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October 14, 2011

Arrow Field Services, LLC
Attn: Mr. Jim Lind
Geophysical Resource Center
8801 S. Yale Avenue, Suite 100
Tulsa, Oklahoma 74137

SWCA Project Number: 16599

**RE: Delineation of Wetlands Identified During SWCA's Wetland Determination
Conducted on April 25, 2011**

Dear Mr. Lind,

On October 12, 2011, SWCA Environmental Consultants (SWCA) conducted a wetland delineation of two areas, previously identified as palustrine emergent (PEM) wetlands (Binstock 2011¹), in order to more accurately determine the potential for wetland impact as a result of construction activities. Specifically, an SWCA ecologist revisited the portions of wetlands identified during the April 25, 2011 wetland determination survey (see attached map).

In general, a wetland determination (determination) is a more rapid assessment of an area's potential status as a wetland. This method provides ecologists with a relatively efficient way of mapping potential wetland areas for a given project. However, during a determination, ecologists often assume that one or more criteria are present without conducting further research to acquire evidence. Therefore, determinations do not necessarily assess all criteria required for an area to be considered a wetland by the standards of the U.S. Army Corps of Engineers (USACE). Determinations are most often appropriate when a project proponent commits to avoiding all impact to potential wetland areas.

A wetland delineation (delineation) is appropriate when, through project constraints, impact to areas identified during a determination is anticipated. A delineation provides the necessary data to determine if an area meets the three criteria as required by the USACE to be considered a wetland. Further, such analysis provides a project proponent with more detailed information regarding the potential jurisdictional status of an area under Section 404 of the Clean Water Act.

¹ Binstock, L. 2011. *Natural Resources and Wetland Determination Report for Arrow Four Bears CDP Connect, McKenzie County, North Dakota*. Prepared by SWCA Environmental Consultants, Bismarck, North Dakota.

This letter report details the methods used by SWCA to conduct the wetland delineation and the results of the survey. Attached are the USACE Wetland Determination forms that provide detailed information about the data recorded during the delineation.

WETLAND DELINEATION METHODS

SWCA conducted the delineation based on the principles and guidelines provided in the 1987 *Corps of Engineers Wetland Delineation Manual* (Manual) (Environmental Laboratory 1987²) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Great Plains Region Version 2.0* (Supplement) (USACE 2010³). According to the Manual and Supplement, an area is a wetland if three mandatory wetland indicators are present in a given area, with special exceptions. These criteria include the presence of a dominant hydrophytic plant community, one primary or two secondary indicators of wetland hydrology, and a recognized indicator of hydric soils.

Hydrophytic Vegetation

Ecologists recorded all plants within the vegetative community based on the respective stratum in which each species occupied. A tree is defined by the Supplement to be a woody-stemmed plant with a trunk diameter at breast height (DBH) of equal to or greater than 3 inches, regardless of height. The sapling and shrub stratum is defined by the Supplement to be composed of woody-stemmed plants with a trunk DBH of less than 3 inches, regardless of height. The herbaceous stratum includes all non-woody-stemmed plants regardless of height. Finally, the woody vine stratum includes all woody-stemmed vines, regardless of diameter.

SWCA recorded the binomial scientific name and percent cover of all plants within a 30-foot radius for the tree stratum, a 15-foot radius for the sapling/shrub stratum, a 5-foot radius for the herbaceous stratum, and a 30-foot radius for the woody vine stratum. SWCA noted each plant species' respective U.S. Fish and Wildlife Service's indicator status (i.e., upland [UPL], facultative upland [FACU], facultative [FAC], facultative wetland [FACW], and obligate [OBL]).

Wetland Hydrology

An area was determined to contain wetland hydrology if at least one primary indicator or at least two secondary indicators of wetland hydrology were present, as defined by the Manual and Supplement. Common hydrologic indicators include the presence of surface water, high water table, soil saturation, sediment deposits, water-stained leaves, and oxidized rhizospheres on living roots.

² Environmental Laboratory. 1987. *Corps of Engineers Wetland Delineation Manual*. Technical Report Y-87-1. Vicksburg, Mississippi: U.S. Army Engineer Waterways Experiment Station.

