aerial photograph and click on "create worksheet".

2016 ▼ August ▼ 15 ▼ create worksheet

precipitation totals are in inches

color key:
total is in lowest 30th percentile of the period-of-record distribution
total is => 30th and <= 70th percentile
total is in highest 30th percentile of the period-of-record distribution

multi-month totals:
WARM = warm season (May thru September)
ANN = calendar year (January thru December)
WAT = water year (Oct. previous year thru Sep. present year)

A 'R' following a monthly total indicates a provisional value derived from radar-based estimates.

Period-of-Record Summary Statistics															
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	WARM	ANN	WAT
30%	0.53	0.51	1.15	1.60	2.58	3.22	2.40	2.75	1.87	1.20	0.73	0.59	16.18	26.07	25.86
70%	1.10	1.20	2.01	2.77	4.33	5.60	4.44	4.48	3.77	2.70	1.92	1.34	21.39	32.47	32.05
mean	0.89	0.91	1.66	2.42	3.68	4.48	3.83	3.62	3.04	2.19	1.53	1.04	18.66	29.30	29.31
1981-2010 Summary Statistics															
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	WARM	ANN	WAT
30%	0.54	0.40	1.33	2.22	2.84	3.41	2.79	3.43	2.36	1.27	1.07	0.71	18.30	30.12	28.06
70%	1.19	1.00	2.11	3.04	4.30	5.49	4.25	5.15	3.90	3.60	2.10	1.43	21.94	34.27	35.36
mean	0.87	0.80	1.90	2.80	3.69	4.61	4.25	4.18	3.43	2.53	1.80	1.22	20.16	32.09	31.89
Year-to-Year Data															
Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	WARM	ANN	WAT

