



1



2



Expert, I helped write the guidance.

What is the off-site method?

3



4



5

6

Overview

What the ?



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Overview

Inherent difficulty with wetlands on ag. land:

- They often lack a natural plant community
- Their soils are disturbed by cultivation
- Their hydrology is often altered either directly (ditches, tile, diversion) or indirectly (tilling patterns, evaporation and transpiration from exposed soils and intensive cropping).



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Overview



- '87 Manual Definitions:
- Normal Circumstances
 - Atypical area
 - Problem area



- Midwest and NC/NE require aerial review per Chapter 5:
- "Agricultural lands"
 - "Wetlands that periodically lack indicators of wetland hydrology"

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Overview

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Guidance



March 4, 2015

Guidance for Submittal of Delineation Reports to the St. Paul District Army Corps of Engineers and Wetland Conservation Act Local Governmental Units in Minnesota, Version 2.0

3.7.6 Using Aerial Imagery to Assess Wetland Hydrology
 Procedures have been updated and improved for the assessment of wetland hydrology based on aerial imagery. The interagency approach to off-site wetland determinations on agricultural lands (also referred to as the state "Mapping Conventions") is required for CWA and WCA purposes. Refer to the guidance

Guidance for Offsite Hydrology

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Guidance



July 1, 2016

Guidance for OffSite Hydrology/Wetland Determinations

This document replaces all previous Minnesota Board of Water and Soil Resources (BWSR) and St Paul District Army Corps of Engineers (District) published versions of guidance concerning wetland mapping conventions.

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Guidance

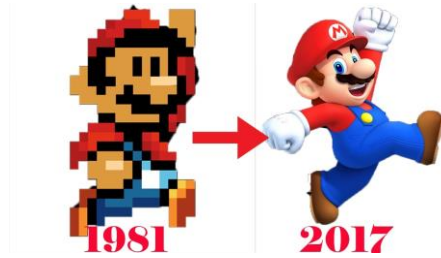
- Always use all* imagery in putting the pieces together, and place greatest reliance on more recent years; they tend to best reflect current conditions.

*Use only high quality/good resolution slides. Much better to focus on image quality than normalcy of antecedent conditions.



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The evolution of aerial photo review

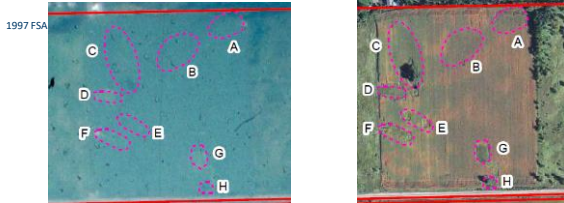


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Guidance

Moving away from FSA images 1979 – 2000

Using more recent and clearer images: 5 normal years

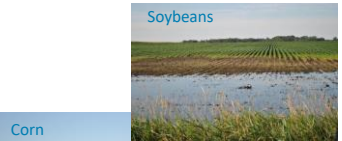


15

Variables

Vegetation Tolerance

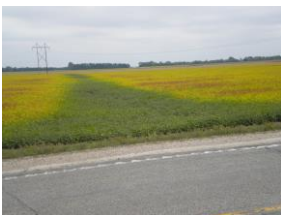
Hydrophytic Veg.



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Guidance

Vigor and stress responses to wetland conditions



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Evaluating Images

Signatures:

- CS: Crop stress
- DO: Drowned Out
- NC: Not cropped
- SW: Standing water
- NV: Normal vegetative cover
- NSS: No soil wetness
- AP: Altered pattern
- SS: Soil wetness signature
- CS/DO... (can have multiple, use the /)

Wetland Signatures are a positive "hit"

18

Evaluating Images

Crop Stress (CS)



19

Evaluating Images

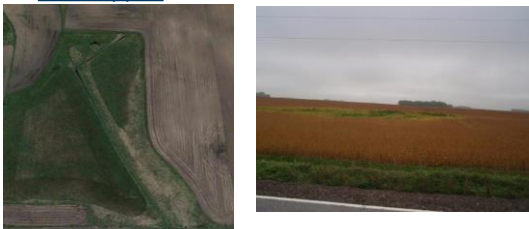
Drowned Out (DO)



20

Evaluating Images

NC – not cropped.



21

Evaluating Images

Standing Water (SW)



22

Evaluating Images

AP – altered pattern



23

WS – wetland signature.



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Evaluating Images

Normal Vegetative Cover (NV) or No Soil Wetness (NSS)



25

Evaluating Images

Soil Wetness Signature-SS

- In Bare soil images, dark, or wet-appearing photo tone from early growing season
- May even include some standing water
- Note the drift lines around the edge of the basin



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Evaluating Images

What signature(s) do you see?



Crop Stress (CS)	
Drowned Out (DO)	
Not Cropped (NC)	
Standing Water (SW)	
Altered Pattern (AP)	
Wetland Signature (WS)	

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Evaluating Images



Light versus dark is relative
Calibrate your eye!

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Variables

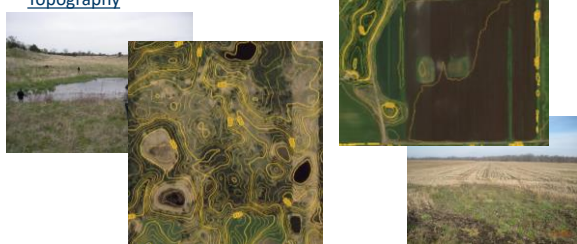
Stem Density



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Variables

Topography



30

Variables

Reference Areas



31

Variables

Deep Peat Soils



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Variables

Iron Chlorosis



Winter Freeze



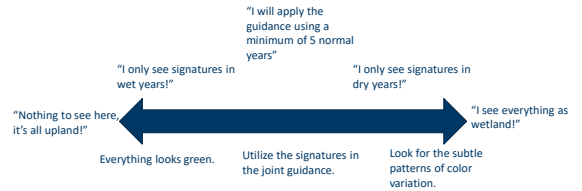
Business Decisions



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Photo interpretation

• Interpretation conundrum scale:



6/6/2023

MWPCP Training | bwr.state.mn.us

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Wet Signatures

Standing Water (black)

Crop Stress (mottled tones, lime green, etc.)



Drownout (gray)

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Wet Signatures

Drownout

Cropped Around Wetland

Late Planting or Mowed for Hay



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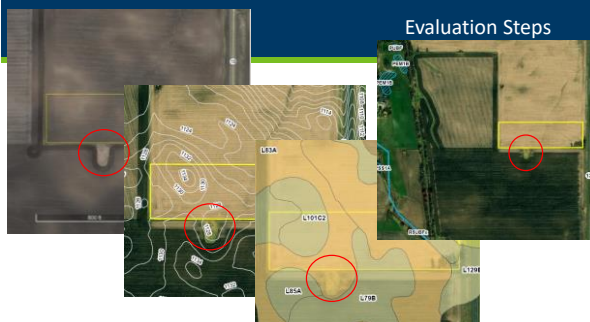
Evaluation Steps

- Assign identifying labels:



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Evaluation Steps



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Aerial photo review

- Note aerial review conclusion on corresponding data sheets, where possible, to aid with regulatory review.
- Signatures on aerials correspond directly to Hydrology Indicators
 - B7 – Inundation Visible on Aerial Imagery
 - C9 – Saturation Visible on Aerial Imagery
 - D1 – Stunted or Stressed Plants



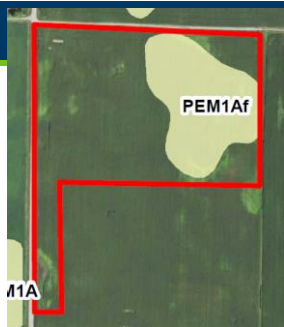
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Overview

HYDROLOGY	
Wetland Hydrology Indicators:	Secondary Indicators (minimum of two required)
<u>Primary Indicators (minimum of one is required, check all that apply):</u>	
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Water-Clashed Leaves (B9)
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Aquatic Fauna (B13)
<input type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Mud Deposits (B15)
<input type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> Hydrogen Sulfide Color (C1)
<input type="checkbox"/> Sediment Deposits (B2)	<input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3)
<input type="checkbox"/> Drift Deposits (B3)	<input type="checkbox"/> Presence of Reduced Iron (C4)
<input type="checkbox"/> Algal Mat or Crust (B4)	<input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)
<input checked="" type="checkbox"/> Iron Deposits (B6)	<input type="checkbox"/> Thin Muck Surface (C7)
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> Sparsely vegetated (C0) (see comments)	
Field Observations:	
Surface Water Present? Yes ___ No ___ Depth (inches):	Wetland Hydrology Present? Yes ___ No ___
Water Table Present? Yes ___ No ___ Depth (inches):	
Saturation Present? Yes ___ No ___ Depth (inches):	
<small>Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available. June 2014 Google Image shows inundation during normal antecedent precip.</small>	
Remarks: Used off-site methods per 2010 BWSR Technical Guidance.	