³ U.S. Army Corps of Engineers (USACE). 2010. *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Great Plains Region (Version 2.0)*. Edited by J.S. Wakeley, R.W. Lichvar, and C.V. Noble. ERDC/EL TR-08-12. Vicksburg, Mississippi: U.S. Army Engineer Research and Development Center.

Hydric Soil

Ecologists recorded detailed notes regarding soil profiles including the hue, value, and chroma (i.e., color) of the soil (using Munsell Soil Color Charts); the depth and extent of that soil color within the entire soil profile; the concentration of any redoximorphic concentrations or depletions; and the texture of the soil at each depth where a color change was observed. Soil pits were excavated to depths between 16 and 20 inches at each data point. The presence of hydric soil indicators can confirm that an area has been inundated or saturated for periods during the growing season that would facilitate oxygen depletion regardless of whether inundation and/or saturation was present. Common hydric soil indicators of the Northern Great Plains sub-region include the presence of hydrogen sulfide gas within the soil pit, redox depressions, and depleted matrix.

RESULTS

As proposed, the 4 Bears to CDP Connect pipeline would not impact any areas that meet the criteria for consideration as a wetland by the USACE. In total, SWCA recorded two datapoints south of wetlands identified during the April 25th, 2011 determination, as shown on the natural resource report maps (Binstock 2011). A brief explanation of SWCA's findings at each datapoint is provided below.

DP1U

DP1U is located within an ephemeral drainage surrounded by 1% to 5% slopes. The datapoint exists within an herbaceous upland community dominated by Canada thistle (*Cirsium arvense*; 50% of absolute coverage) and smooth brome (*Bromus inermis*; 40% of absolute coverage). Additional plant species noted include prairie cordgrass (*Spartina pectinata*; 5% of absolute coverage) and narrowleaf cattail (*Typha angustifolia*; 5% of absolute coverage). A high water table, regarded as a primary indicator of wetland hydrology, was observed at a depth of 12 inches. Soil data derived from a pit excavated to a depth of 20 inches contained redoximorphic concentrations starting at 10 inches, but did not meet any of the criteria required to be considered hydric by the USACE.

Overall, this datapoint does not contain a positive indicator of a dominant hydrophytic vegetation community or hydric soil indicators as defined by the Manual and Supplement and therefore exists within an upland area.

DP2U

DP2U is located within an ephemeral drainage surrounded by slopes ranging from 1% to 5%. The vegetative community was classified as herbaceous upland and is also dominated by smooth brome (90% absolute coverage). The herb stratum also contained Canada thistle (5% absolute coverage) and 5% bare ground. Additionally, two species were noted within the sapling/shrub stratum including chokecherry (*Prunus virginiana*; 10% absolute coverage) and downy hawthorn (*Crataegus mollis*; 5% absolute coverage). No primary indicators of wetland hydrology were recorded; however, a secondary indicator (geomorphic position) was present. The USACE requires at least one primary or two secondary indicators to be present in order to confirm that wetland hydrology is present. Therefore, a positive indication of wetland hydrology was not present at this datapoint.

October 14, 2011
Mr. Jim Lind
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Data acquired from the soil pit, excavated to a depth of 20 inches, indicate that hydric soil indicator F6: Redox Dark Surface is present. This determination is predicated on the presence of a layer at least 4 inches thick located within the upper 12 inches of the profile that exhibits a value of 2 and a chroma of 2 accompanied by 15% redoximorphic concentrations. Overall, DP2U is not located within a wetland, as defined by the Manual and Supplement, due to a lack of a dominant hydrophytic vegetation community and a lack of one primary or two secondary indicators of wetland hydrology.

CONCLUSION

Based on data collected during the delineation, SWCA has determined that two wetlands, as identified during the determination, do not exhibit the requisite criteria to be considered a wetland by USACE standards. Further, Arrow has committed to completing a horizontal directional drill of Dry Creek. Therefore, as currently proposed, the 4 Bears to CDP Connect pipeline project will not impact any wetland areas. This assertion is predicated on the results of SWCA's delineation and Arrow's commitment to complete a horizontal directional drill beneath Dry Creek.