2016	0.30	0.82	1.53	3.62	2.31	2.91	5.59R								
2015	0.34	0.29	0.65	2.01	4.32	3.31	7.10	3.50	3.90	2.80	4.25	1.68	22.13	34.15	28.76
2014	1.22	1.40	0.78	7.33	4.36	10.50	3.25	3.11	1.61	1.13	1.16	1.05	22.83	36.90	40.24
2013	0.67	1.19	2.06	4.48	4.90	7.84	4.52	1.42	1.31	4.44	0.60	1.64	19.99	35.07	32.38
2012	0.50	2.11	1.30	2.89	9.60	4.21	4.22	1.38	0.54	1.47	0.89	1.63	19.95	30.74	28.71
2011	0.94	0.93	2.05	3.16	6.38	4.00	7.11	4.17	0.50	0.93	0.18	0.85	22.16	31.20	36.55
2010	0.59	0.86	0.95	1.99	2.85	6.11	3.68	5.79	5.86	2.01	2.07	3.23	24.29	35.99	37.37
2009	0.47	1.00	1.93	1.40	0.45	3.84	0.98	6.51	0.78	5.87	0.59	2.23	12.56	26.05	21.62
2008	0.14	0.52	2.08	4.06	2.60	4.36	2.13	2.75	2.28	1.56	1.19	1.51	14.12	25.18	28.14
2007	0.61	1.38	3.51	2.47	3.13	1.94	2.37	6.36	4.91	5.32	0.08	1.82	18.71	33.90	31.05
2006	0.64	0.40	1.78	3.53	3.98	4.24	1.98	5.16	3.27	0.68	1.09	2.60	18.63	29.35	32.55
2005	1.28	1.01	1.30	2.54	3.57	6.30	2.59	3.68	7.02	4.39	1.78	1.40	23.16	36.86	34.46
2004	0.53	1.49	2.18	2.66	5.93	5.16	3.86	1.57	4.91	3.64	1.06	0.47	21.43	33.46	31.34
2003	0.26	0.98	1.66	2.96	5.28	7.88	1.86	0.34	2.40	0.97	1.14	0.94	17.76	26.67	27.80
2002	0.58	0.56	1.94	4.09	4.41	8.52	7.05	6.60	4.15	3.84	0.08	0.26	30.73	42.08	42.59
2001	1.37	1.40	0.99	7.53	5.38	4.80	2.52	3.37	3.79	0.94	3.13	0.62	19.86	35.84	37.28
2000	0.94	1.21	1.03	1.50	3.61	3.48	6.32	3.47	2.46	0.92	3.90	1.31	19.34	30.15	25.79
1999	1.30	0.35	1.70	3.32	6.07	5.48	4.62	3.79	2.47	0.61	0.82	0.34	22.43	30.87	34.30
1998	1.25	0.83	3.85	2.13	4.03	4.46	2.92	5.22	1.26	2.77	1.76	0.67	17.89	31.15	28.82
1997	1.74	0.24	1.43	1.12	1.80	2.98	10.99	4.46	2.69	1.93	0.69	0.25	22.92	30.32	38.17
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	WARM	ANN	WAT
1996	2.25	0.32	1.93	0.74	4.14	4.16	1.78	1.40	1.64	3.95	5.07	1.70	13.12	29.08	26.03
1995	0.64	0.38	2.25	2.40	3.60	5.52	3.79	6.40	1.91	5.19	1.14	1.34	21.22	34.56	32.98
1994	1.31	0.87	0.45	5.98	2.08	2.87	3.64	3.43	3.34	3.93	1.46	0.70	15.36	30.06	27.89
1993	1.45	0.46	1.29	2.53	4.91	6.65	5.63	7.06	2.79	1.24	1.93	0.75	27.04	36.69	38.87
1992	0.94	0.40	1.34	2.37	1.53	4.33	6.73	3.48	4.88	2.29	2.48	1.33	20.95	32.10	33.45
1991	0.54	1.32	2.41	3.91	8.37	2.62	6.58	4.87	8.55	1.66	4.84	0.95	30.99	46.62	42.80
1990	0.10	0.68	3.98	2.73	4.09	8.25	6.80	2.28	1.60	1.93	0.69	1.01	23.02	34.14	32.34
1989	0.46	0.83	1.89	2.31	4.28	3.23	3.82	2.59	1.44	0.46	1.08	0.29	15.36	22.68	25.03
1988	1.17	0.18	1.55	1.19	2.02	0.17	1.60	4.79	3.15	0.79	2.67	0.72	11.73	20.00	19.95
1987	0.47	0.02	0.56	0.15	2.39	2.14	12.56	3.57	1.50	0.96	2.16	1.01	22.16	27.49	25.56
1986	0.88	1.53	1.98	5.73	2.97	4.96	3.96	3.42	6.26	1.28	0.73	0.19	21.57	33.89	38.12
1985	0.70	0.25	3.48	2.60	4.33	3.22	2.89	5.24	6.16	3.59	1.35	1.49	21.84	35.30	35.71
1984	0.72	1.47	1.24	2.73	2.81	6.76	3.25	4.57	3.42	4.50	0.30	2.04	20.81	33.81	35.21
1983	0.43	0.79	2.90	2.26	3.45	5.12	4.09	5.15	2.71	2.71	4.15	1.38	20.52	35.14	36.28
1982	1.96	0.27	2.22	1.93	4.86	2.10	2.87	3.32	3.63	3.34	3.02	3.02	16.78	32.54	28.53
1981	0.26	2.00	1.32	3.24	1.86	6.58	3.63	4.80	1.60	2.70	1.60	1.07	18.47	30.66	26.76
1980	1.08	0.85	1.18	0.85	1.70	5.70	3.66	5.26	3.88	0.94	0.30	0.23	20.20	25.63	28.70
1979	1.28	1.47	2.57	0.58	4.16	5.59	2.40	5.48	2.00	3.10	1.21	0.23	19.63	30.07	28.65
1978	0.37	0.20	0.83	4.55	3.84	6.79	7.47	3.63	2.98	0.49	1.68	0.95	24.71	33.78	37.53
1977	0.69	1.20	4.07	2.21	2.82	4.40	3.79	5.84	3.80	3.99	1.50	1.38	20.65	35.69	29.75
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	WARM	ANN	WAT
1976	1.12	0.58	2.29	0.70	1.09	2.54	2.07	1.23	1.48	0.43	0.11	0.39	8.41	14.03	19.55
1975	3.79	0.84	1.95	5.93	4.99	7.38	2.52	5.97	1.55	0.57	5.10	0.78	22.41	41.37	38.44
1974	0.24	1.40	0.90	2.84	3.21	7.18	1.46	3.89	0.98	1.86	1.17	0.49	16.72	25.62	26.82
1973	1.20	1.02	1.46	1.24	4.14	1.81	3.02	4.04	3.08	0.99	2.37	1.36	16.09	25.73	25.84
1972	0.85	0.35	1.13	1.12	2.58	3.28	6.24	3.75	2.93	2.04	1.10	1.69	18.78	27.06	31.68
1971	0.96	1.64	1.24	1.30	3.72	4.24	3.50	2.33	3.14	6.10	2.76	0.59	16.93	31.52	31.68
1970	0.54	0.15	1.59	3.62	5.54	2.39	4.71	2.75	3.15	5.34	3.86	0.41	18.54	34.05	30.18
1969	2.17	0.51	0.81	1.95	2.37	3.30	4.39	0.63	0.32	2.48	0.89	2.37	11.01	22.19	25.24
1968	0.66	0.15	1.79	3.40	4.05	7.30	5.05	1.04	4.87	6.22	0.64	1.93	22.31	37.10	30.32
1967	2.99	1.37	0.85	2.86	1.48	7.59	1.94	3.68	0.76	1.47	0.07	0.47	15.45	25.53	28.19
1966	0.82	1.66	2.29	1.16	1.62	3.43	2.24	4.55	2.41	3.28	0.45	0.94	14.25	24.85	25.62
1965	0.33	1.49	3.69	3.97	6.54	3.94	5.22	3.41	5.52	1.51	2.16	1.77	24.63	39.55	37.02