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AOI NWI

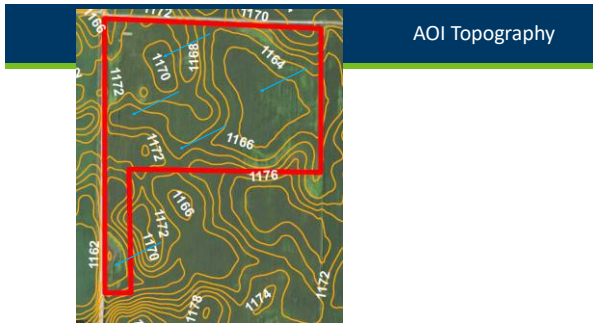


41

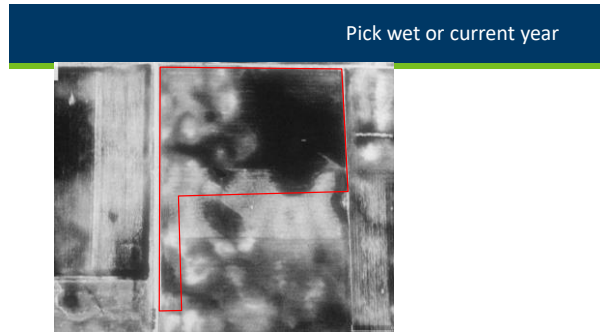
AOI Soils



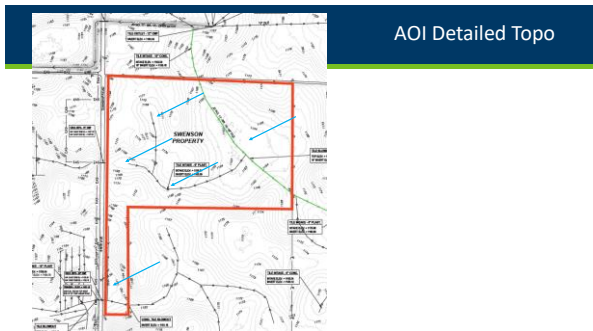
42



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Antecedent Precip

Hydrology & Antecedent Precipitation

bwsr.state.mn.us/hydrology-antecedent-precipitation

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2018-Dry

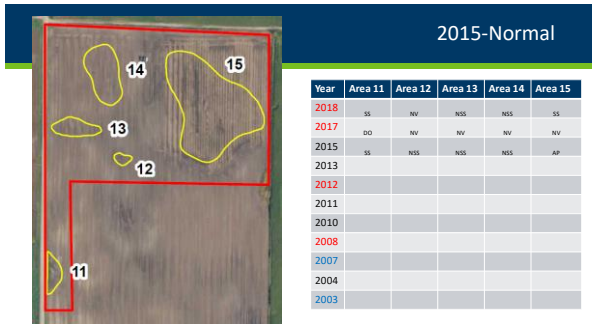
Year	Area 11	Area 12	Area 13	Area 14	Area 15
2018	SS	NV	NSS	NSS	SS
2017					
2015					
2013					
2012					
2011					
2010					
2008					
2007					
2004					
2003					

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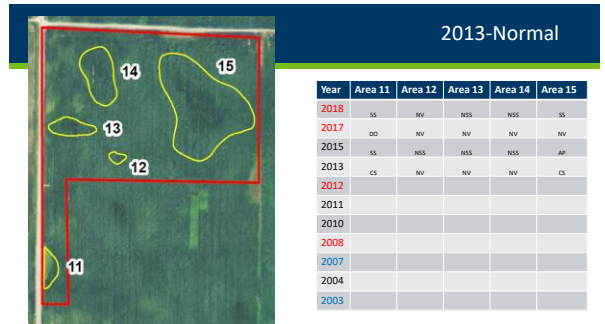
2017-Dry

Year	Area 11	Area 12	Area 13	Area 14	Area 15
2018	SS	NV	NSS	NSS	SS
2017	DD	NV	NV	NV	NV
2015					
2013					
2012					
2011					
2010					
2008					
2007					
2004					
2003					

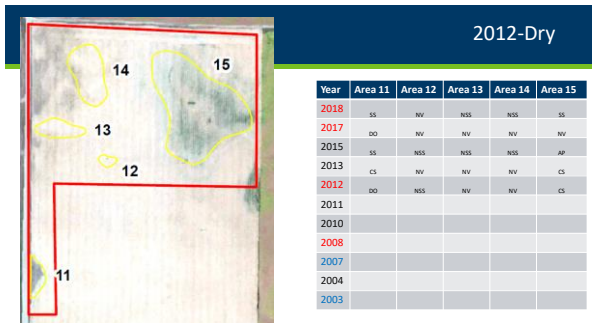
48



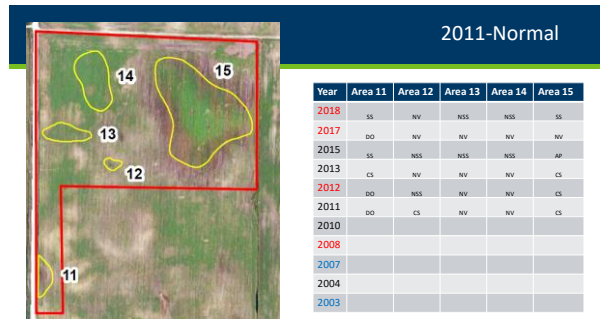
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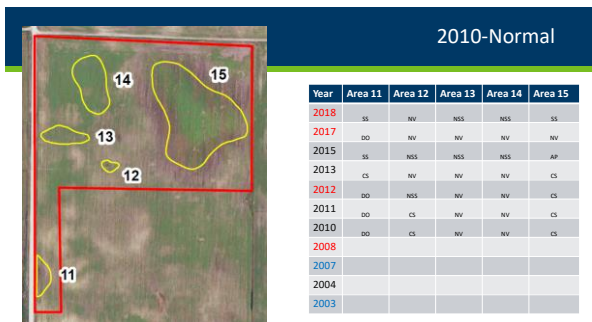
50



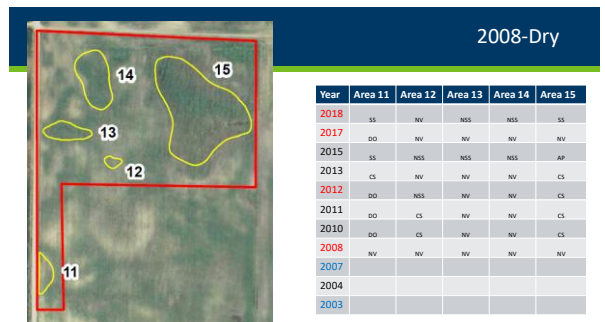
51



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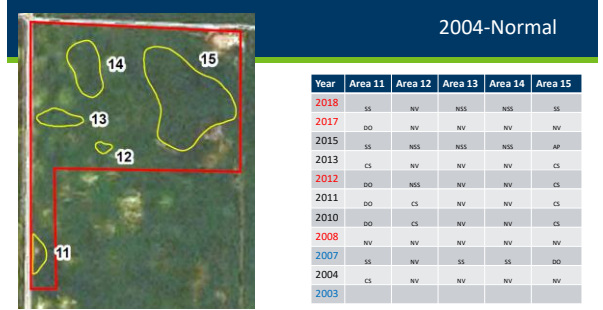
54