Please contact me at 701.258.6622 or mcook@swca.com should you require additional clarification regarding SWCA's wetland delineation of the proposed 4 Bears to CDP Connect pipeline project.

Regards,



Michael J. Cook, M.S.
Natural Resources Lead-Bismarck

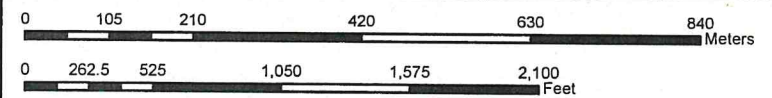
Attachments: 3



Legend

- | | | |
|---|------------------|----------------|
| Datapoints | Stream | Existing Road |
| Four Bears CDP Connect Pipeline | Welland | Township/Range |
| Alternate Four Bears CDP Connect Pipeline | Large Shrub | Section Line |
| Surveyed Area | Woody Vegetation | |
| Survey Exclusion | | |

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Scale: 1:9,000
 Base Map: USGS 7.5' Topographic Map
 McKenzie County, North Dakota

UTM Zone 13N, NAD83, Meters
 October 13, 2011



WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: 4 Bears to CDP Connect Pipeline County: McKenzie Sampling Date: October 12, 2011
 Applicant/Owner: Arrow Field Services, LLC State: North Dakota Sampling Point: DP1U
 Investigator(s): Jason Bivens and N/A Section, Township, Range: Sec. 24, T150N, R96W
 Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 1-5
 Subregion (LRR): LRR F Lat: 47.80325 Long: -102.90053 Datum: NAD 83
 Soil Map Unit Name: Belfield-Savage silty clay loams, 2 to 6 percent slopes NWI Classification: None
 Are climatic / hydrologic conditions on the site typical for this time of year? (Yes / No) Yes (if no, explain in Remarks.)
 Are Vegetation NO, Soil NO, or Hydrology NO significantly disturbed? Are "Normal Circumstances" present? Yes X No
 Are Vegetation NO, Soil NO, or Hydrology NO naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <u> </u> No <u>X</u> Hydric Soil Present? Yes <u> </u> No <u>X</u> Wetland Hydrology Present? Yes <u>X</u> No <u> </u>	Is the Sampled Area within a Wetland? Yes <u> </u> No <u>X</u>
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Remarks:

This point was determined not to be within a wetland due to the lack of hydrophytic vegetation and hydric soils.

VEGETATION - Use scientific names of plants.