1964	0.36	0.07	0.91	3.03	3.64	2.96	2.25	5.92	4.44	0.52	1.36	1.03	19.21	26.49	25.67
1963	0.41	0.36	1.14	2.16	4.79	3.66	2.04	1.76	3.12	0.71	0.64	0.74	15.37	21.53	21.71
1962	0.56	1.64	1.63	1.32	7.16	2.48	5.92	3.92	3.06	1.51	0.55	0.21	22.54	29.96	33.92
1961	0.19	0.63	1.95	2.53	4.77	1.65	3.78	1.85	3.65	2.69	2.19	1.35	15.70	27.23	22.91
1960	0.66	0.17	0.73	2.45	4.69	3.15	2.37	5.33	3.65	0.36	1.07	0.48	19.19	25.11	27.59
1959	0.05	0.38	0.36	0.49	6.33	2.73	3.31	5.98	3.10	2.56	0.52	1.31	21.45	27.12	25.43
1958	0.28	0.13	0.33	2.11	1.96	2.66	2.85	4.46	1.45	1.71	0.86	0.13	13.38	18.93	19.40
1957	0.33	0.81	1.44	1.33	3.85	7.45	4.66	6.07	3.02	1.37	1.55	0.25	25.05	32.13	32.71
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	WARM	ANN	WAT
1956	0.65	0.14	1.41	0.73	2.76	7.49	5.37	5.56	0.80	2.06	1.54	0.15	21.98	28.66	28.58
1955	0.52	1.45	0.61	0.96	0.81	2.26	8.01	3.54	1.53	1.56	0.92	1.19	16.15	23.36	22.33
1954	0.26	0.45	1.73	4.59	3.03	5.08	2.61	3.05	3.71	1.76	0.55	0.33	17.48	27.15	28.27
1953	0.83	1.24	1.50	2.68	3.50	7.08	5.72	3.45	0.74	0.23	1.94	1.59	20.49	30.50	28.24
1952	1.07	1.21	2.79	0.67	3.29	4.77	4.94	4.87	0.39	0.02	1.10	0.38	18.26	25.50	28.79
1951	0.50	1.66	2.96	2.04	4.04	5.28	7.88	3.65	5.55	1.75	1.63	1.41	26.40	38.35	37.79
1950	1.40	0.60	2.66	2.53	4.03	1.21	3.57	1.49	1.88	1.19	1.16	1.88	12.18	23.60	23.18
1949	2.04	0.25	3.08	1.89	1.28	4.24	5.74	2.02	3.39	2.27	0.53	1.01	16.67	27.74	27.86
1948	0.19	1.84	1.53	1.93	0.73	2.92	2.34	3.89	1.02	0.86	2.32	0.75	10.90	20.32	21.06
1947	0.89	0.21	0.46	2.88	2.72	5.12	1.44	3.46	1.69	0.98	3.15	0.54	14.43	23.54	24.32
1946	0.73	1.32	1.25	0.92	3.40	6.53	2.24	0.61	5.65	2.78	1.90	0.77	18.43	28.10	25.86
1945	0.77	1.93	2.07	3.46	2.65	5.99	3.53	3.22	2.11	0.40	1.27	1.54	17.50	28.94	28.58
1944	0.49	1.32	1.45	2.58	5.65	7.14	4.31	3.50	0.92	0.17	2.43	0.25	21.52	30.21	30.93
1943	1.34	0.65	1.28	0.97	5.35	4.14	4.33	2.28	1.90	1.50	2.07	0.00	18.00	25.81	24.34
1942	0.15	0.45	2.26	3.18	7.86	2.92	3.55	2.91	7.21	0.72	0.37	1.01	24.45	32.59	36.99
1941	0.65	1.20	1.04	2.37	3.90	4.57	2.39	3.59	3.93	4.65	0.93	0.92	18.38	30.14	30.80
1940	0.37	0.89	2.17	1.31	1.96	5.98	1.89	4.43	0.39	1.89	4.15	1.12	14.65	26.55	21.76
1939	1.16	1.17	0.73	2.57	3.53	6.81	3.10	3.59	3.21	1.49	0.02	0.86	20.24	28.24	29.67
1938	0.81	0.77	2.20	3.51	7.74	3.32	4.09	3.58	3.28	0.79	2.12	0.89	22.01	33.10	32.12
1937	1.24	0.51	1.00	2.57	5.95	2.63	0.87	4.48	1.72	1.70	0.51	0.61	15.65	23.79	24.18
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	WARM	ANN	WAT
1936	0.95	1.78	2.95	1.78	2.38	1.78	0.17	2.76	1.24	0.51	0.74	1.96	8.33	19.00	21.91
1935	1.59	0.24	1.50	2.40	3.34	5.60	2.90	3.53	1.85	4.24	0.80	1.08	17.22	29.07	30.59
1934	0.86	0.18	0.82	1.22	0.24	2.70	1.45	2.12	5.15	4.24	2.09	1.31	11.66	22.38	17.48
1933	0.73	0.81	1.92	1.45	6.78	1.47	2.11	1.06	3.24	1.37	0.64	0.73	14.66	22.31	24.67
1932	1.69	0.75	1.52	2.33	2.57	2.46	4.43	3.96	0.82	1.09	2.56	1.45	14.24	25.63	27.26
1931	0.17	0.97	1.64	1.01	1.38	4.56	0.87	3.78	2.42	2.14	3.92	0.67	13.01	23.53	20.93
1930	1.12	2.25	0.60	0.59	3.66	5.70	1.64	1.04	4.09	1.36	2.67	0.10	16.13	24.82	24.06
1929	1.66	1.09	1.30	1.93	1.50	3.57	2.82	2.77	4.27	2.37	0.52	0.48	14.93	24.28	25.04
1928	0.36	1.60	0.93	2.61	2.15	3.39	3.93	5.30	2.53	3.18	0.40	0.55	17.30	26.93	29.65
1927	0.54	0.50	2.70	2.83	4.26	5.81	1.88	2.42	4.38	2.26	1.60	2.99	18.75	32.17	30.42
1926	0.98	0.62	1.51	0.56	1.25	3.76	2.74	3.69	5.45	1.68	1.96	1.46	16.89	25.66	22.58
1925	0.57	0.56	0.47	1.20	2.46	5.02	5.61	0.61	3.50	0.65	0.55	0.82	17.20	22.02	22.51
1924	0.49	0.63	1.71	4.41	1.23	6.35	1.65	8.53	3.84	0.86	0.62	1.03	21.60	31.35	30.60
1923	1.17	0.48	1.16	2.50	2.76	5.70	3.20	2.18	1.43	0.90	0.44	0.42	15.27	22.34	25.74
1922	0.85	3.43	1.88	1.43	2.56	4.84	1.64	1.70	2.27	1.26	3.75	0.15	13.01	25.76	23.36
1921	0.47	0.61	2.20	2.13	3.43	4.15	4.10	2.05	4.23	0.59	1.85	0.32	17.96	26.13	28.22
1920	1.84	0.44	2.88	2.31	2.81	7.70	1.48	1.68	3.00	2.76	1.28	0.81	16.67	28.99	29.94
1919	0.49	2.46	0.95	3.54	2.20	5.16	6.38	2.26	1.25	2.08	2.91	0.81	17.25	30.49	33.32
1918	0.57	0.51	0.95	1.23	4.93	2.64	3.88	3.71	1.21	2.64	4.06	1.93	16.37	28.26	22.40
1917	2.15	0.70	2.96	1.69	3.57	3.69	4.03	2.93	2.07	2.10	0.08	0.59	16.29	26.56	26.79
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	WARM	ANN	WAT
1916	3.05	0.42	1.45	2.76	7.08	5.88	2.10	2.75	2.64	1.66	0.40	0.94	20.45	31.13	35.13
1915	1.42	2.20	1.19	1.77	4.84	5.26	6.12	3.71	2.75	2.75	3.80	0.45	22.68	36.26	31.81
1914	0.90	0.55	1.24	3.29	2.01	8.84	1.42	7.38	2.90	1.76	0.19	0.60	22.55	31.08	32.13