2007-Wet

Year	Area 11	Area 12	Area 13	Area 14	Area 15
2018	SS	NV	NSS	NSS	SS
2017	DO	NV	NV	NV	NV
2015	SS	NSS	NSS	NSS	AP
2013	CS	NV	NV	NV	CS
2012	DO	NSS	NV	NV	CS
2011	DO	CS	NV	NV	CS
2010	DO	CS	NV	NV	CS
2008	NV	NV	NV	NV	NV
2007	SS	NV	SS	SS	DO
2004	CS	NV	NV	NV	NV
2003					

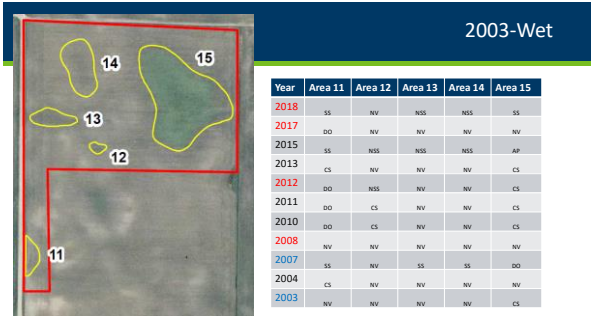
55



2004-Normal

Year	Area 11	Area 12	Area 13	Area 14	Area 15
2018	SS	NV	NSS	NSS	SS
2017	DO	NV	NV	NV	NV
2015	SS	NSS	NSS	NSS	AP
2013	CS	NV	NV	NV	CS
2012	DO	NSS	NV	NV	CS
2011	DO	CS	NV	NV	CS
2010	DO	CS	NV	NV	CS
2008	NV	NV	NV	NV	NV
2007	SS	NV	SS	SS	DO
2004	CS	NV	NV	NV	NV
2003					

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2003-Wet

Year	Area 11	Area 12	Area 13	Area 14	Area 15
2018	SS	NV	NSS	NSS	SS
2017	DO	NV	NV	NV	NV
2015	SS	NSS	NSS	NSS	AP
2013	CS	NV	NV	NV	CS
2012	DO	NSS	NV	NV	CS
2011	DO	CS	NV	NV	CS
2010	DO	CS	NV	NV	CS
2008	NV	NV	NV	NV	NV
2007	SS	NV	SS	SS	DO
2004	CS	NV	NV	NV	NV
2003	NV	NV	NV	NV	CS

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Let's do the math.

Wetland Area	Hydric Soils	Identified on NWI	Percent with wet signatures	Field verification	Wetland?
11	Yes	Yes	100	NA	Yes
12	Yes	No	0	NA	No
13	Yes	No	0	NA	No
14	Yes	No	0	NA	No
15	Yes	Yes	80	NA	Yes

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Document

Hydric Soils present?	Identified on NWI or other wetland map?	Percent with wet signatures from Exhibit 1	Field verification required?	Wetland?
Yes	Yes	>50%	No	Yes
Yes	Yes	30-50%	No	Yes
Yes	Yes	<50%	Yes	Yes, if other hydrology indicators present
Yes	No	>50%	No	Yes
Yes	No	30-50%	Yes	Yes, if other hydrology indicators present
Yes	No	<50%	No	No
No	Yes	30-50%	No	Yes
No	Yes	<50%	No	No
No	No	>50%	Yes	Yes, if other hydrology indicators present
No	No	30-50%	Yes	Yes, if other hydrology indicators present
No	No	<50%	No	No

Area	Hydric Soils Present	Identified on NWI or other wetland map	Percent with wet signatures from Exhibit 1	Other hydrology indicators present	Wetland?
11	Yes	Yes	100	NA	Yes
12	Yes	No	0	NA	No
13	Yes	No	0	NA	No
14	Yes	No	0	NA	No
15	Yes	Yes	80	NA	Yes

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Document

Hydric Soils present?	Identified on NWI or other wetland map?	Percent with wet signatures from Exhibit 1	Field verification required?	Wetland?
Yes	Yes	>50%	No	Yes
Yes	Yes	30-50%	No	Yes
Yes	Yes	<50%	Yes	Yes, if other hydrology indicators present
Yes	No	>50%	No	Yes
Yes	No	30-50%	Yes	Yes, if other hydrology indicators present
Yes	No	<50%	No	No
No	Yes	30-50%	No	Yes
No	Yes	<50%	No	No
No	No	>50%	Yes	Yes, if other hydrology indicators present
No	No	30-50%	Yes	Yes, if other hydrology indicators present
No	No	<50%	No	No

Area	Hydric Soils Present	Identified on NWI or other wetland map	Percent with wet signatures from Exhibit 1	Other hydrology indicators present	Wetland?
11	Yes	Yes	100	NA	Yes
12	Yes	No	0	NA	No
13	Yes	No	0	NA	No
14	Yes	No	0	NA	No
15	Yes	Yes	80	NA	Yes

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Document

Hydric Soils present ^a	Identified on NWI or other wetland map ^b	Percent with wet signatures from Exhibit 1	Field verification required ^c	Wetland? ^d
Yes	Yes	<50%	No	No
Yes	Yes	50-50%	No	Yes
Yes	Yes	<50%	Yes	Yes, if other hydrology indicators present.
Yes	No	<50%	No	Yes
Yes	No	50-50%	Yes	Yes, if other hydrology indicators present.
Yes	No	<50%	No	No
No	Yes	<50%	No	Yes
No	Yes	50-50%	No	Yes
No	Yes	<50%	Yes	Yes, if other hydrology indicators present.
No	No	50-50%	Yes	Yes, if other hydrology indicators present.
No	No	<50%	No	No

Area	Hydric Soils Present	Identified on NWI or other wetland map	Percent with wet signatures from Exhibit 1	Other hydrology indicators present	Wetland?
11	Yes	No	100	NA	Yes
12	Yes	No	40	NA	No
13	Yes	No	0	NA	No
14	Yes	No	0	NA	No
15	Yes	Yes	40	NA	Yes

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Document

Hydric Soils present ^a	Identified on NWI or other wetland map ^b	Percent with wet signatures from Exhibit 1	Field verification required ^c	Wetland? ^d
Yes	Yes	<50%	No	No
Yes	Yes	50-50%	No	Yes
Yes	Yes	<50%	Yes	Yes, if other hydrology indicators present.
Yes	No	<50%	No	Yes
Yes	No	50-50%	Yes	Yes, if other hydrology indicators present.
Yes	No	<50%	No	No
No	Yes	<50%	No	Yes
No	Yes	50-50%	No	Yes
No	Yes	<50%	Yes	Yes, if other hydrology indicators present.
No	No	50-50%	Yes	Yes, if other hydrology indicators present.
No	No	<50%	No	No

Area	Hydric Soils Present	Identified on NWI or other wetland map	Percent with wet signatures from Exhibit 1	Other hydrology indicators present	Wetland?
11	Yes	No	100	NA	Yes
12	Yes	No	40	NA	No
13	Yes	No	0	NA	No
14	Yes	No	0	NA	No
15	Yes	Yes	40	NA	Yes

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Conclusion: Final Determination



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Other uses

Level 1 Delineations

Delineation Method	Review of offsite mapping resources	Site Visit	Sampling Approach	Complete Field Data Forms	Field Staking of Wetland Boundaries
Routine Level 1	Yes	Sometimes	Offsite	No	No
Routine Level 2	Yes	Yes	Onsite, qualitative	Yes	Yes
Comprehensive	Yes	Yes	Onsite, quantitative	Yes	Yes

WCA Application Type Examples	Commonly Used Delineation Method
Temporary impact under No-Loss	Routine Level 1
Banking application: pre-application scoping	Routine Level 1
Banking application: full application	Routine Level 2
Road Program: Wetland Impact Documentation—Road project through a large continuous wetland	Routine Level 1
Road Program: Wetland Impact Documentation—Scattered wetlands within construction corridor	Routine Level 2
Replacement plan	Routine Level 2
Enforcement actions	Routine Level 2 or Comprehensive
Wetland boundary approval (no project application)	Routine Level 2
Agricultural exemption determination (8420.0420, Subpart 2A)	Routine Level 1

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Other uses



Level 1 Delineations

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Agricultural Exemptions

Use method to determine whether site qualifies for WCA exemption when cropping history is needed per 8420.0420 Subparts 2 & 3.