Tree Stratum (Plot size: <u>30 ft.</u>)	Absolute % cover	Dominant Species?	Indicator Status																	
1. <u>None Observed</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC-): <u>0</u> (A) Total Number of Dominant Species Across All Strata: <u>2</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>0</u> (A/B)																
2. <u> </u>	<u> </u>	<u> </u>	<u> </u>																	
3. <u> </u>	<u> </u>	<u> </u>	<u> </u>																	
4. <u> </u>	<u> </u>	<u> </u>	<u> </u>																	
<u>N/A</u> = Total Cover																				
Sapling/Shrub Stratum (Plot size: <u>15 ft.</u>)																				
1. <u>None Observed</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	Prevalence Index Worksheet: <table style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Total % Cover of:</th> <th style="text-align: left;">Multiply by:</th> </tr> </thead> <tbody> <tr> <td>OBL species <u>5</u></td> <td>x 1 = <u>5</u></td> </tr> <tr> <td>FACW species <u>5</u></td> <td>x 2 = <u>10</u></td> </tr> <tr> <td>FAC species <u>0</u></td> <td>x 3 = <u>0</u></td> </tr> <tr> <td>FACU species <u>50</u></td> <td>x 4 = <u>200</u></td> </tr> <tr> <td>UPL species <u>40</u></td> <td>x 5 = <u>200</u></td> </tr> <tr> <td>Column Totals: <u>100</u> (A)</td> <td><u>415</u> (B)</td> </tr> <tr> <td colspan="2">Prevalence Index = B/A = <u>4.15</u></td> </tr> </tbody> </table>	Total % Cover of:	Multiply by:	OBL species <u>5</u>	x 1 = <u>5</u>	FACW species <u>5</u>	x 2 = <u>10</u>	FAC species <u>0</u>	x 3 = <u>0</u>	FACU species <u>50</u>	x 4 = <u>200</u>	UPL species <u>40</u>	x 5 = <u>200</u>	Column Totals: <u>100</u> (A)	<u>415</u> (B)	Prevalence Index = B/A = <u>4.15</u>	
Total % Cover of:	Multiply by:																			
OBL species <u>5</u>	x 1 = <u>5</u>																			
FACW species <u>5</u>	x 2 = <u>10</u>																			
FAC species <u>0</u>	x 3 = <u>0</u>																			
FACU species <u>50</u>	x 4 = <u>200</u>																			
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Column Totals: <u>100</u> (A)	<u>415</u> (B)																			
Prevalence Index = B/A = <u>4.15</u>																				
2. <u> </u>	<u> </u>	<u> </u>	<u> </u>																	
3. <u> </u>	<u> </u>	<u> </u>	<u> </u>																	
4. <u> </u>	<u> </u>	<u> </u>	<u> </u>																	
5. <u> </u>	<u> </u>	<u> </u>	<u> </u>																	
<u>N/A</u> = Total Cover																				
Herb Stratum (Plot size: <u>5 ft.</u>)																				
1. <u>Cirsium arvense</u>	<u>50</u>	<u>Yes</u>	<u>FACU</u>	Hydrophytic Vegetation Indicators: <u> </u> 1 - Rapid Test for Hydrophytic Vegetation <u> </u> 2 - Dominance Test is >50% <u> </u> 3 - Prevalence Index is ≤ 3.0 ¹ <u> </u> 4 - Morphological Adaptations ¹ (Explain) <u> </u> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. Provide supporting data in Remarks.																
2. <u>Bromus inermis</u>	<u>40</u>	<u>Yes</u>	<u>UPL</u>																	
3. <u>Spartina pectinata</u>	<u>5</u>	<u>No</u>	<u>FACW</u>																	
4. <u>Typha angustifolia</u>	<u>5</u>	<u>No</u>	<u>OBL</u>																	
5. <u> </u>	<u> </u>	<u> </u>	<u> </u>																	
6. <u> </u>	<u> </u>	<u> </u>	<u> </u>																	
7. <u> </u>	<u> </u>	<u> </u>	<u> </u>																	
8. <u> </u>	<u> </u>	<u> </u>	<u> </u>																	
9. <u> </u>	<u> </u>	<u> </u>	<u> </u>																	
10. <u> </u>	<u> </u>	<u> </u>	<u> </u>																	
<u>100</u> = Total Cover																				
Woody Vine Stratum (Plot size: <u>30 ft.</u>)																				
1. <u>None Observed</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	Hydrophytic Vegetation Present? Yes <u> </u> No <u>X</u>																
2. <u> </u>	<u> </u>	<u> </u>	<u> </u>																	
<u>N/A</u> = Total Cover																				
% Bare Ground in Herb Stratum <u>0</u>																				

Remarks: (if observed, list morphological adaptations below).

No positive indication of hydrophytic vegetation was observed (≥50% of dominant species indexed as FAC- or drier).

SOIL

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

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-10	10YR 2/2	60	None	N/A	N/A	N/A	Clay Loam	
0-10	10YR 2/1	40	None	N/A	N/A	N/A	Clay Loam	
10-20	10YR 2/2	80	10YR 3/4	10	C	M	Clay Loam	
10-20	10YR 2/1	10	None	N/A	N/A	N/A	Clay Loam	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