1913	0.43	0.75	1.35	2.05	2.97	2.46	7.85	1.75	4.10	2.63	0.92	0.05	19.13	27.31	26.55
1912	0.63	0.26	0.33	2.34	5.20	1.21	6.27	5.56	1.60	1.00	0.02	1.82	19.84	26.24	32.88
1911	0.89	0.94	1.00	2.44	4.00	6.37	4.37	3.52	5.16	6.21	1.25	2.02	23.42	38.17	30.54
1910	1.20	0.64	0.08	0.82	1.46	1.49	0.90	1.83	2.24	0.86	0.56	0.43	7.92	12.51	17.77
1909	1.81	2.38	0.31	2.00	3.62	3.34	4.46	2.21	3.63	1.71	2.85	2.55	17.26	30.87	28.50
1908	0.55	1.07	1.74	3.85	7.71	6.69	2.14	0.87	4.36	2.26	1.18	1.30	21.77	33.72	32.04
1907	1.26	0.88	0.82	1.18	2.46	4.61	3.39	5.31	4.54	1.52	0.90	0.64	20.31	27.51	30.12
1906	1.61	0.36	1.03	1.99	9.62	3.22	2.53	4.82	5.04	2.22	2.46	0.99	25.23	35.89	36.04
1905	0.90	0.69	0.87	0.82	4.34	8.29	3.13	4.32	5.80	2.75	2.93	0.14	25.88	34.98	35.82
1904	0.72	1.01	1.54	1.97	3.35	3.94	4.69	5.65	3.19	6.00	0.10	0.56	20.82	32.72	31.48
1903	0.32	0.68	2.07	3.46	4.72	1.22	6.21	4.85	7.29	4.11	0.40	0.91	24.29	36.24	37.16
1902	0.55	0.58	0.39	2.78	3.82	2.57	7.51	4.54	4.01	1.75	1.75	2.84	22.45	33.09	29.14
1901	0.42	0.34	2.15	1.36	1.41	5.66	2.10	2.11	4.46	0.75	0.96	0.68	15.74	22.40	27.05
1900	0.63	0.86	1.75	1.73	0.31	1.72	7.11	6.22	8.14	5.68	0.77	0.59	23.50	35.51	33.52
1899	0.79	1.19	2.73	0.75	3.46	5.24	1.54	3.40	1.57	3.48	0.42	1.15	15.21	25.72	28.10
1898	0.05	1.60	2.25	1.29	5.47	2.80	2.97	2.87	1.09	5.83	1.51	0.09	15.20	27.82	23.13
1897	2.04	1.19	3.68	1.33	1.72	7.50	5.12	2.10	2.25	1.67	0.89	0.18	18.69	29.67	35.56
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	WARM	ANN	WAT
1896	0.86	0.21	3.43	5.50	3.68	3.36	1.08	4.26	2.57	3.97	3.94	0.72	14.95	33.58	26.04
1895	0.98	0.54	0.49	1.76	2.59	2.94	3.62	2.01	4.37	0.06	0.89	0.14	15.53	20.39	24.90
1894	1.31	0.06	2.90	4.65	4.40	1.24	0.38	0.55	1.82	3.69	0.54	1.37	8.39	22.91	23.16
1893	1.30	1.74	2.14	5.11	2.57	1.54	2.22	4.64	2.55	2.20	1.05	2.60	13.52	29.66	25.41
1892	0.06	1.59	1.08	1.26	5.86	7.33	10.07	5.18	1.30	0.27	0.62	0.71	29.74	35.33	39.24
1891	0.84	1.67	1.45	2.30	1.35	3.41	2.87	3.15	1.87	1.55	0.87	3.09	12.65	24.42	