Agricultural Exemption (Sub. 2)

- Planted or crop rotation 6 out of 10 prior to 1991. Impacts to Type 1 or 2 only.

Drainage Exemption (Sub. 3)

- 8/10 most recent years. Planted or cropped.



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Incidental



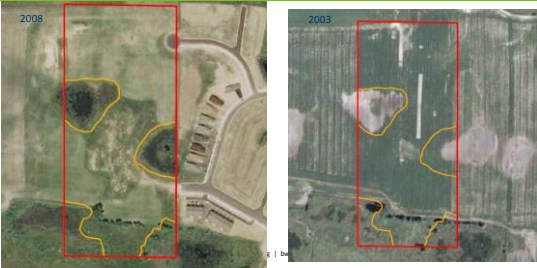
67

Incidental



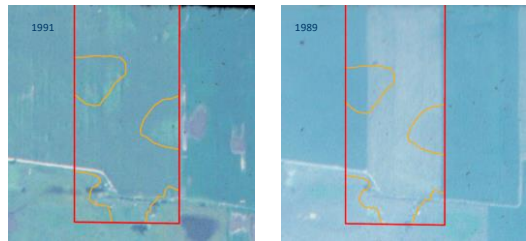
68

Incidental



69

Incidental



70

Incidental



71

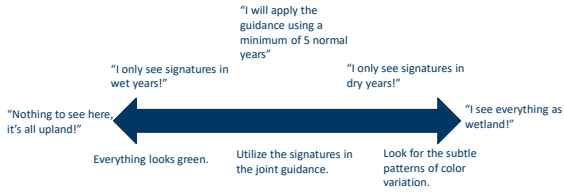
Final Point

- Except for Level 1 delineations, the results of aerial imagery review are not necessarily the final determination.
- Other data to support conclusions.
- Results do not override site specific data (Level 2, etc).

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Photo interpretation

• Interpretation scale conundrum:



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Submitting & Reviewing Wetland Delineation Reports



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Guidance for Submitting Delineation Reports in MN

- Delineation report content
- Delineation Method and data collection
- On-site field demarcation
- Guidance on each parameter
- Field Notes
- Basic Report Components
- Field Review
- Non-Routine Wetland Delineations



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Guidance

Delineation Method	Review of offsite mapping resources	Site Visit	Sampling Approach	Complete Field Data Forms	Field Staking of Wetland Boundaries
Routine Level 1	Yes	Sometimes	Offsite	No	No
Routine Level 2	Yes	Yes	Onsite, qualitative	Yes	Yes
Comprehensive	Yes	Yes	Onsite, quantitative	Yes	Yes

WCA Application Type Examples	Commonly Used Delineation Method
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Road Program Wetland Impact Documentation—Scattered wetlands within construction corridor	Routine Level 2
Replacement plan	Routine Level 2
Enforcement actions	Routine Level 2 or Comprehensive
Wetland boundary approval (no project application)	Routine Level 2
Agricultural exemption determination (8420.0420, Subpart 2A)	Routine Level 1

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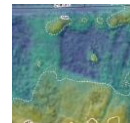
Take Good Field Notes



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What to Record

- Plant communities
 - Describe and sketch on aerial photograph
- Landscape settings
 - Topographic changes from wetland to upland
 - Gradual, abrupt?
- Vegetation
 - Dominant veg
 - changes from wetland to upland
- Soil
 - Changes from wetland to upland
 - Textures, Colors
- Hydrology indicators
 - Changes from wetland to upland



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What to Record

- Wetland type
(Circular 39, Cowardin, Eggers & Reed)
- General site description
 - Buildings, ditches, culverts, etc
 - Field conditions
 - Precip. before site visit, cloud cover, drought, etc.

Type 3, shallow marsh. 0.43 acres

Type 2, wet meadow. 0.15 acres



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Notes on Field Notes (cont.)

- Note taking skills improve with experience as you figure out what is important and what is not
- Take time to organize, refine, and augment field notes immediately following your field visit.
- Label and organize photos so you know where you took them and what they are intended to show.

WETLAND DETERMINATION DATA FORM Northeast and Midwest Region			
Project Location: <input type="text"/>		City/County: <input type="text"/>	Survey Date: <input type="text"/>
Applicant/Owner: <input type="text"/>		Case No.: <input type="text"/>	Sampling Date: <input type="text"/>
County: <input type="text"/>		Section: Township: Range: <input type="text"/>	
Latitude: <input type="text"/>		Longitude: <input type="text"/>	
Site No.: <input type="text"/>			
Are there any structures on this site? <input type="checkbox"/> If so, what are they? <input type="text"/>			
Are there any signs of agriculture on this site? <input type="checkbox"/> If so, what are they? <input type="text"/>			
Are there any signs of mining on this site? <input type="checkbox"/> If so, what are they? <input type="text"/>			
Are there any signs of other activities on this site? <input type="checkbox"/> If so, what are they? <input type="text"/>			
SUMMARY OF FINDINGS			
Wetlands present?	<input type="checkbox"/>	Are there any signs of a wetland?	<input type="checkbox"/>
Wetlands present?	<input type="checkbox"/>	Are there any signs of a wetland?	<input type="checkbox"/>
Wetlands present? <input type="checkbox"/> If so, what are they? <input type="text"/>			
Wetlands present? <input type="checkbox"/> If so, what are they? <input type="text"/>			
Wetlands present? <input type="checkbox"/> If so, what are they? <input type="text"/>			
Climate conditions typical (normal) based on greatest database.			

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Wetland Delineation Reports



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Marking Wetland Boundaries

- Mark with:
 - Flagging tape, lath, pin flags
 - Will vary depending on situation.
- Locate via GPS or land survey methods (find out local requirements).
- Wetland boundaries must be usable for the regulatory purposes intended (grading plans, plat maps, etc.).



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Guidance



March 4, 2015

Guidance for Submittal of Delineation Reports to the St. Paul District Army Corps of Engineers and Wetland Conservation Act Local Governmental Units in Minnesota, Version 2.0

Introduction - Purpose and Background of 2015 Guidance

This guidance provides specific standards and expectations for conducting wetland delineations and submitting wetland delineation reports for regulatory purposes in Minnesota. It supplements and emphasizes information in the 1987 Corps of Engineers *Wetland Delineation Manual* (Manual) and applicable regional supplements. In 1996, the Corps of Engineers (the Corps), St. Paul District Regulatory Branch issued *Guidelines for Submitting Wetland Delineations to the St. Paul District Corps of Engineers and Local Units of Government in the State of Minnesota* jointly with the Minnesota Board of Water and Soil Resources (BWSR). Significant improvements to the application of the science behind wetland and

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Typical Report Format

- Introduction
- Methods
- Results
- Discussion (optional)
- Figures
- Field Data Forms

Avenue NE
Blaine, Anoka County, Minnesota
Wetland Delineation Report

TABLE OF CONTENTS		Page
1. WETLAND DELINEATION SUMMARY	1	
2. OVERVIEW	2	
3. METHODS	3	
4. RESULTS	3	
4.1 Review of FWS, State, Public Works, and NHD Information	3	
4.2 Wetland Delineations and Delineations	3	
4.3 Other Data	3	
4.4 Review for Wetland Boundary and Interferential Determination	3	
5. CERTIFICATION OF RELIABILITY	4	
FIGURES		
1. Site Location	1	
2. Existing Conditions	2	
3. Natural Wetlands Inventory	3	
4. Soil Survey	3	
5. DDE Public Works Inventory	3	
6. Natural Hydrography Dataset	3	
APPENDICES		
A. Inter-Applicant Form for Activities Affecting Water Resources in Minnesota	4	
B. Wetland Delineation Data Form	4	
C. Supporting Information	4	

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Introduction

- Who did you do this for?
 - Developer, public entity
- Where is the project
 - General location and size of project area
 - General description of plant communities: Wooded, meadow, urban etc
 - Why are you doing it?
 - Identify wetlands on potential development site
 - Identify wetlands in road corridor
- When did you do it?