<p>Hydric Soils Indicators: (Applicable to all LRRs, unless otherwise noted.)</p> <p><input type="checkbox"/> Histosol (A1) <input type="checkbox"/> Sandy Gleyed Matrix (S4)</p> <p><input type="checkbox"/> Histic Epipedon (A2) <input type="checkbox"/> Sandy Redox (S5)</p> <p><input type="checkbox"/> Black Histic (A3) <input type="checkbox"/> Stripped Matrix (S6)</p> <p><input type="checkbox"/> Hydrogen Sulfide (A4) <input type="checkbox"/> Loamy Mucky Mineral (F1)</p> <p><input type="checkbox"/> Stratified Layers (A5) (LRR F) <input type="checkbox"/> Loamy Gleyed Matrix (F2)</p> <p><input type="checkbox"/> 1 cm Muck (A9) (LRR F, G, H) <input type="checkbox"/> Depleted Matrix (F3)</p> <p><input type="checkbox"/> Depleted Below Dark Surface (A11) <input type="checkbox"/> Redox Dark Surface (F6)</p> <p><input type="checkbox"/> Thick Dark Surface (A12) <input type="checkbox"/> Depleted Dark Surface (F7)</p> <p><input type="checkbox"/> Sandy Mucky Mineral (S1) <input type="checkbox"/> Redox Depressions (F8)</p> <p><input type="checkbox"/> 2.5 cm Mucky Peat or Peat (S2) (LRR G, H) <input type="checkbox"/> High Plains Depressions (F16)</p> <p><input type="checkbox"/> 5 cm Mucky Peat or Peat (S3) (LRR F) <input type="checkbox"/> (MLRA 72 & 73 of LRR H)</p>	<p>Indicators for Problematic Hydric Soils³:</p> <p><input type="checkbox"/> 1 cm Muck (A9) (LRR I, J)</p> <p><input type="checkbox"/> Coast Prairie Redox (A16) (LRR F, G, H)</p> <p><input type="checkbox"/> Dark Surface (S7) (LRR G)</p> <p><input type="checkbox"/> High Plains Depressions (F16)</p> <p>(LRR H outside of MLRA 72 & 73)</p> <p><input type="checkbox"/> Reduced Vertic (F18)</p> <p><input type="checkbox"/> Red Parent Material (TF2)</p> <p><input type="checkbox"/> Very Shallow Dark Surface (TF12)</p> <p><input type="checkbox"/> Other (Explain in Remarks)</p> <p>³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.</p>
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<p>Restrictive Layer (if observed):</p> <p>Type: <u>None</u></p> <p>Depth (inches): <u>N/A</u></p>	<p>Hydric Soil Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/></p>
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Remarks:

No positive indication of hydric soils was observed.

HYDROLOGY

<p>Wetland hydrology Indicators:</p> <p>Primary Indicators (minimum of one is required; check all that apply)</p> <p><input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> Salt Crust (B11)</p> <p><input checked="" type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Aquatic Invertebrates (B13)</p> <p><input checked="" type="checkbox"/> Saturation (A3) <input type="checkbox"/> Hydrogen Sulfide Odor (C1)</p> <p><input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Dry-Season Water Table (C2)</p> <p><input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3)</p> <p><input type="checkbox"/> Drift Deposits (B3) (where not tilled)</p> <p><input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Presence of Reduced Iron (C4)</p> <p><input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Thin Muck Surface (C7)</p> <p><input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Other (Explain in Remarks)</p> <p><input type="checkbox"/> Water-Stained Leaves (B9)</p>		<p>Secondary Indicators (minimum of two required)</p> <p><input type="checkbox"/> Surface Soil Cracks (B6)</p> <p><input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)</p> <p><input type="checkbox"/> Drainage Patterns (B10)</p> <p><input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3)</p> <p>(where tilled)</p> <p><input type="checkbox"/> Crayfish Burrows (C8)</p> <p><input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)</p> <p><input checked="" type="checkbox"/> Geomorphic Position (D2)</p> <p><input type="checkbox"/> FAC-Neutral Test (D5)</p> <p><input type="checkbox"/> Frost-Heave Hummocks (D7) (LRR F)</p>
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<p>Field Observations:</p> <p>Surface Water Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): <u>N/A</u></p> <p>Water Table Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Depth (inches): <u>12</u></p> <p>Saturation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Depth (inches): <u>12</u></p> <p>(includes capillary fringe)</p>	<p>Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p>
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Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least one primary indicator).