Minnesota Climatology Working Group

State Climatology Office - DNR Division of Ecological and Water Resources University of Minnesota

Precipitation Worksheet Using Gridded Database

Precipitation data for target wetland location:

county: Hennepin
township name: Plymouth
nearest community: **Mission Farms**
township number: 118N
range number: 22W
section number: 24

Aerial photograph or site visit date:

Monday, **August 15, 2016**

Score using 1981-2010 normal period

values are in inches A 'R' following a monthly total indicates a provisional value derived from radar-based estimates.	first prior month: **July 2016**	second prior month: **June 2016**	third prior month: **May 2016**
estimated precipitation total for this location:	5.59R	2.91	2.31
there is a 30% chance this location will have less than:	2.79	3.41	2.84
there is a 30% chance this location will have more than:	4.25	5.49	4.30
type of month: dry normal wet	wet	dry	dry
monthly score	**3 * 3 = 9**	**2 * 1 = 2**	**1 * 1 = 1**
multi-month score: 6 to 9 (dry) 10 to 14 (normal) 15 to 18 (wet)	**12 (Normal)**		

Other Resources:

- retrieve daily precipitation data
- view radar-based precipitation estimates
- view weekly precipitation maps
- *Evaluating Antecedent Precipitation Conditions* (BWSR)