1. Introduction

1.1 Site Description

1.1.1 **Site Description**

1.1.1.1 **Site Description**

Completed a wetland reclassification and wetland delineation for the project (Site). The Site is located east of Decker Road, south of Adams Road, and west of Decker Street in Section 30 of Township 50N, Range 14W in DuSable, Massachusetts (Figure 1). The delineation area covers approximately 11.25 acres within St. Louis County Parcel ID numbers 010-2710-00001, 010-4515-00000, 010-4515-00000, 010-4515-00150, and 010-4515-00180 as shown in Figure 2. The primary land cover is undisturbed forest with some residential use in the southern portion.

The purpose of the wetland reclassification and wetland delineation was to inventory the wetland boundary completed by [redacted] in 2016 and identify wetland and other aquatic resource boundaries, and classify the wetland plant community types on additional property obtained by Highland Inc. since 2016. The reclassification and delineation will be used to aid in project planning and to identify potential wetland and aquatic resource impacts.

85

Methods

- Level 1 or 2?
- Off site aerial review?
- Monitoring data?
- Reference wetlands?
- Problem area or atypical procedures?

2.2 Methodology

2.2.1 **Methodology**

2.2.1.1 **Methodology**

Topographic maps, the U. S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) map, and the Massachusetts Department of Natural Resources (DNR) Public Waters Inventory (PWI) map, the National Resources Conservation Service (NRCS) Soil Survey (SSUR) 2002 1:62,500 Scale County, 10:10 Scale County, and the 1:25,000 Scale County were reviewed prior to visiting the site to locate potential wetland types. Figure 3 is a copy of the NWI map for the PWI map, and Figure 4 is a copy of the SSUR map. Figure 5 shows the NWI on the 1:25,000 scale map and a digital elevation model.

2.2.1.2 **Field Procedures**

The study area was examined on August 7th, 2022 for ground-truthing the technical wetland delineation as per the U.S. Army Corps of Engineers Wetlands Delineation Manual (DM) (1987) and the Regional Supplement to the Corps of Engineers Wetlands Delineation Manual "Intervenor" and Approved Major (SAC) 2012. The delineation procedure in the Corps Manual is the Wetland Classification Method, in consultation with wetland indicators and guidance provided in the Regional Supplement, were applied for the delineation. Other references in the two documents occur. The Regional Supplement takes precedence over the Corps Manual for application to the Northeast and Southwestern Region (USACE 2012).

Field notes, samples, and photographs were taken at representative locations in each wetland basin, with data entered into the following reporting guidelines in the Regional Supplement. The respective wetland pro-upter plots for each wetland were documented on Wetland Delineation Data Forms (Appendix A). Representative photographs of the site and representative sample locations are included in Appendix B.

Wetland boundaries were marked and marked with pin flags and/or flagging labeled with "WETLAND BOUNDARY" to allow for field review. The locations of the delineated wetland boundaries were collected with a handheld accuracy Global Positioning System (GPS) unit and mapped. The results of the delineation are shown on Figure 7. The sample points clearly identify where data was collected.

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RESULTS and Discussion

Describe wetlands AND uplands

- Wetland Type – Circular 39 and Eggers & Reed
- Dominant Vegetation for each community/type

87

Text Examples

Wetland Type &Vegetation:

“Wetland 1 is a Type 3 (PEMC/F) with an interior shallow marsh community surrounded by a fringe of wet meadow.

Dominant vegetation in the shallow marsh includes broadleaf cattail, and water plantain.

The wet meadow fringe include reed canary grass, with a few scattered willow shrubs.”

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Text Examples

Soils:

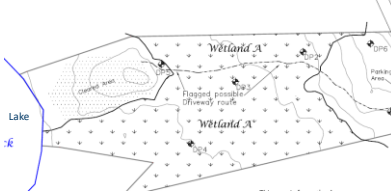
“Soils in the wetland consisted of a deep layer of organic sapric material overlying fine sand consistent with the mapped soil unit. Indicator A1 (histosol) was observed in the wetland.

Adjacent upland soils lacked the organic surface layer and consisted of high chroma loamy fine sand over sand. No hydric soil indicators were observed in the upland.”

89

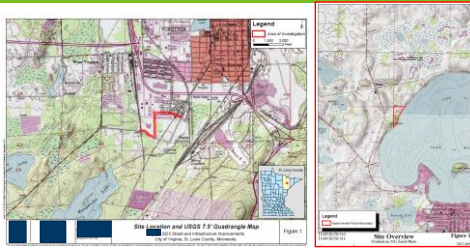
Report Components – Figures

1. Site Location
 2. National Wetland Inventory (NWI)*
 3. Soils
 4. Public Waters Inventory (PWI)*
 5. Wetland Boundary Map
- *often combined



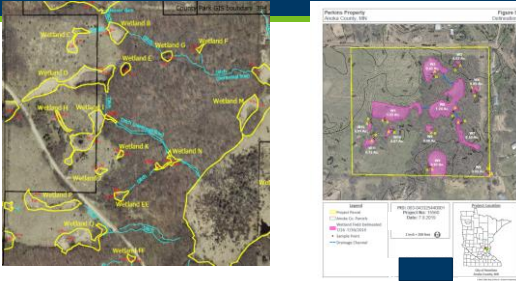
90

Report Components – Maps | Site Location



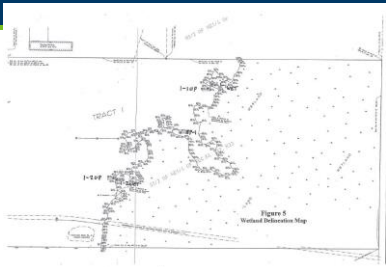
91

Identify all aquatic resources



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Report figures



93

Report figures



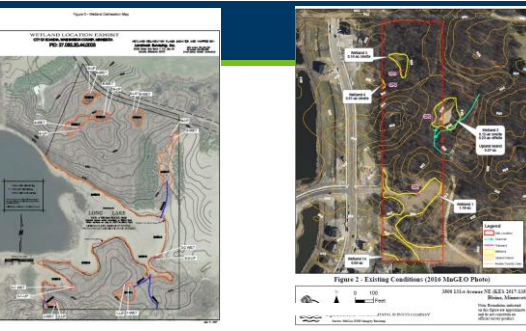
94

Reports



95

Reports



96

Report figures

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Data Forms

- Completely filled out
- Correspond to sample locations indicated on a map
- Remember that sample locations should be representative
- Not needed if doing a Routine Level 1
- Do a complete job, but keep in mind that these are field assessments, not a scientific study, spend a reasonable amount of time.

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Field Review

Who should conduct site review?

- At least 1 member of TEP
- LGU may request assistance from TEP (SWCD and BWSR) or other tech. prof.
- Corps invited/coordination
- Delineator invited (but does not need to be present)

99

Non-Routine Wetland Delineations

- Informal Delineations
- Landowner wanted to fill an area mapped as non-hydric soil
- Site visit to estimate and stake wetland boundary

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Basic Class Summary

BOARD OF WATER AND SOIL RESOURCES

Minnesota Wetland Professional Certification Program

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MINNESOTA WETLAND PROFESSIONAL CERTIFICATION PROGRAM CORE CURRICULUM

- **Critical Definitions**
- **Classification Systems & Functions**
- **Wetland Delineation**
 - Vegetation – hydrophyte, Dominance
 - Soil – hydric indicators
 - Hydrology- inputs/outputs, indicators, monitoring
- **Wetland Conservation Act**
 - Purpose & Scope
 - Application Procedures & Noticing Requirements
 - Basic Decisions
 - Boundary/Type
 - No-Loss
 - Exemptions
 - Replacement plans
 - Wetland Banking
 - Enforcement & Appeals

102

What is a Wetland?