Recent precipitation was observed which may have contributed to the presence of a high water table and saturated soils.

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: 4 Bears to CDP Connect Pipeline County: McKenzie Sampling Date: October 12, 2011
 Applicant/Owner: Arrow Field Services, LLC State: North Dakota Sampling Point: DP2U
 Investigator(s): Jason Bivens and N/A Section, Township, Range: Sec. 24, T150N, R96W
 Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 1-5
 Subregion (LRR): LRR F Lat: 47.80321 Long: -102.90112 Datum: NAD 83
 Soil Map Unit Name: Belfield-Savage silty clay loams, 2 to 6 percent slopes NWI Classification: None
 Are climatic / hydrologic conditions on the site typical for this time of year? (Yes / No) Yes (if no, explain in Remarks.)
 Are Vegetation NO, Soil NO, or Hydrology NO significantly disturbed? Are "Normal Circumstances" present? Yes X No
 Are Vegetation NO, Soil NO, or Hydrology NO naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <u> </u> No <u>X</u>	Is the Sampled Area within a Wetland? Yes <u> </u> No <u>X</u>
Hydric Soil Present? Yes <u>X</u> No <u> </u>	
Wetland Hydrology Present? Yes <u> </u> No <u>X</u>	

Remarks:

This point was determined not to be within a wetland due to the lack of hydrophytic vegetation and wetland hydrology.

VEGETATION - Use scientific names of plants.

Tree Stratum (Plot size: <u>30 ft.</u>)	Absolute % cover	Dominant Species?	Indicator Status	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC-): <u>0</u> (A) Total Number of Dominant Species Across All Strata: <u>3</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>0</u> (A/B)
1. <u>None Observed</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	
2. <u> </u>	<u> </u>	<u> </u>	<u> </u>	
3. <u> </u>	<u> </u>	<u> </u>	<u> </u>	
4. <u> </u>	<u> </u>	<u> </u>	<u> </u>	
	<u>N/A</u> = Total Cover			
Sapling/Shrub Stratum (Plot size: <u>15 ft.</u>)				Prevalence Index Worksheet: Total % Cover of: Multiply by: OBL species <u>0</u> x 1 = <u>0</u> FACW species <u>0</u> x 2 = <u>0</u> FAC species <u>0</u> x 3 = <u>0</u> FACU species <u>20</u> x 4 = <u>80</u> UPL species <u>90</u> x 5 = <u>450</u> Column Totals: <u>110</u> (A) <u>530</u> (B) Prevalence Index = B/A = <u>4.82</u>
1. <u>Prunus virginiana</u>	<u>10</u>	<u>Yes</u>	<u>FACU</u>	
2. <u>Crataegus mollis</u>	<u>5</u>	<u>Yes</u>	<u>FACU</u>	
3. <u> </u>	<u> </u>	<u> </u>	<u> </u>	
4. <u> </u>	<u> </u>	<u> </u>	<u> </u>	
5. <u> </u>	<u> </u>	<u> </u>	<u> </u>	
	<u>15</u> = Total Cover			
Herb Stratum (Plot size: <u>5 ft.</u>)				Hydrophytic Vegetation Indicators: <u> </u> 1 - Rapid Test for Hydrophytic Vegetation <u> </u> 2 - Dominance Test is >50% <u> </u> 3 - Prevalence Index is ≤ 3.0 ¹ <u> </u> 4 - Morphological Adaptations ¹ (Explain) <u> </u> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. Provide supporting data in Remarks.
1. <u>Bromus inermis</u>	<u>90</u>	<u>Yes</u>	<u>UPL</u>	
2. <u>Cirsium arvense</u>	<u>5</u>	<u>No</u>	<u>FACU</u>	
3. <u> </u>	<u> </u>	<u> </u>	<u> </u>	
4. <u> </u>	<u> </u>	<u> </u>	<u> </u>	
5. <u> </u>	<u> </u>	<u> </u>	<u> </u>	
6. <u> </u>	<u> </u>	<u> </u>	<u> </u>	
7. <u> </u>	<u> </u>	<u> </u>	<u> </u>	
8. <u> </u>	<u> </u>	<u> </u>	<u> </u>	
9. <u> </u>	<u> </u>	<u> </u>	<u> </u>	
10. <u> </u>	<u> </u>	<u> </u>	<u> </u>	
	<u>95</u> = Total Cover			
Woody Vine Stratum (Plot size: <u>30 ft.</u>)				Hydrophytic Vegetation Present? Yes <u> </u> No <u>X</u>
1. <u>None Observed</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	
2. <u> </u>	<u> </u>	<u> </u>	<u> </u>	
	<u>N/A</u> = Total Cover			
% Bare Ground in Herb Stratum <u>5</u>				