		Monthly	30 day rolling	Date of visit (x)	y
1-Jan-16	0	0.35		8/16/2016	0
2-Jan-16	0			8/16/2016	10
3-Jan-16	0				
4-Jan-16	0				
5-Jan-16	0				
6-Jan-16	0				
7-Jan-16	0.07				
8-Jan-16	0.11				
9-Jan-16	T				
10-Jan-16	0				
11-Jan-16	0				
12-Jan-16	0.03				
13-Jan-16	0				
14-Jan-16	0				
15-Jan-16	T				
16-Jan-16	0				
17-Jan-16	0				
18-Jan-16	0				
19-Jan-16	0				
20-Jan-16	0.06				
21-Jan-16	0				
22-Jan-16	T				
23-Jan-16	0				
24-Jan-16	0				
25-Jan-16	0.01				
26-Jan-16	0.06				
27-Jan-16	0.01				
28-Jan-16	0				
29-Jan-16	0				
30-Jan-16	0				
31-Jan-16	0				
1-Feb-16	0	0.89			
2-Feb-16	0				
3-Feb-16	0.44				
4-Feb-16	T				
5-Feb-16	0.02				
6-Feb-16	0				
7-Feb-16	T				
8-Feb-16	0.05				
9-Feb-16	0				
10-Feb-16	0				
11-Feb-16	0				
12-Feb-16	0				
13-Feb-16	0				
14-Feb-16	0				
15-Feb-16	0				
16-Feb-16	0				
17-Feb-16	0				
18-Feb-16	0				

mon year	pre (inches)
Jan-16	0.35
Feb-16	0.89
Mar-16	1.67
Apr-16	3.86
May-16	2.53
Jun-16	3.39
Jul-16	6.19
Aug-16	0.98

19-Feb-16	0	
20-Feb-16	0	
21-Feb-16	0	
22-Feb-16	0	
23-Feb-16	0.38	
24-Feb-16	0	
25-Feb-16	0	
26-Feb-16	0	
27-Feb-16	0	
28-Feb-16	0	
29-Feb-16	T	
1-Mar-16	0	1.67
2-Mar-16	0	
3-Mar-16	0	
4-Mar-16	0	
5-Mar-16	0.02	
6-Mar-16	0	
7-Mar-16	0	
8-Mar-16	T	
9-Mar-16	T	
10-Mar-16	0	
11-Mar-16	0	
12-Mar-16	0	
13-Mar-16	T	
14-Mar-16	0.01	
15-Mar-16	0.02	
16-Mar-16	0.8	
17-Mar-16	0	
18-Mar-16	0	
19-Mar-16	0.08	
20-Mar-16	0	
21-Mar-16	0	
22-Mar-16	0	
23-Mar-16	0	
24-Mar-16	0	
25-Mar-16	0	
26-Mar-16	0	
27-Mar-16	0	
28-Mar-16	0	
29-Mar-16	0	
30-Mar-16	0	
31-Mar-16	0.74	
1-Apr-16	0	3.86
2-Apr-16	0	
3-Apr-16	0	
4-Apr-16	0	
5-Apr-16	0	
6-Apr-16	0.05	
7-Apr-16	0.03	
8-Apr-16	0.09	
9-Apr-16	T	
10-Apr-16	0	

11-Apr-16	0		
12-Apr-16	0		
13-Apr-16	0		
14-Apr-16	0		
15-Apr-16	0		
16-Apr-16	0		
17-Apr-16	0		
18-Apr-16	0		
19-Apr-16	0.33		
20-Apr-16	0.06		
21-Apr-16	0.41		
22-Apr-16	0.14		
23-Apr-16	0		
24-Apr-16	0.64		
25-Apr-16	0.73		
26-Apr-16	0.2		
27-Apr-16	0		
28-Apr-16	0.5		
29-Apr-16	0.68		
30-Apr-16	0		
1-May-16	0	2.53	3.86
2-May-16	0		3.86
3-May-16	0		3.86
4-May-16	0		3.86
5-May-16	0		3.86
6-May-16	0		3.86
7-May-16	0		3.81
8-May-16	0		3.78
9-May-16	0		3.69
10-May-16	0.85		3.69
11-May-16	0.04		4.54
12-May-16	0.14		4.58
13-May-16	0.19		4.72
14-May-16	0		4.91
15-May-16	0		4.91
16-May-16	0		4.91
17-May-16	0		4.91
18-May-16	0		4.91
19-May-16	0		4.91
20-May-16	0		4.58
21-May-16	0		4.52
22-May-16	0		4.11
23-May-16	0		3.97
24-May-16	0.21		3.97
25-May-16	0		3.54
26-May-16	0.34		2.81
27-May-16	0.04		2.95
28-May-16	0.48		2.99
29-May-16	0.13		2.97
30-May-16	0.11		2.42
31-May-16	0		2.53
1-Jun-16	0.02	3.39	2.53