Definition: Those areas 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 to life in saturated soil conditions.



Hydrology + Vegetation + Soil = Wetland

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3-Parameter/ Indicator Approach

1. **Soils**—Historic conditions, may not reflect current condition.
2. **Hydrology**—Current condition, but heavily influenced by recent climate conditions
3. **Vegetation**—Somewhere between



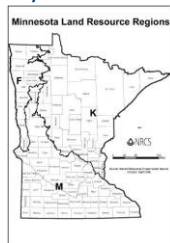
The 87 Manual requires 3 parameters because no one source typically gives the answer in all situations

104

Land Resource Regions

• **Regions dictate which indicators are used and how they are used**

- a) The indicator descriptions in this guide are abbreviated versions of the full descriptions found the Regional Supplements to the Corps of Engineers Wetland Delineation Manual (Great Plains, North-Central/North-East, Midwest). Users are encouraged to reference the full descriptions and user notes found in those documents.
- b) An indicator is applicable statewide unless otherwise indicated below the indicator description.



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Land Resource Regions

• **Regions dictate which indicators are used and how they are used**



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Wetland Delineation Types

ROUTINE

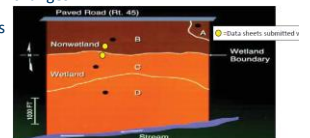
- **Level 1** - Onsite Inspection Unnecessary
- **Level 2** - Onsite Inspection Necessary
- **Level 3** - Combination of Levels 1 and 2



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Sampling Location Should Be Representative

- Representative of soil changes (from upland to wetland)
- Representative of vegetation changes
- Representative of hydrology indicator changes
- Representative of landscape changes



108

Critical Definitions

- Wetlands
- Growing Season
- Atypical Situations
- Problem Areas
- Normal Circumstances

109

Wetland Classification Systems in MN

- Circular 39
- Cowardin et al.
- Eggers & Reed
- Hydrogeomorphic Method

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Wetland Functions & Values

Wetland Functions: in scientific assessments means natural processes

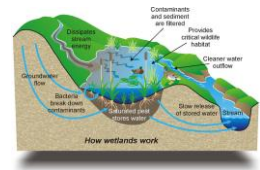
Wetland Value: wetland goods and services providing monetary or social welfare benefit.



111

Wetland Functions

- Act as a natural "filter" to maintain water quality
- Facilitates infiltration recharging groundwater
- Stabilize base flow
- Decreases fluid velocity during high flow events which decreases turbidity
- Storm water retention (i.e. storage)
- Provides habitat
- Shoreline protection



BWSR Wetland Section | www.bwsr.state.mn.us/wetlands

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Functional Assessment Methods

- MN Routine Assessment Method (MNRAM)
- Numeric model for assessing wetland functions and some values

Comprehensive General Guidance

for Minnesota Routine Assessment Method (MNRAM) Evaluating Wetland Function, Version 3.4 (beta)

9/15/2010

- Floristic Quality Assessment
- Vegetation based ecological condition assessment method



BWSR Wetland Section | www.bwsr.state.mn.us/wetlands

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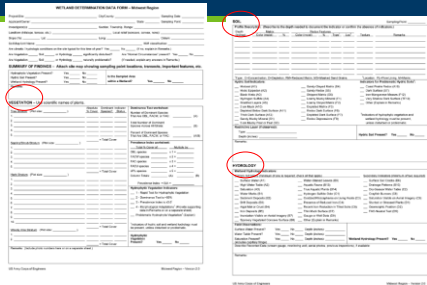
Research Data Sources

- Aerial Photos (current and historic)
- Soil map (Web Soil Survey)
- Topographic\LiDAR
- NWI Map (updated version in MN)
- DNR Protected Waters Map



114

It's all about the documentation!



115

MN Wetland Regulatory Programs

- Public Waters Permit Program
- Wetland Conservation Act (WCA)
- Clean Water Act Section 404
- Section 401 of the Clean Water Act (401)
- Swampbuster provisions of the Food Security Act (FSA)



US Army Corps of Engineers

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Wetland Conservation Act

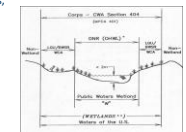
- Regulates:** draining, filling, some excavation
- Administered by:** Local Government Units, SWCDs, Watershed Districts
- Oversight by:** MN Board of Water and Soil Resources
- Authorities:** M.S. 103A, 103B, 103G; M.R. Chapter 8420
- Jurisdictional boundary:** 1987 Corps of Engineers Wetland Delineation Manual
- Review standards:** Avoid, minimize, replace (sequencing)
- Enforcement:** DNR Conservation Officers; cease & desist, restoration orders
- Application:** Joint Application Form for Activities Affecting Water Resources in Minnesota



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Public Waters Permit Program

- Regulates:** changes to "course, current or cross-section"
- Administered by:** DNR – Area Hydrologists
- Authorities:** M.S. 103G; M.R. Chapter 6115
- Jurisdictional boundary:** "Ordinary High Water Level"
- Review standards:** Public interest; reasonable/practical, Riparian rights, Availability of feasible & prudent alternatives, Compensatory mitigation
- Appeals:** Contested case hearing
- Enforcement:** DNR Conservation Officers; cease & desist, restoration orders
- Application:** on-line via "MPARS"



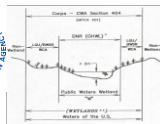
118

Clean Water Act Section 404

- Regulates:** Discharges of dredged or fill material, including redeposit
- Administered by:** U.S. Army Corps of Engineers – St. Paul District
- Authorities:** 33 U.S.C. §1251; 33 CFR Parts 320-332; 40 CFR Part 230
- Jurisdictional boundary:** 1987 Corps of Engineers Wetland Delineation Manual
- Review Standards:** Sequencing, public interest, adequate compensatory mitigation
- Appeals:** COE administrative appeal
- Enforcement:** COE and USEPA; administrative orders
- Application:** Joint Application Form for Activities Affecting Water Resources in Minnesota



US Army Corps of Engineers



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Soil

- Basics of Soil**
 - Soil formation
 - Landscape position
- Soil Properties**
 - Texture
 - Color
- Hydric soil development**
- Web Soil Survey**
 - Interpreting soil reports
- Hydric soil indicators**
 - All
 - Fine
 - Sandy
- Common soil indicators**



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Field Indicators of Hydric Soils

Field Indicators of Hydric Soils in the United States
A Guide for Identifying and Delineating Hydric Soils, Version 6.2, 2018

Figure 20.—Indicator T1 (Depleted Matrix). This soil is a result of a more soil profile of 12 in. and more depleted matrix with a depth of 12 in. from surface. The indicator requires measurement to 43,32,41 51,42

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Soils

USDA SOIL TEXTURING FIELD FLOW CHART

122

Web Soil Survey

Map Unit Symbol	Map Unit Name	Area in AIC	Percent of AIC
110B	Blountville loamy sand, 10 to 12 percent clay	31.9	25.3%
110B2	Blountville loamy sand, 10 to 12 percent clay	19.0	15.3%
110B3	Blountville loamy sand, 10 to 12 percent clay	15.1	12.0%
110B4	Blountville loamy sand, 10 to 12 percent clay	56.1	44.8%
11	110B	126.1	100%

123

Wetland Conservation Act 101

Purpose

Method

Scope

124

Hydrology

...“inundated or saturated by surface or ground water at a frequency and duration”

- Technical standard of 14 or more consecutive days of flooding or ponding;
- Water table 12 in. or less below soil surface;

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Hydrology Indicators

Evidence that there is continuing hydrology and confirms that an episode of inundation/saturation occurred recently.

Wetland hydrology indicators are divided into two categories:
Primary – provide stand-alone evidence of a current or recent hydrologic event; and
Secondary – provide evidence of recent hydrology when supported by one or more other hydrology indicators.