Remarks: (if observed, list morphological adaptations below).

No positive indication of hydrophytic vegetation was observed (≥50% of dominant species indexed as FAC- or drier).

SOIL

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

Depth (inches)	Matrix			Redox Features				Texture	Remarks
	Color (moist)		%	Color (moist)	%	Type ¹	Loc ²		
1-6	10YR 2/2		60	None	N/A	N/A	N/A	Clay Loam	
1-6	10YR 3/1		40	None	N/A	N/A	N/A	Clay Loam	
6-16	10YR 2/2		70	10YR 3/6	15	C	M	Clay Loam	
6-16	10YR 3/1		15	None	N/A	N/A	N/A	Clay Loam	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators: (Applicable to all LRRs, unless otherwise noted.)

- Histosol (A1)
- Sandy Gleyed Matrix (S4)
- Histic Epipedon (A2)
- Sandy Redox (S5)
- Black Histic (A3)
- Stripped Matrix (S6)
- Hydrogen Sulfide (A4)
- Loamy Mucky Mineral (F1)
- Stratified Layers (A5) (LRR F)
- Loamy Gleyed Matrix (F2)
- 1 cm Muck (A9) (LRR F, G, H)
- Depleted Matrix (F3)
- Depleted Below Dark Surface (A11)
- Redox Dark Surface (F6)
- Thick Dark Surface (A12)
- Depleted Dark Surface (F7)
- Sandy Mucky Mineral (S1)
- Redox Depressions (F8)
- 2.5 cm Mucky Peat or Peat (S2) (LRR G, H)
- High Plains Depressions (F16)
- 5 cm Mucky Peat or Peat (S3) (LRR F)
- (MLRA 72 & 73 of LRR H)

Indicators for Problematic Hydric Soils³:

- 1 cm Muck (A9) (LRR I, J)
- Coast Prairie Redox (A16) (LRR F, G, H)
- Dark Surface (S7) (LRR G)
- High Plains Depressions (F16)
- (LRR H outside of MLRA 72 & 73)
- Reduced Vertic (F18)
- Red Parent Material (TF2)
- Very Shallow Dark Surface (TF12)
- Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: None
 Depth (inches): N/A

Hydric Soil Present? Yes No

Remarks:

A positive indication of hydric soil was observed.

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)
- Water-Stained Leaves (B9)
- Salt Crust (B11)
- Aquatic Invertebrates (B13)
- Hydrogen Sulfide Odor (C1)
- Dry-Season Water Table (C2)
- Oxidized Rhizospheres on Living Roots (C3) (where not tilled)
- Presence of Reduced Iron (C4)
- Thin Muck Surface (C7)
- Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- Surface Soil Cracks (B6)
- Sparsely Vegetated Concave Surface (B8)
- Drainage Patterns (B10)
- Oxidized Rhizospheres on Living Roots (C3) (where tilled)
- Crayfish Burrows (C8)
- Saturation Visible on Aerial Imagery (C9)
- Geomorphic Position (D2)
- FAC-Neutral Test (D5)
- Frost-Heave Hummocks (D7) (LRR F)

Field Observations:

Surface Water Present? Yes No Depth (inches): N/A
 Water Table Present? Yes No Depth (inches): N/A
 Saturation Present? Yes No Depth (inches): N/A
 (includes capillary fringe)

Wetland Hydrology Present? Yes No

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No positive indication of wetland hydrology was observed.