2-Jun-16	0		2.55
3-Jun-16	0		2.55
4-Jun-16	0.24		2.55
5-Jun-16	0.11		2.79
6-Jun-16	0.06		2.90
7-Jun-16	0		2.96
8-Jun-16	0		2.96
9-Jun-16	0.64		2.96
10-Jun-16	0		2.75
11-Jun-16	0		2.71
12-Jun-16	0.41		2.57
13-Jun-16	1.3		2.79
14-Jun-16	0		4.09
15-Jun-16	0.19		4.09
16-Jun-16	0		4.28
17-Jun-16	0.02		4.28
18-Jun-16	0		4.30
19-Jun-16	0		4.30
20-Jun-16	0.26		4.30
21-Jun-16	0		4.56
22-Jun-16	0		4.56
23-Jun-16	0.14		4.56
24-Jun-16	0		4.49
25-Jun-16	0		4.49
26-Jun-16	0		4.15
27-Jun-16	0		4.11
28-Jun-16	0		3.63
29-Jun-16	0		3.50
30-Jun-16	0		3.39
1-Jul-16	0.06	6.19	3.39
2-Jul-16	0		3.43
3-Jul-16	0		3.43
4-Jul-16	0		3.43
5-Jul-16	0		3.19
6-Jul-16	2.11		3.08
7-Jul-16	0.09		5.13
8-Jul-16	0		5.22
9-Jul-16	0		5.22
10-Jul-16	0.51		4.58
11-Jul-16	0		5.09
12-Jul-16	0.22		5.09
13-Jul-16	0		4.90
14-Jul-16	0		3.60
15-Jul-16	0.38		3.60
16-Jul-16	0		3.79
17-Jul-16	0.29		3.79
18-Jul-16	0		4.06
19-Jul-16	0		4.06
20-Jul-16	0		4.06
21-Jul-16	0.17		3.80
22-Jul-16	0		3.97
23-Jul-16	0		3.97

24-Jul-16	1.98		3.83
25-Jul-16	0		5.81
26-Jul-16	0		5.81
27-Jul-16	0		5.81
28-Jul-16	0.38		5.81
29-Jul-16	0		6.19
30-Jul-16	0		6.19
31-Jul-16	0		6.19
1-Aug-16	0	10.98	6.13
2-Aug-16	0		6.13
3-Aug-16	0		6.13
4-Aug-16	3.02		6.13
5-Aug-16	0		9.15
6-Aug-16	0		7.04
7-Aug-16	0		6.95
8-Aug-16	0		6.95
9-Aug-16	0		6.95
10-Aug-16	0		6.44
11-Aug-16	3.64		6.44
12-Aug-16	0		9.86
13-Aug-16	0.34		9.86
14-Aug-16	0		10.20
15-Aug-16	0		9.82
16-Aug-16	0		9.82
17-Aug-16	0		9.53
18-Aug-16	0		9.53
19-Aug-16	0.75		9.53
20-Aug-16	0.57		10.28
21-Aug-16	0.27		10.68
22-Aug-16	0		10.95
23-Aug-16	0		10.95
24-Aug-16	1.04		8.97
25-Aug-16	0		10.01
26-Aug-16	0		10.01
27-Aug-16	0.03		10.01
28-Aug-16	0		9.66
29-Aug-16	0		9.66
30-Aug-16	1.32		9.66
31-Aug-16	0		10.98