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Hydrology Indicator Groups



Group A – direct observation of water



Group B – evidence of flooding/ponding



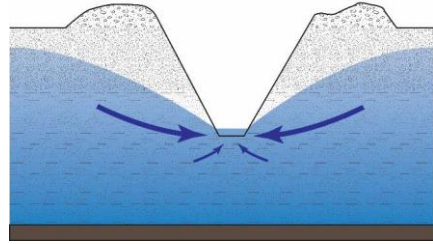
Group C – evidence of current or recent saturation.



Group D – Landscape and veg. characteristics that indicate contemporary wetland conditions.

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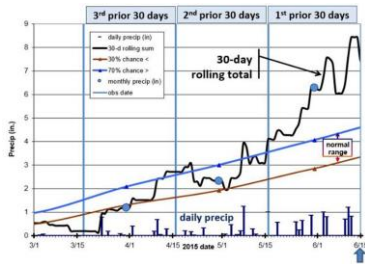
How do drains work?



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Antecedent Precipitation

To better interpret the data collected or observation made in the proper context.



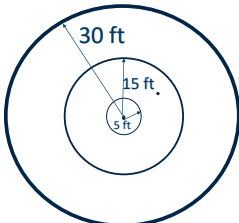
129

Overview of Wetland Vegetation

- Hydrophytic Vegetation Definition
 - Define Hydrophyte
 - What makes a plant a hydrophyte
 - Determine why matters
- Hydrophytic Vegetation Indicators
 - Field indicators
 - Indicator status
 - Dominance
- Determining Hydrophytic Plant Community
 - Rapid Test
 - 50/20 Rule
 - Prevalence Index
 - Morphological Adaptations

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Vegetation Sampling



5 ft Herbaceous; 15 ft Shrub/Sapling; 30 ft Tree



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Determining Hydrophytic Vegetation

The procedure for using hydrophytic vegetation indicators is as follows:

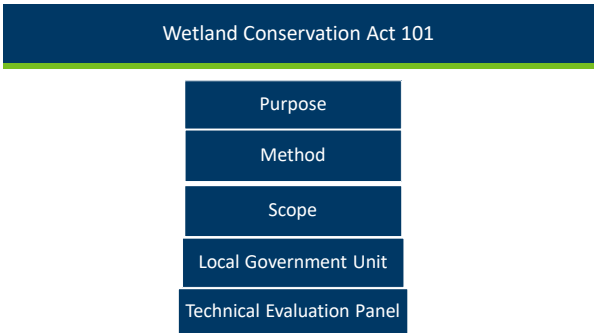
- Apply Indicator 1 (Rapid Test for Hydrophytic Vegetation).
- Apply Indicator 2 (Dominance Test).
- Apply Indicator 3 (Prevalence Index). This and the following step assume that at least one indicator of hydric soil and one primary or two secondary indicators of wetland hydrology are present.
- Apply Indicator 4 (Morphological Adaptations).

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Hydrophytic Veg.

VEGETATION - Use scientific names of plants.			Comments: Use worksheet
Total Species (P&A sites)	Abundant (Common/Abundant)	Rare/Uncommon (RARE, UNCOMMON)	
1			That Rev. CIP, FACU or FACU introducing FACU?
2			Total Number of Dominant Species (Rev. CIP, FACU or FACU)
3			Percent of Dominant Species That Rev. CIP, FACU or FACU
4			
Species/Group/Stratum (P&A sites)			Prevalence Index Worksheet
1			— P&A, CIP, etc. = 0/1/2/3/4
2			— CIP, FACU = 1/2/3/4
3			— FACU species = 1/2/3/4
4			— FACU species = 1/2/3/4
5			— FACU species = 1/2/3/4
6			— FACU species = 1/2/3/4
7			— FACU species = 1/2/3/4
8			— FACU species = 1/2/3/4
9			— FACU species = 1/2/3/4
10			— FACU species = 1/2/3/4
Species/Group/Stratum (P&A sites)			Prevalence Index = Sum
1			
2			
3			
4			
Species/Group/Stratum (P&A sites)			Hydrophytic Vegetation Indicators
1			— Disturbance Within 100m
2			— Prevalence Index > 10.0
3			— Magnitudinal Abundance (Choose supporting data if Prevalence is an accurate index)
4			— Prevalence Index > 10.0
5			— Prevalence Index > 10.0
6			— Prevalence Index > 10.0
7			— Prevalence Index > 10.0
8			— Prevalence Index > 10.0
9			— Prevalence Index > 10.0
10			— Prevalence Index > 10.0
Species/Group/Stratum (P&A sites)			Indicators of public soil and wetland hydrology must be present, unless otherwise indicated.
1			
2			
3			
4			
Species/Group/Stratum (P&A sites)			Hydrophytic Wetland Present? Yes No
1			
2			
3			
4			

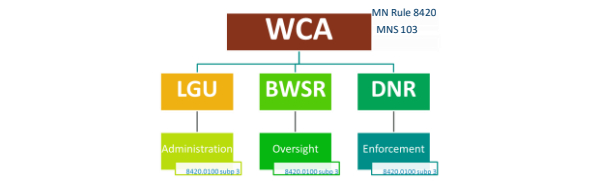
133



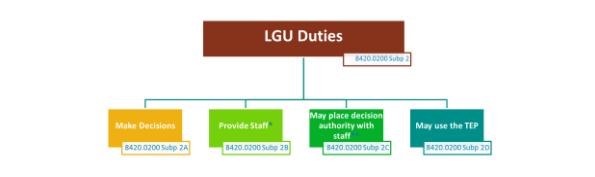
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WCA

WCA



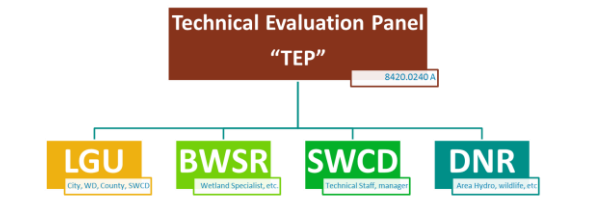
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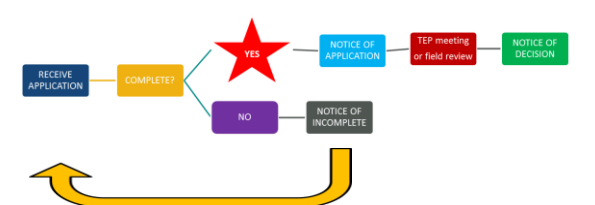
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WCA

Procedures and Process



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WCA

Application Types and Procedures

- Boundary/Type
- No-Loss
- Exemption
- Sequencing
- Replacement Plan
- Banking

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WCA



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WCA

WCA decisions for wetland projects that DO NOT REQUIRE REPLACEMENT



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Replacement Plans

8420.0330 REPLACEMENT PLAN APPLICATIONS. Subpart 1. Requirement. A landowner proposing a wetland impact that requires replacement under this chapter must apply to the local government unit and receive approval of a replacement plan before impacting the wetland.



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Overview of Wetland Banking

- Purpose of Wetland Banking
- Types of Wetland Banks
- Actions Eligible for Credit
- Establishing a Wetland Bank
- Certification and deposit of credits
- Withdrawals and transfers
- Replacement for Public Road Projects

Banking-related topics covered in other sections:

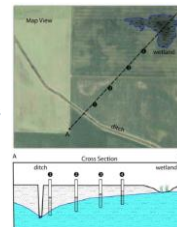
- Restoration Construction Standards
- Monitoring and Corrective Actions



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Overview of Wetland Bank Monitoring

- Monitoring process
 - Construction Certification
 - Duration of monitoring
 - Deposit of Credits
- Maintenance responsibilities
 - Monitoring reports
 - Timeline
 - Reports
- Corrective Actions

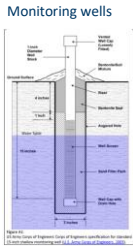
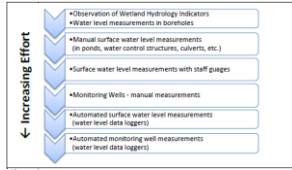


- Hydrology Monitoring
 - Performance standards
- Vegetation Monitoring
 - Performance standards

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Methods to monitor hydrology

- Observation of indicators
- Staff gauges
- Open boreholes



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Enforcement- Restoration or Replacement

VS

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Overview of Wetland Restoration

- General considerations for successful restoration
 - MN Restoration Guide
- Restoring natural hydrology
 - Hydrogeomorphology
 - Landscape position
 - Hydrology
 - hydraulics
- Restoration techniques
 - Filling ditches
 - Removing drain tile
 - Rerouting & pump removal
- Establishing vegetation
- Monitoring
 - Timelines
 - Roles and responsibilities
 - Interpreting hydrology and vegetation monitoring data

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Wetland Delineation Reports

- Field Notes
- Basic Report Components
- Report Contents
- Field Review
- Non-Routine Wetland Delineations

Viking Boulevard NE Site
East Afton, Afton County, Minnesota
Wetland Delineation Report

TABLE OF CONTENTS	
Title	Page
1. WETLAND DELINEATION SUMMARY	1
2. OVERVIEW	2
3. METHODS	3
4. RESULTS	4
a.1. General (WCA, SWS, Public Wetlands, and USFWS Determination)	4
a.2. Wetland Delineation and Determination	4
a.3. Other Data	4
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5. CERTIFICATION OF DELINEATION	7
FIGURES	
1. Site Location	
2. Survey Conditions	
3. Wetland Delineation Summary	
4. Site Map	
5. DSR Public Wetland Summary	
6. Wetland Delineation Diagram	
APPENDICES	
a. 2007 Agriculture Policy for Activities Affecting State Resources in Minnesota	
b. Wetland Delineation Data Tables	
c. Interpretation Data	

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Final Thoughts

Questions (last chance!)



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Summary Quiz



- 1) Sometimes referred to as the "60 day Rule", this Minnesota State Statute determines the agency action deadline for all WCA LGUs to make a decision on a wetland application.
- A) MN Statute 8420
 - B) MN Statute 15.99
 - C) MN Statute 404
 - D) MN Statute 103G

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2) An exemption is:

- a) An activity that no matter how large of an impact requires replacement.
- b) A regulated activity that does not require replacement.
- c) An activity that requires an application everywhere in the State.
- d) An activity occurring in a calcareous fen.

3) During the review of a replacement plan application, LGUs must use this process to determine whether a project avoids, minimizes then replaces wetland impacts:

- a) No-loss criteria
- b) Sequencing
- c) Exemption standards
- d) Replacement order

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4) Per Rule, pre-settlement wetlands are wetlands or public water wetlands that:

- a) Have been constructed since humans developed the area.
- b) Existed at the time of Minnesota statehood in 1858.
- c) Natural wetlands that have been altered since statehood.
- d) Are high quality wetlands where no impacts can occur.

5) Bank Service Areas are factored into what aspect of implementing the Wetland Conservation Act?

- a) Calculating de minimis
- b) Wetland replacement siting
- c) Determining the LGU
- d) Prioritizing wetland restoration projects

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6) A project to restore a partially drained wetland may be qualify as what under the wetland banking program:

- a) Action eligible for credit
- b) Compensation planning framework
- c) Local Government road wetland replacement project
- d) Full application

7) Who certifies construction of a wetland bank project?

- a) BWSR
- b) Army Corps
- c) LGU
- d) SWCD

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8) Which of the following are considerations for wetland restoration projects?

- a) Adjacent land uses
- b) Location of existing drainage ditches
- c) Drainage law implications of restoring ditches
- d) All of the above

9) Which of following is a vegetation based ecological condition assessment method for wetlands:

- a) MNRAM
- b) Cowardin
- c) Floristic Quality Assessment
- d) Eggers & Reed

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10) Which member of TEP is responsible for writing a WCA Restoration Order?

- a) LGU
- b) BWSR
- c) SWCD
- d) Army Corps

11) In the WCA, fill is defined as:

- a) Any solid material added to or redeposited in a wetland
- b) Woody vegetation that originated in the wetland that impairs water flow
- c) Posts or pilings for linear projects such as boardwalks
- d) Both a and b

12) A delineator utilizes air photos, soils map, topographic maps, and local wetland maps to identify and define a wetland boundary. This is an example of what?

- a) A comprehensive level 3 delineation
- b) An unacceptable methodology under any circumstances
- c) A quantitative delineation approach
- d) A routine level 1 delineation

13) A Circular 39 Type 2 wetland, is most similar to what Cowardin Classification?

- a) PEMB
- b) PUBF
- c) PSS1C
- d) PFO1B

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- 14) A seasonally flooded wetland on agricultural land is normally plowed and planted in most years. For delineation purposes, which of the following conclusions is most likely true?
- a) This is not a jurisdictional wetland
 - b) Normal circumstances are not present
 - c) Normal circumstances exist
 - d) A level 1 delineation is required

- 15) A wetland good and services which provides monetary or social welfare benefit is known as:
- a) wetland value
 - b) Floristic Quality Assessment
 - c) wetland function
 - d) stormwater retention

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- 16) What is the definition of depleted matrix? Describe what it looks like.
- Value 4 or More
Chroma 2 or Less



- 17) How deep do you need to dig a soil sample pit?
- Deep enough to determine if an indicator is present or absent

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- 18) When administering the Wetland Conservation Act, duties of the Local Government Unit include:
- a) Providing knowledgeable and trained staff to make decisions on WCA applications.
 - b) Making recommendations to TEP on WCA applications.
 - c) Writing the WCA Rule.
 - d) Maintaining WCA records for 5 years.

- 19) Which of the following is the least important when conducting hydrology monitoring with shallow wells for determining if the wetland hydrology technical standard is met for an area?
- a) Growing season.
 - b) Depth to restrictive soil layer.
 - c) "A" horizon thickness.
 - d) Well installation methodology.

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- 20) Which of the following tests is used for a wetland hydrology indicator?
- a) 50/20 dominance
 - b) FAC Neutral
 - c) Prevalence Index
 - d) Bulk density

- 21) When should the Prevalence Index be calculated?
- a) When dominant vegetation (as determined by the 50/20 rule) is determined to be hydrophytic.
 - b) When non-dominant vegetation (as determined by the 50/20 rule) is determined to be hydrophytic.
 - c) When hydric soils and wetland hydrology indicators are absent and the wetland determination is made by vegetation alone.
 - d) When wetland plant communities fail the dominance test, but have indicators of hydric soils and wetland hydrology

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22) Based on the following vegetation sampling, how many dominant species are present?

Herb Strata	Shrub Strata	Tree Strata
Species A – 45%	Species A – 4%	Species A – 10%
Species B – 35%		Species B – 5%
Species C – 30%		
Species D – 30%		

- a) 2
- b) 6
- c) 7
- d) 8

- 23) Which of the following does not qualify for a no-loss?
- a) Activity that will not impact the wetland.
 - b) Excavation limited to sediment removal in wetlands that are utilized as a stormwater basin.
 - c) Excavation in wetlands that removes sediment which alters the original cross section of the wetland.
 - d) Seasonal water level management activities.

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24. A primary function-based goal of a wetland restoration project should include:
- a) Build structures to impound water to create ponding.
 - b) Reestablish a plant community that will thrive no matter the conditions.
 - c) Create open water habitat.
 - d) Restore the site to the natural hydrology.

25. When using the "Guidance for Offsite Hydrology", Area A shows what wetland signature?
- a) Altered Pattern (AP)
 - b) Upland (UP)
 - c) Normal vegetative cover (NSS)
 - d) Drowned out (DO)



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MWPCP Exam Instructions

- Show State-issued ID
- Fill out name and date
- Circle the one best answer
- 2 hours to complete
- No cell phones allowed on desk
- Use calculators provided
- Return test and all materials
- Results in ~4 weeks

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