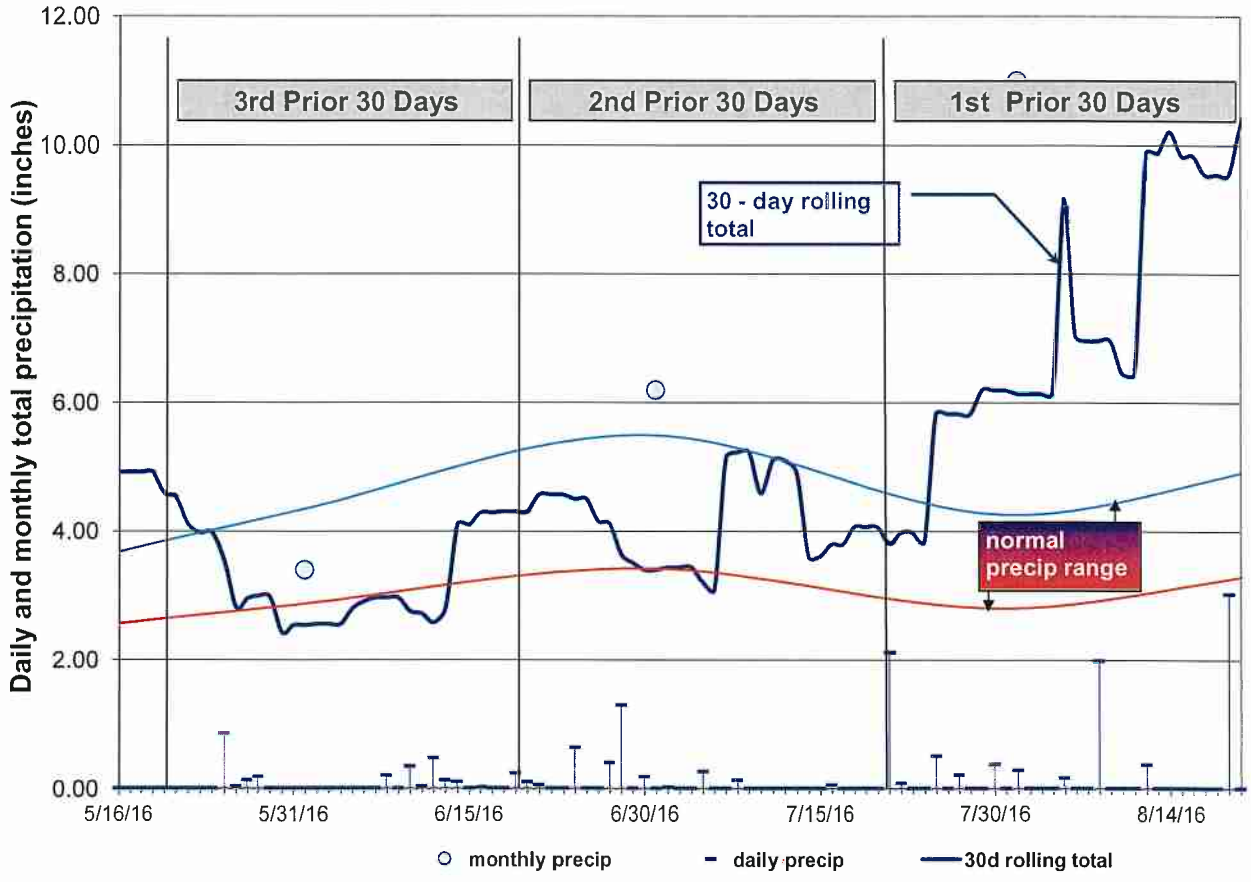
month	date	30% chance <	30% chance >
Jan	1/31/16	0.54	1.19
Feb	2/29/16	0.4	1
Mar	3/31/16	1.33	2.11
Apr	4/30/16	2.22	3.04
May	5/31/16	2.84	4.3
Jun	6/30/16	3.41	5.49
Jul	7/31/16	2.79	4.25
Aug	8/31/16	3.43	5.15
Sep	9/30/16	2.36	3.9
Oct	10/31/16	1.27	3.6
Nov	11/30/16	1.07	2.1
Dec	12/31/16	0.71	1.43

1981-2010 Summary Statistics from State Climatology web site:

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
30%	0.54	0.4	1.33	2.22	2.84	3.41	2.79	3.43	2.36	1.27	1.07
70%	1.19	1	2.11	3.04	4.3	5.49	4.25	5.15	3.9	3.6	2.1

:

Dec
0.71
1.43


12.00
10.00
8.00
6.00
4.00
2.00
0.00
Daily and monthly total precipitation (inches)
3rd Prior 30 Days
2nd Prior 30 Days
1st Prior 30 Days
30 - day rolling total
normal precip range
5/16/16
5/31/16
6/15/16
6/30/16
7/15/16
7/30/16
8/14/16
monthly precip
daily precip
30d rolling total

Responsive partner.
Exceptional outcomes.

Toll Free: 800-472-2232 **Email: wenckmp@wenck.com** **Web: wenck.com**

MINNESOTA
Maple Plain
763-479-4200

Golden Valley
763-252-6800
Windom
507-831-2703

New Hope
800-368-8831
Woodbury
651-294-4580

COLORADO
Denver
602-370-7420
Fort Collins
970-223-4705

GEORGIA
Roswell
678-987-5840

NORTH DAKOTA
Fargo
701-297-9600
Mandan
701-751-3370
Williston
800-472-2232

SOUTH DAKOTA
Pierre
605-222-1826

WYOMING
Cheyenne
307-634-7848
Sheridan
307-675-1148